Yachats Terrestrial Restoration Project

Environmental Assessment

Siuslaw National Forest
South Zone District
Lincoln and Lane Counties, Oregon

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Comments received in response to this solicitation, including names and addresses of those who comment, will be considered part of the public record on this proposed action and will be available for public inspection. Comments submitted anonymously will be accepted and considered; however, those who only submit anonymous comments will not have standing to appeal the subsequent decision under 36 CFR part 215. Additionally, pursuant to 7 CFR 1.27 (d), any person may request the agency to withhold a submission from the public record by showing how the Freedom of Information Act (FOIA) permits such confidentiality. Person requesting such confidentiality should be aware that, under the FOIA, confidentiality may be granted in only very limited circumstances, such as to protect trade secrets.

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Chapter titles are framed as questions intended to focus the writing and to alert readers to judge whether the answers provided are adequate. For readers accustomed to earlier environmental documents, chapter 1 is equivalent to the "Purpose and Need for Action" section.

Introduction

Forest Supervisor Gloria Brown proposed the Yachats Watershed Terrestrial Restoration Project (the Project) to speed the development of late-successional habitat by enhancing growth, health, stand structure, and diversity in plantations up to 50 years old; and to enhance watershed function. The Project lies in the Yachats River basin and is about 42 air miles southwest of Corvallis, Oregon (map 1).

On November 7, 2003, the Forest Supervisor delegated District Ranger Bill Helphinstine as the deciding officer for this project. Since the previous availability of the Yachats Terrestrial Restoration Project Environmental Assessment (legal notice published in August 22, 2003), the engineering staff has documented that the effects of deferring maintenance on key forest roads over several years has resulted in a backlog of work required to maintain the road system infrastructure in the Yachats watershed to a level that will support administrative, public, and commercial use. To deal with this issue, the engineering staff obtained additional information, leading to the development of Alternative 5. This new information is disclosed in this preliminary analysis.

Additionally, several comments were received during the initial 30-day comment period regarding the Keller Creek dispersed site or picnic area. Based on these comments, the District Ranger modified the alternatives to retain the existing recreational opportunities by not reducing the existing parking capacity.

The Proposed Project

The Yachats Terrestrial Restoration Project is a package of associated terrestrial and watershed restoration actions, and key forest road maintenance activities. They include commercially thinning about 2,039 acres to speed the development of late-successional habitat in plantations now 25 to 50 years old, non-commercially thinning about 2,381 acres to speed the development of other (generally younger) plantations, decommissioning about 8.5 miles of road to help restore watershed health, and performing maintenance on 38.4 miles of key Forest roads. Road maintenance and decommissioning activities may begin as early as the summer of 2005, followed by commercial thinning.

Performing maintenance on key forest roads is a connected action because the timber purchaser will be required to perform the work as a condition of the timber-sale contract prior to using the roads. Some of these roads extend outside the watershed boundaries and provide connections

from the project area to locations where commercial thinning products will be transported. Other actions such as snag and coarse wood creation, understory planting, and early-seral (meadow) maintenance are also part of the Project. These actions are connected because they help meet the restoration objectives, or they will be funded using revenue from the sale of timber. Most activities would be completed in 10 years, with commercial timber-sale contracts awarded in 5 to 6 years, beginning as early as fiscal year 2005 (10-1-04 to 9-30-05). Descriptions of the proposed project and other alternatives are located in chapter 2, pages 9 through 13.

The Siuslaw Forest Plan (USDA 1990), as amended by the Northwest Forest Plan (USDA, USDI 1994, 2001, 2004a, 2004b), establishes the management direction, desired conditions, and standards and guidelines under which lands administered by the Siuslaw National Forest are managed. These plans are intended to provide for healthy forest ecosystems, including protecting riparian areas and waters. All relevant aspects of the amended Siuslaw Forest Plan—such as management area standards and guidelines—apply to this project. Thus, this assessment is tiered to the Final Environmental Impact Statement for the Siuslaw National Forest Land and Resource Management Plan, as amended by the Northwest Forest Plan (the Plan).

The Planning Area

The planning area includes 6 sub-watersheds in the Yachats 5th-field watershed and covers about 28,000 acres. The U.S. Forest Service manages about 76% of the area, 23% is privately owned, 1% is managed by the Bureau of Land Management, and about 40 acres are managed by the Oregon Department of Forestry. The project area is located in portions of Township 14 South, Range 10 and 11 West; and Township 15 South, Range 10 and 11 West; Lincoln and Lane Counties, Oregon. All proposed activities are in the riparian and late-successional reserve land allocations as prescribed in the Northwest Forest Plan.

The Problems (Issues) To Be Addressed

Based on available information, including the direction from the Siuslaw Forest Plan as amended by the Northwest Forest Plan (the Plan), the recommendations from the Yachats-Blodgett Watershed Analysis, and the Siuslaw National Forest Roads Analysis (USDA 2003b), District Ranger Bill Helphinstine identified the following needs and associated problems:

- ✓ The shortage of late-successional habitat in the Pacific Northwest limits recovery, of old-growth-dependent species such as the northern spotted owl and the marbled murrelet. Thus, he saw a need to speed development of late-successional habitat in late-successional and riparian reserves.
- ✓ The shortage of properly functioning aquatic habitat in the Oregon Coast Range, including the Yachats watershed, limits recovery of cold-water species such as coho salmon. Thus, he saw a need to improve watershed function.
- ✓ The shortage of road maintenance funds limits the suitability of key forest roads for commercial and noncommercial use. Thus, he saw a need to use timber-sale revenue to repair and maintain key forest roads to standards that allow both uses.

Evidence Used by the District Ranger in Deciding to Address These Problems

The record of decision (USDA, USDI 1994b) for the Northwest Forest Plan—based on physical, biological, and societal evidence provided in the Forest Ecosystem Management Assessment Team report (USDA, USDI, et al. 1993) and described in the Plan's environmental impact statement (USDA, USDI 1994a)—is intended to provide for:

- ⇨ Healthy forest ecosystems, including protecting riparian areas and waters; and
- ⇨ A suitable supply of timber and other forest products to help maintain local and regional economies predictably over the long term.

The Plan identified concern for northern spotted owls, marbled murrelets, and anadromous fish in the Oregon Coast Range Province (which includes the Siuslaw National Forest) because of its isolation and harvest history (chapters 3 and 4; p. 21). The record of decision, which amended the Siuslaw Forest Plan, allocated federal lands in the Yachats watershed into one or more of the following:

- ⇨ Late-successional reserve (pages C-9 to C-20);
- ⇨ Riparian reserve (pages C-30 to C-38); or
- ⇨ Matrix (lands not included in the other two allocations; pages C-39 to C-48).

The Plan identified specific environmental conditions and appropriate commodities and amenities to be produced and maintained in each land allocation. It also outlined the rules and limits governing possible activities for achieving desired conditions in each allocation.

The Assessment Report for Federal Lands in and adjacent to the Oregon Coast Province (USDA 1995) shows the planning area in the coastal fog zone block (block 1) and the central interior block (block 6). In block 1, mature conifer patches have been substantially reduced in size and the number of acres of all seral stages in the small patch class has increased**.** The mature conifer stands in block 6 have been extensively clearcut, and few patches of functional late-successional forest remain. The central interior block once supported the largest unfragmented patches of late-successional forest in the Province. The Report recommends managing to accelerate successional development and to aggregate small patches into larger ones.

The Report describes the in-stream fish habitat on federal lands throughout the Province as being in marginal to poor condition. It recommends specific actions to improve fish habitat on federal land by:

- ⇨ Stabilizing, decommissioning, or obliterating roads; and
- ⇨ Restoring long-term habitat by reestablishing natural riparian areas through actions such as thinning riparian areas to speed the development of large wood.

The Siuslaw National Forest Roads Analysis (USDA 2003b) was developed to provide information to support road management decisions on the Forest. The Roads Analysis recognized funding for road maintenance is limited:

Historically, the Siuslaw National Forest emphasized timber management. Timber-sale revenue helped build a large road system to access primarily timber resources. Timber-sale revenue also paid for the majority of road maintenance. Declining timber harvest and a greater emphasis on ecosystem management has seriously reduced the Forest's ability to maintain an extensive road system. Maintenance on many of the Forest's system roads has been deferred for several years because funds are lacking. Thus, some roads have been decommissioned, closed, or been kept at the lowest possible maintenance level.

The Roads Analysis recommends prioritizing limited available maintenance funds to key Forest roads.

For needing late-successional habitat

Late-successional reserves were designed into the Northwest Forest Plan to protect and enhance these forest ecosystems, which are required habitat for many species. Riparian reserve objectives include protecting and enhancing habitat for terrestrial plants and animals, as well as providing connectivity corridors between late-successional reserves. The Late Successional Reserve Assessment, Oregon Coast Province Southern Portion (USDA, USDI 1997), identified the following landscape changes in the Yachats watershed:

- ⇨ Since the mid-1900's, mature conifer patch sizes have been reduced and the number of mature patches has at least doubled over that found in the mid-1900s.
- ⇨ Late-seral vegetation on federal lands has been reduced.
- ⇨ Existing forest fragmentation has diminished the amount and quality of interior forest habitat favored by some species such as the northern spotted owl and marbled murrelet.

The Yachats-Blodgett Watershed Analysis (USDA 1997c) reported that:

- ⇨ About 45% of the planning area is mature forest.
- ⇨ About 20% of the planning area is in plantations now less than 50 years old.
- ⇨ Large diameter, coarse, woody debris with later decay classes, typically found in similarly aged natural stands, is lacking in plantations.
- ⇨ Plantations were intended to be and have been managed for intensive wood-fiber production.
- ⇨ Dense canopy closure in many plantations has resulted in little or no understory, reducing structural and species diversity.

Over the past few years, much work has been done in the scientific field evaluating the merits of thinning to speed the development of late-successional old-growth characteristics in dense, young managed stands (plantations) west of the Cascades in the Pacific Northwest. Examples of scientific findings that support our treatment strategies for plantations include:

- ✓ In an Oregon Coast Range study, Tappeiner et al. (1997) found that trees in old-growth stands had little competition from one another because of the low tree numbers per acre. Also, self- or natural-thinning was uncommon during the development of the older stands studied, indicating that canopy gaps in these forests were the result of conifer establishment as well as mortality of individual, large trees.

- ✓ In a study by Hayes et al. (1997), no bird species endemic to the Oregon Coast Range is unique to closed-canopy stands with limited understory development. In a study exploring the effects of thinning on wildlife in the Oregon Cascades, Hagar and Howlin (2001) concluded that songbird species richness and diversity is increased after thinning relative to controls, and no species were "lost" after treatment.

- ✓ Through their study, Bailey et al. (1998) found that thinning in young Douglas-fir forests of western Oregon increased total herbaceous cover and vegetation species richness, and Bailey and Tappeiner (1998) concluded that thinning young Douglas-fir stands appears to set young stands on a trajectory towards achieving overstory and understory attributes similar to those in old-growth stands by promoting the development of understory tree species and tall- and low-shrub species.

- ✓ Wilson and Oliver (2000) concluded that control of Douglas-fir stand density through early thinning is critical to future stand stability.

- ✓ In their notes to the Regional Ecosystem Office as a result of their meeting on January 18, 2001, the Science Findings Evaluation Group has indicated "very strong support for active management (thinning, selective thinning, and possible underplanting) in young, dense forest stands".

- ✓ Jerry Franklin, professor at the University of Washington who specializes in old growth forest ecology, was involved in a field trip (September 2001) to review some of our stands that were commercially thinned under previous projects. John Tappeiner (pers. comm.), a professor of silviculture at Oregon State University who researches stand development in the Oregon Coast Range, was consulted about our proposal. Both scientists reaffirmed our proposal for thinning to different densities so that variable pathways can be established for young managed stands.

With one known exception, all current scientific evidence points to the need for thinning young, dense managed stands to achieve conditions favorable for developing late-successional upland and riparian forest characteristics. Winters (2000) conducted a study in the Washington Cascades that suggests that old-growth stands were developed from high conifer densities. This study was based on a single stand with no replications. This finding is contrary to the findings of all other studies conducted in coastal forests and is based on a single stand. Therefore, we feel the preponderance of the evidence suggests that early reductions in stand densities in the Oregon Coast Range province is the most prudent approach to follow.

For needing to restore watershed health

The Plan's Aquatic Conservation Strategy is intended to restore and maintain the health of watersheds and the aquatic ecosystems they contain. The Yachats-Blodgett Watershed Analysis (USDA 1997c) identified the following adverse effects on the watershed:

- ⇨ Forest and county roads inhibit large wood and coarse sediment transport, disconnect stream channels, may contribute fine sediment to streams, and may act as barriers to aquatic species migration.
- ⇨ Over the past 15 years, funding to maintain all non-key Forest roads to standard is lacking. Roads not maintained to standard deteriorate more rapidly, increasing adverse effects to fish such as creating migration barriers or contributing fine sedimentation to streams from culvert failure.

For needing to maintain key forest roads

For the past several years, Forest program funds have not been sufficient to maintain the existing key forest road system. Thus, a backlog of key forest road maintenance has accumulated in the Yachats watershed.

The Yachats-Blodgett Watershed Analysis (USDA 1997c) reported that:

- Many roads were constructed in the Yachats watershed using side-cast methods that have resulted and will continue to result in resource damage; continued use of these roads will require some stabilization and realignment to reduce the risk of mass wasting.

The Siuslaw Forest Plan standard and guideline FW-162 states:

- Maintain roads to the minimum standard required for the safety of users, for current and future intended uses, and to meet all resource objectives for an area.

The Siuslaw National Forest Roads Analysis recommends:

- Inventory maintenance needs (annual and deferred) of the key forest road system. Prioritize road maintenance work to ensure resource protection and user safety within current and anticipated Forest budgets.
- Consider alternative funding sources for road maintenance and repair.

Road conditions surveys indicate that:

- Road conditions are not suitable for commercial and non-commercial use.
- Due to a lack of adequate road maintenance over the past decade, the capitol investment associated with building and maintaining key forest roads is at risk of being lost.

Help From Other Agencies and The Public

After considering the identified problems to be addressed with this project and developing a proposal to correct those problems, letters describing the actions considered in the proposed project were mailed to about 200 parties. Public comment on the proposed project was also solicited through the Siuslaw National Forest's quarterly "Project Update" publications, the Corvallis Gazette-Times in Corvallis, Oregon, and the Newport News-Times in Newport, Oregon. Scoping letters were mailed on October 2, 2002. A news release was published in the

Gazette-Times on October 4, 2002 and in the News-Times on October 9, 2002. Comments were requested by October 31, 2002.

In response to these scoping efforts, 12 letters were received that included comments on the Project. Public comments contained a wide variety of suggestions to consider. Comments not outside the scope of the Project and not covered by previous environmental review or existing regulations were reviewed for substantive content related to the Project. After reviewing the comments, it was determined that no issues were raised that were not already identified as problems. Thus, the issues related to this project are limited to addressing the needs and associated problems identified in chapter 1. Based largely on public comment, some alternatives were considered but eliminated from detailed study, while others were considered in detail. The alternatives are described in chapter 2. Comments, relevant to clarifying how the project will be implemented or disclosing the effects of implementing the project, are addressed in chapters 2, 3, or 4; the project design criteria (appendix A); or the project file.

Upon completion of the initial Project EA, a legal notice was published in the Corvallis Gazette-Times (paper of record) on August 22, 2003, informing the public that the Project EA was available for a 30-day review and comment period. Copies of the Project EA were made available at the Siuslaw National Forest Headquarters in Corvallis, the Waldport Ranger District Office in Waldport, and the Mapleton Ranger District Office in Florence. Copies of the Project EA, appendices A and B, and a cover letter announcing the 30-day review and comment period were mailed on August 20, 2003 to those who commented on the proposed project during the scoping phase and to others who had requested a copy of the Project EA.

The legal notice and letters identified Alternative 2b as the preferred alternative and indicated the beginning and end of the comment period. The comment process was described and a Forest Service contact person was identified. The 30-day comment period terminated close-of-business on September 22, 2003. Comments on the initial Project EA were received from 13 persons. The summary of these comments and Forest Service responses are located in appendix D. These comments were considered in the development of the preliminary analysis.

Since that time, engineering staff obtained additional information regarding the condition of key forest roads in and near the Yachats watershed, leading to the development of Alternative 5. Public comments regarding the Keller Creek dispersed site resulted in the modification of the initial Project EA alternatives to retain the existing recreational opportunities. This new information is documented in the preliminary analysis. Public comments received during the review of the initial Project EA have been carried forward into the preliminary analysis and did not need to be repeated.

The notice of availability for the Yachats Terrestrial Restoration Project Preliminary Analysis (PA) was published as a legal notice in the Eugene Register-Guard on September 18, 2004, informing the public that the PA is available for a 30-day review and comment period. Copies of the PA were made available at the Siuslaw National Forest Headquarters in Corvallis, and the District offices in Waldport and Florence. Copies of the PA were mailed to those who commented on the proposed project or who requested a copy of the document. The legal notice and PA cover letters indicated the beginning and end of the comment period. The comment process was described and a Forest Service contact person was identified. The comment period

ended at the close-of-business on October 18, 2004. Additional comments on the PA were received from two persons. The summary of these comments and Forest Service responses are located in appendix D. These comments, along with those associated with the initial EA, were considered in the development of this EA.

Decision Framework

The Responsible Official for this project is the District Ranger for the South Zone District of the Siuslaw National Forest. The environmental assessment for this project—to be completed after public comment on the preliminary analysis—will provide the alternatives, the environmental effects of implementation, and public comments upon which a decision will be made by the District Ranger. The District Ranger will determine through a Decision Notice:

- To what extent, if any, will activities called for in the proposed project or management alternatives be implemented?

- What management requirements and mitigation measures (project design criteria) will be applied to these activities?

The primary factors that will influence the District Ranger's decision are based on how well the problems on page 2 are addressed. The Decision Notice will document this decision and describe what activities will be implemented to address the problems. The decision will be consistent with the Siuslaw Forest Plan, as amended by the Northwest Forest Plan, and will incorporate the associated project design criteria (appendix A), including the management requirements and mitigation measures.

What alternatives were developed to meet the identified needs?

CHAPTER 2

In chapter 2, the District Ranger considered alternative proposals that were not fully developed for reasons disclosed. He guided the development of alternative proposals for resolving the problems and meeting the needs identified in chapter 1. These fully developed alternatives are described in this chapter; it is equivalent to the traditional section, "Alternatives Including the Proposed Action".

Alternatives were designed based in part on priorities and recommendations identified in the Forest's late-successional reserve assessments for LSR RO268 and the Yachats-Blodgett Watershed Analysis. The interdisciplinary team also evaluated the project activities and their placement, based on the histories and current conditions of those sites. For example, information was collected about past harvesting practices, such as clearcutting trees, broadcast-burning harvested areas, and felling all of the snags; silvicultural practices, such as planting a single tree species at 400 trees per acre; and the age and current attributes of managed stands for the sites where actions are proposed. This collection of site information helped the District Ranger to identify stands suitable for or in need of thinning and other actions--such as underplanting, adding coarse wood, and creating snags--to help maintain stand health or accelerate developing late-successional characteristics.

The interdisciplinary team evaluated roads and their influence on watershed function to help the District Ranger identify areas for restoration. Actions for restoring watershed function under this environmental assessment include decommissioning roads that qualify for KV funding and are not likely to adversely affect coho salmon. Several factors were used to identify roads for decommissioning: the need to reduce adverse effects to fish habitat and water quality by reducing reliance on valley-bottom and mid-slope roads, maintaining future access to managed stands, providing public access, providing legal access to private land, and reducing road maintenance or rebuilding costs because funds for maintaining the current road system are lacking.

Alternatives were developed to meet the identified needs and associated problems, and to be consistent with the standard and guidelines associated with the Siuslaw Forest Plan, as amended by the Northwest Forest Plan. The range of alternatives considered, including those that were considered but eliminated from detailed study, reflects comments received during public scoping for this project, public involvement with recent Forest projects such as the Five Rivers Landscape Management Project (USDA 2002a) and the Lower Siuslaw Landscape Management Project (USDA 2002b), the problems identified on page 2, and concerns raised during monitoring of District projects. These concerns are addressed in the following section, in the Alternatives Considered in Detail section, in chapter 3, and in the project design criteria (appendix A).

Alternatives Considered But Eliminated from Detailed Study

The following alternatives represent those that were considered by the District Ranger, but for various reasons, were eliminated from detailed study. These alternatives were considered to address comments raised during public scoping.

Single-entry treatment of managed stands—Considerable thought was given to determine whether a one-time only thinning entry is desirable for all 25 to 50 year-old stands. Our team felt strongly that this alternative provided too much risk to stands. In this scenario, managed stands across the landscape would be thinned to about 30 to 50 trees per acre and associated activities such as stand underplanting would be implemented. Stands would then be allowed to develop old-growth conditions on their own. A landscape populated by stands with minimum numbers of trees leaves little room for mortality from natural events such as strong winds or insect infestation. In addition, the variability between stands would be limited. Tappeiner et al. (1997) and Oliver and Larson (1996) advocate the use of several prescriptive residual overstory levels across a landscape. Carey et al. (1999) says that diversity in treatment is critical to meeting existing and future needs of wildlife. Variability and diversity are the keys to recapturing many of the forest functions. Also, the Northwest Forest Plan standards and guidelines incorporate the concept of adaptive management (ROD, page E-12). Applying the single-story treatment on all plantations limits the agency's ability to monitor, evaluate, and adapt treatments to these plantations in response to new information. Thus, under this alternative, the Forest Service would not be able to apply the concept of adaptive management in the Yachats 5th-field watershed.

Based on the above information, the District Ranger decided it was better to take a more conservative approach to stand management and development at this time by implementing single-entry prescriptions for only a few stands under this project. As information is obtained about single-entry treatments through studies such as the Five Rivers Landscape Management Project Final EIS management study (USDA 2002a), it may become a more widespread silvicultural tool in the future.

Maintain the Keller Creek Road (road 5491)—A few responses to the proposed action included requests to maintain road 5491 as an open road, including reopening the lower portion that is currently decommissioned to provide a tie to road 58 for emergency access purposes. However, this road was decommissioned through the decision made for the Flood Restoration Project (July 1998). Thus**,** the reopening the lower portion road 5491 is beyond the scope of this project. This project is limited to evaluating alternative actions regarding decommissioning or repairing the upper portion of road 5491. Currently, road 54 maintains the tie between the Yachats River Road and road 58. Flood Restoration Project (July 1998).

Alternatives Considered in Detail

Management requirements, mitigation measures, and monitoring—Design criteria (appendix A) outline the practices to be used and their timing and duration when planned activities under Alternatives 2a, 2b, 3, 4, and 5 are implemented. Measures to avoid or minimize impacts associated with implementing these alternatives have been incorporated into the design criteria. Therefore, we believe that management requirements and mitigation measures for all proposed actions are covered by the design criteria. Monitoring and observations of past similar actions

indicate that the design criteria are effective in protecting natural resources. Monitoring for this project has been identified in appendix A for project implementation and effectiveness of design criteria.

Six alternatives—including No Action (Alternative 1) and the Proposed Project (Alternative 2a)—were fully developed and are described in this section. The analyses of their effects are described in chapter 3. Alternatives 2a, 2b, 3, 4, and 5 were developed to meet the standards and guides of the Siuslaw Forest Plan as amended by the Northwest Forest Plan, including the Aquatic Conservation Strategy objectives (USDA, USDI 1994b; ROD, page B-11).

Alternative 1: No action

The no-action alternative is required by Council of Environmental Quality regulations (40CFR 1502.14(d)). The no-action alternative forms the basis for a comparison between meeting the project needs and **not** meeting the project needs. This alternative provides baseline information for understanding changes associated with the action alternative and expected environmental responses as a result of past management actions. Selecting this alternative would continue the following resource management actions:

- ✓ Forest management would rely on natural processes to develop late-seral forests and restore watersheds;
- ✓ No plantations would be commercially thinned (no timber harvest) under this alternative;
- ✓ Current management trajectory of plantations would be abandoned and not replaced with a management strategy to accelerate developing late-seral forest conditions;
- ✓ Current key forest roads will be retained with no changes in management objectives;
- ✓ Other roads would be evaluated and managed by reacting to individual events such as slides, road slippage, or culvert failures that make a road impassable or affect natural resources; and
- ✓ No additional projects are anticipated for the next 10 years unless a catastrophic event such as a flood or a fire occurs.

Because the existing environment is not static, environmental consequences from selecting this alternative are expected. Depending on the kind and frequency of disturbances and gradual change in vegetation and animal populations, these lands would move toward old-growth conditions.

Alternatives 2a, 2b, 3, 4, and 5

Activities included for these alternatives are designed to address the problems identified by the District Ranger. The actions incorporate the standards and guides established by the Siuslaw Forest Plan, as amended by the Northwest Forest Plan. Design criteria (appendix A) are also incorporated and outline the practices to be used and their timing and duration when planned actions and activities are implemented. We believe that mitigation measures and monitoring protocols for all proposed actions are covered by the design criteria.

Alternative 2a: Proposed project

Selecting this alternative would result in implementing the following management activities:

Commercial and non-commercial thinning and associated activities

- Commercially thin about 2,039 acres of plantations, including about 1,921 acres by skyline logging and 118 acres by helicopter. All acres are in late-successional reserve, with about 1,611 acres also in riparian reserve (map 2 and appendix B-3);
- Temporarily reopen about 8.8 miles of unclassified roads (built during initial harvest) by removing vegetation and minor slides from road surfaces. All miles are in late-successional reserve, with about 5.5 miles also in riparian reserve (map 2 and appendix B-3);
- Build about 1.8 miles of temporary road on stable ridges. All miles are in late-successional reserve, with about 0.6 miles also in riparian reserve (map 2 and appendix B-3);
- Remove 4 failed culverts from streams in plantations 007, 037, 064, and 179 and about 1,000 cubic yards of unstable sidecast material from 4 road locations in plantations 007, 038, 041, and 154;
- Create about 249 snags (28 to 36 inches in diameter) in natural stands adjacent to commercially thinned plantations, as mitigation for snags that were cut inside plantation boundaries during initial harvest;
- Develop future snags in thinning portions of plantations by topping about 3,898 trees or inoculating them with native fungi; 20% of the future snags will serve to mitigate snags that were cut inside plantation boundaries during initial harvest (appendix B-2);
- Increase the coarse wood component in commercially thinned plantations by leaving about 6,410 trees on the ground, to mitigate loss associated with past harvest practices (appendix B-2);
- Non-commercially thin about 97 acres of plantations 25+ years old. All acres are in late-successional reserve, with about 69 acres also in riparian reserve (map 2);
- Non-commercially thin about 2,284 acres of plantations 5 to 25 years old. All acres are in late-successional reserve, with about 1,827 acres also in riparian reserve (map 2);
- Maintain about 29 acres of early-seral habitat to provide minimum diversity of seral conditions in late-successional reserve (map 2);
- Plant a mixture of shade-tolerant conifers and hardwoods in about 1,032 acres of existing plantations (map 2);
- Decommission about 8.5 miles of non-key (system) roads. All miles are in late-successional reserve, with about 5.6 miles also in riparian reserve (map 2); and
- Maintain the existing recreational opportunities at the Keller Creek dispersed site by not reducing the capacity of the parking area.
- Use proposed new road (not connected with this project) that would connect roads 5500 and 5492 by extending road 5500-520 and decommission the upper 2.4 miles (included above) of road 5491.
- Use thinning and salvage operations to manage roadside vegetation adjacent to key forest roads 5300, 5360, 5400, 5500, 5590, and 5800, affecting about 313 acres.

The terrestrial restoration activities of Alternative 2a are summarized by subwatershed in table 1. Most activities would be completed in 10 years, with commercial timber-sale contracts awarded over the next 5 to 6 years, beginning as early as FY 2005. Refer to appendix B for specific

plantation information about stand exams (B-1), stand prescriptions (B-2), and the harvest plan (B-3).

Rationale for alternatives to the proposed project

Alternative 2b (maintain road 5491) was developed primarily in response to additional information collected for a proposed new road (not connected to this project) that would connect roads 5500 and 5492 by extending road 5500-520. Extending this road to access road 5492, road 5491 would no longer be needed. However, because the location of the proposed new road was modified to lessen road grade, the road would be positioned on steep midslopes, increasing the cost for its construction, increasing its projected maintenance costs, and creating uncertainty about its long-term stability. Consequently, the District Ranger directed the Team to fully evaluate an alternative (Alternative 2b) that is similar to the proposed project (Alternative 2a) but would maintain and improve the upper portion of road 5491 instead of decommissioning it.

Alternative 3 was developed in response to public comments on environmental assessments of past similar projects such as the Lower Siuslaw Landscape Management Project. One commenter preferred that we fully evaluate another action alternative that would not build new temporary roads or reopen existing closed roads.

Alternative 4 was developed in response to public comments and internal comments from agency employees on previous projects. They preferred that the Forest evaluate an alternative that limits commercial thinning to those stands that are adjacent to key Forest roads (roads maintained open for public and management access), including no new temporary roads and no reopening of existing roads.

Alternative 5 was developed in response to an engineering review of the Project EA—after the initial public review and comment period—about the lack of adequate maintenance on key forest roads in the watershed. This alternative recognizes that additional maintenance addressing structural strength, replacing inadequate and failing ditch-relief culverts, and surface repairs are needed to facilitate commercial and noncommercial use. This alternative is similar to Alternative 2b, except it would perform maintenance and repair on six key forest roads.

Alternative 2b: Maintain road 5491

This alternative is similar to Alternative 2a, except it would not decommission the upper 2.4 miles of road 5491. Some new culverts in 5491 would be installed to improve fish passage or to replace deteriorated culverts. Fill quantities above culverts would be reduced by dipping the road surface at stream crossings. By maintaining road 5491, Alternative 2b would decommission about 6.1 miles of classified road in the watershed, including about 4 miles in riparian reserve (map 3).

The terrestrial restoration activities of Alternative 2b are summarized by subwatershed in table 1. Most activities would be completed in 10 years, with commercial timber-sale contracts awarded over the next 5 to 6 years, beginning as early as FY 2005. Refer to appendix B for specific plantation information about stand exams (B-1), stand prescriptions (B-2), and the harvest plan (B-3).

Table 1. Description of Alternatives 2a and 2b by subwatershed

Terrestrial Restoration Activities	Lower Yachats	North Yachats	School	Stump	Upper Yachats	Yachats
Commercial thinning (acres)						
Total commercial thin	89	759	135	109	412	535
Commercial thin, skyline	79	725	135	42	405	535
Commercial thin, helicopter	10	34	0	67	7	0
Classified (system) roads						
Decommissioning-**2a** (miles)	0.8	0.5	0	1.8	4.9	0.5
Decommissioning-**2b** (miles)	0.8	0.5	0	1.8	2.5	0.5
Fill removal-**2a** (cubic yards)	0	20	0	454	30,307	0
Fill removal-**2b** (cubic yards)	0	20	0	454	11,059	0
Unclassified (temporary) roads						
New roads (miles)	0.07	0.86	0.05	0.04	0.14	0.62
Reopen roads (miles)	0.62	2.88	1.04	0.04	2.04	2.20
Unstable sidecast removal (number of sites and cubic yards)	0	(2) 850	0	0	(1) 100	(1) 50
Snag and coarse wood creation (trees)						
Mature tree topping	25	69	8	10	93	44
Plantation tree snag creation	178	1,502	270	218	824	906
Coarse wood	918	1,932	928	126	938	1,568
Other actions						
Non-commercial thinning 25+ year old stands (acres)	0	0	0	34	0	63
Non-commercial thinning 5 to 25 year old stands (acres)	301	689	271	344	232	496
Meadow maintenance (acres)	0	9.3	0	0	19.3	0
Upland underplanting (acres)	64	366	89	46	264	203
Roadside thinning and salvage (acres)*	36	68	46	54	24	64

*About 21 acres of roadside salvage adjacent to key forest roads 5300 and 5360 are north of the Yachats watershed.

Alternative 3: No temporary roads

This alternative would not build any new temporary roads or reopen any existing roads. Consequently, this alternative would require more helicopter logging than Alternatives 2a and 2b and some stands proposed for commercial thinning under Alternatives 2a and 2b would be noncommercially thinned. Like Alternative 2b, this alternative would maintain the upper portion of road 5491. Selecting this alternative would result in implementing the following management activities:

Commercial and non-commercial thinning and associated activities

- Commercially thin about 1,594 acres of plantations, including about 750 acres by skyline logging and 844 acres by helicopter. All acres are in late-successional reserve, with about 1,291 acres also in riparian reserve (map 4 and appendix B-3);
- Create about 249 snags (28 to 36 inches in diameter) in natural stands adjacent to commercially thinned plantations, as mitigation for snags that were cut inside plantation boundaries during initial harvest;
- Develop future snags in thinning portions of plantations by topping about 3,184 trees or inoculating them with native fungi; 20% of the future snags will serve to mitigate snags that were cut inside plantation boundaries during initial harvest (appendix B-2);
- Increase the coarse wood component in commercially thinned plantations by leaving about 5,213 trees on the ground, to mitigate loss associated with past harvest practices (appendix B-2);
- Non-commercially thin about 717 acres of plantations 25+ years old. All acres are in late-sucessional reserve, with about 553 acres also in riparian reserve (map 4);
- Non-commercially thin about 2,284 acres of plantations 5 to 25 years old. All acres are in late-successional reserve, with about 1,827 acres also in riparian reserve (map 4);
- Maintain about 29 acres of early-seral habitat to provide minimum diversity of seral conditions in late-successional reserve (map 4);
- Plant a mixture of shade-tolerant conifers and hardwoods in about 869 acres of existing plantations (map 4);
- Decommission about 6.1 miles of classified (system) road. All miles are in late-successional reserve, with about 4.9 miles also in riparian reserve (map 4); and
- Maintain the existing recreational opportunities at the Keller Creek dispersed site by not reducing the capacity of the parking area.
- Use thinning and salvage operations to manage roadside vegetation adjacent to key forest roads 5300, 5360, 5400, 5500, 5590, and 5800, affecting about 313 acres.

The terrestrial restoration activities of Alternative 3 are summarized by subwatershed in table 2. Most activities would be completed in 10 years, with commercial timber-sale contracts awarded over the next 5 to 6 years, beginning as early as FY 2005. Refer to appendix B for specific plantation information about stand exams (B-1), stand prescriptions (B-2), and the harvest plan (B-3).

Table 2. Description of Alternative 3 by subwatershed

Terrestrial Restoration Activities	Lower Yachats	North Yachats	School	Stump	Upper Yachats	Yachats
Commercial thinning (acres)						
Total commercial thin	83	549	39	85	348	490
Commercial thin, skyline	35	288	39	17	149	222
Commercial thin, helicopter	48	261	0	68	199	268
Classified (system) roads						
Decommissioning (miles)	0.8	0.5	0	1.8	4.9	0.5
Fill removal (cubic yards)	0	20	0	454	11,059	0
Unclassified (temporary) roads						
New roads (miles)	0	0	0	0	0	0
Reopen roads (miles)	0	0	0	0	0	0
Unstable sidecast removal (number of sites and cubic yards)	0	0	0	0	0	0
Snag and coarse wood creation (trees)						
Mature tree topping	25	69	8	10	93	44
Plantation tree snag creation	166	1,110	78	170	696	964
Coarse wood	918	1,519	158	112	938	1,568
Other actions						
Non-commercial thinning 25+ year old stands (acres)	12	260	167	45	101	132
Non-commercial thinning 5 to 25 year old stands (acres)	301	689	271	344	232	496
Meadow maintenance (acres)	0	9.3	0	0	19.3	0
Upland underplanting (acres)	64	292	20	43	205	245
Roadside thinning and salvage (acres)*	36	68	46	54	24	64

*About 21 acres of roadside salvage adjacent to key forest roads 5300 and 5360 are north of the Yachats watershed.

Alternative 4: Limit access to key forest roads

In addition to not building any new temporary roads or reopening any existing roads, this alternative would limit commercial thinning activities to use of key forest roads only. Consequently, this alternative would require the most helicopter logging and the most noncommercial thinning of the action alternatives. Like Alternative 2b, this alternative would maintain the upper portion of road 5491. Selecting this alternative would result in implementing the following management activities:

Commercial and non-commercial thinning and associated activities

- Commercially thin about 1,281 acres of plantations, including about 289 acres by skyline logging and 992 acres by helicopter. All acres are in late-successional reserve, with about 1,063 acres also in riparian reserve (map 5 and appendix B-3);
- Create about 249 snags (28 to 36 inches in diameter) in natural stands adjacent to commercially thinned plantations, as mitigation for snags that were cut inside plantation boundaries during initial harvest;
- Develop future snags in thinning portions of plantations by topping about 2,476 trees or inoculating them with native fungi; 20% of the future snags will serve to mitigate snags that were cut inside plantation boundaries during initial harvest (appendix B-2);
- Increase the coarse wood component in commercially thinned plantations by leaving about 4,541 trees on the ground, to mitigate loss associated with past harvest practices (appendix B-2);
- Non-commercially thin about 1,216 acres of plantations 25+ years old. All acres are in late-successional reserve, with about 973 acres also in riparian reserve (map 5);
- Non-commercially thin about 2,284 acres of plantations 5 to 25 years old. All acres are in late-successional reserve, with about 1,827 acres also in riparian reserve (map 5);
- Maintain about 17 acres of early-seral habitat to provide minimum diversity of seral conditions in late-successional reserve (map 5);
- Plant a mixture of shade-tolerant conifers and hardwoods in about 718 acres of existing plantations (map 5);
- Decommission about 6.1 miles of classified (system) road. All miles are in late-successional reserve, with about 4 miles also in riparian reserve (map 5); and
- Maintain the existing recreational opportunities at the Keller Creek dispersed site by not reducing the capacity of the parking area.
- Use thinning and salvage operations to manage roadside vegetation adjacent to key forest roads 5300, 5360, 5400, 5500, 5590, and 5800, affecting about 313 acres.

The terrestrial restoration activities of Alternative 4 are summarized by subwatershed in table 3. Most activities would be completed in 10 years, with commercial timber-sale contracts awarded over the next 5 to 6 years, beginning as early as FY 2005. Refer to appendix B for specific plantation information about stand exams (B-1), stand prescriptions (B-2), and the harvest plan (B-3).

Table 3. Description of Alternative 4 by subwatershed

Terrestrial Restoration Activities	Lower Yachats	North Yachats	School	Stump	Upper Yachats	Yachats
Commercial thinning (acres)						
Total commercial thin	83	427	39	41	223	468
Commercial thin, skyline	15	101	39	0	48	86
Commercial thin, helicopter	68	326	0	41	175	382
Classified (system) roads						
Decommissioning (miles)	0.8	0.5	0	1.8	4.9	0.5
Fill removal (cubic yards)	0	20	0	454	11,059	0
Unclassified (temporary) roads						
New roads (miles)	0	0	0	0	0	0
Reopen roads (miles)	0	0	0	0	0	0
Unstable sidecast removal (number of sites and cubic yards)	0	0	0	0	0	0
Snag and coarse wood creation (trees)						
Mature tree topping	25	69	8	10	93	44
Plantation tree snag creation	166	856	78	82	446	848
Coarse wood	918	1,232	158	0	770	1,463
Other actions						
Non-commercial thinning 25+ year old stands (acres)	12	543	166	156	276	63
Non-commercial thinning 5 to 25 year old stands (acres)	301	689	271	344	232	496
Meadow maintenance (acres)	0	4.7	0	0	12.1	0
Upland underplanting (acres)	59	224	30	32	138	235
Roadside thinning and salvage (acres)*	36	68	46	54	24	64

*About 21 acres of roadside salvage adjacent to key forest roads 5300 and 5360 are north of the Yachats watershed.

Alternative 5: Perform maintenance and repair on key forest roads

This alternative is similar to Alternative 2b, except it would perform maintenance and repair on six key forest roads because maintenance and repair on these roads has been lacking for several years. Like Alternative 2b, this alternative would maintain the upper portion of road 5491. Selecting this alternative would result in implementing the following management activities:

Commercial and non-commercial thinning and associated activities

- Commercially thin about 2,039 acres of plantations, including about 1,921 acres by skyline logging and 118 acres by helicopter. All acres are in late-successional reserve, with about 1,611 acres also in riparian reserve (map 6 and appendix B-3);
- Temporarily reopen about 8.8 miles of unclassified roads (built during initial harvest) by removing vegetation and minor slides from road surfaces. All miles are in late-successional reserve, with about 5.5 miles also in riparian reserve (map 6 and appendix B-3);
- Build about 1.8 miles of temporary road on stable ridges. All miles are in late-successional reserve, with about 0.6 miles also in riparian reserve (map 6 and appendix B-3);
- Remove 4 failed culverts from streams in plantations 007, 037, 064, and 179 and about 1,000 cubic yards of unstable sidecast material from 4 road locations in plantations 007, 038, 041, and 154;
- Create about 249 snags (28 to 36 inches in diameter) in natural stands adjacent to commercially thinned plantations, as mitigation for snags that were cut inside plantation boundaries during initial harvest;
- Develop future snags in thinning portions of plantations by topping about 3,898 trees or inoculating them with native fungi; 20 percent of the future snags will serve to mitigate snags that were cut inside plantation boundaries during initial harvest (appendix B-2);
- Increase the coarse wood component in commercially thinned plantations by leaving about 6,410 trees on the ground, to mitigate loss associated with past harvest practices (appendix B-2);
- Non-commercially thin about 97 acres of plantations 25+ years old. All acres are in late-successional reserve, with about 69 acres also in riparian reserve (map 6);
- Non-commercially thin about 2,284 acres of plantations 5 to 25 years old. All acres are in late-successional reserve, with about 1,827 acres also in riparian reserve (map 6);
- Maintain about 29 acres of early-seral habitat to provide minimum diversity of seral conditions in late-successional reserve (map 6);
- Plant a mixture of shade-tolerant conifers and hardwoods in about 1,032 acres of existing plantations (map 6);
- Decommission about 6.1 miles of non-key (system) roads. All miles are in late-successional reserve, with about 4 miles also in riparian reserve (map 6);
- Perform maintenance and repair on 38.4 miles of key forest roads by repairing road surfaces, repairing failing road fills, replacing failed or failing ditch-relief culverts, adding ditch relief culverts, and replacing selected culverts in streams; and
- Maintain the existing recreational opportunities at the Keller Creek dispersed site by not reducing the capacity of the parking area.
- Use thinning and salvage operations to manage roadside vegetation adjacent to key forest roads 5300, 5360, 5400, 5500, 5590, and 5800, affecting about 313 acres.

The terrestrial restoration activities of Alternative 5 are summarized by subwatershed in table 4. Most activities would be completed in 10 years, with commercial timber-sale contracts awarded over the next 5 to 6 years, beginning as early as FY 2005. Refer to appendix B for specific plantation information about stand exams (B-1), stand prescriptions (B-2), and the harvest plan (B-3).

Table 4. Description of Alternative 5 by subwatershed

Terrestrial Restoration Activities	Lower Yachats	North Yachats	School	Stump	Upper Yachats	Yachats
Commercial thinning (acres)						
Total commercial thin	89	759	135	109	412	535
Commercial thin, skyline	79	725	135	42	405	535
Commercial thin, helicopter	10	34	0	67	7	0
Classified (system) roads						
Decommissioning (miles)	0.8	0.5	0	1.8	2.5	0.5
Fill removal (cubic yards)	0	20	0	454	11,059	0
Perform maintenance on key forest roads (miles)[a]	2.7	8.8	1.8	7.0	6.7	2.9
Unclassified (temporary) roads						
New roads (miles)	0.07	0.86	0.05	0.04	0.14	0.62
Reopen roads (miles)	0.62	2.88	1.04	0.04	2.04	2.20
Unstable sidecast removal (number of sites and cubic yards)	0	(2) 850	0	0	(1) 100	(1) 50
Snag and coarse wood creation (trees)						
Mature tree topping	25	69	8	10	93	44
Plantation tree snag creation	178	1,502	270	218	824	906
Coarse wood	918	1,932	928	126	938	1,568
Other actions						
Non-commercial thinning 25+ year old stands (acres)	0	0	0	34	0	63
Non-commercial thinning 5 to 25 year old stands (acres)	301	689	271	344	232	496
Meadow maintenance (acres)	0	9.3	0	0	19.3	0
Upland underplanting (acres)	64	366	89	46	264	203
Roadside thinning and salvage (acres)[b]	36	68	46	54	24	64

[a] There are about 8.5 miles of additional road outside of the 6th-field watersheds that will require maintenance because they will likely be used for log hauling. These include roads on ridges that comprise the boundary of the planning area where they occasionally traverse short distances into adjacent watersheds. Other examples include roads 53 and 5360 that travel north from the planning area to Lincoln County road 711, then to State Highway 34.

[b] About 21 acres of roadside salvage adjacent to key forest roads 5300 and 5360 are north of the Yachats watershed.

Comparison of Alternatives—Key quantitative differences—based on our **estimates**—of Alternatives 1, 2a, 2b, 3, 4, and 5 are compared in table 5.

Table 5. Comparing the key quantitative differences of Alternatives 1, 2a, 2b, 3, 4, and 5

Issue, objective, and outcome	Alt. 1 (no action)	Alt. 2a (proposed action)	Alt. 2b	Alt. 3	Alt. 4	Alt. 5
Increase late-successional habitat in late-successional and riparian reserves:						
Speed development of late-successional habitat in reserves (acres)	0[a]	2,039	2,039	1,594	1,281	2,039
New temporary roads in reserves (miles)	0	1.8	1.8	0	0	1.8
Reopen temporary roads in reserves (miles)	0	8.8	8.8	0	0	8.8
Remove failed culverts in reserves (number)	0	4	4	0	0	4
Remove unstable sidecast in reserves (cubic yards)	0	1,000	1,000	0	0	1,000
Create mature snags in reserves (trees)	0	249	249	249	249	249
Create snags in plantations in reserves (trees)	0	3,898	3,898	3,184	2,476	3,898
Create coarse wood in plantations in reserves (trees)	0	6,410	6,410	5,213	4,541	6,410
Noncommercial thin in reserves (acres)	0	2,381	2,381	3,001	3,500	2,381
Maintain existing early-seral habitat (meadows) in reserves (acres)	0[b]	29	29	29	17	29
Underplant thinned plantations in Reserves (acres)	0	1,032	1,032	869	718	1,032
Perform maintenance on six key forest roads (miles)	0	0	0	0	0	38.4
Total skyline yarding acres [c]	0	1,921	1,921	750	289	1,921
Total helicopter yarding acres	0	118	118	844	992	118
Estimated total timber-sale value (dollars)	0	3,603,720	3,603,720	2,479,161	1,852,223	2,824,339
Essential and mitigated non-essential KV projects funded (%)	0	100	100	100	100	100
Non-essential (enhancement) KV projects funded (%), Pay Co-based analysis	0	100	100	75	59	91
Non-essential (enhancement) KV projects funded (%), traditional-based analysis	0	62	56	24	13	19
Roadside thinning and salvage (acres)	0	313	313	313	313	313
Restore watershed health and associated aquatic ecosystems:						
Decommission roads in watershed (miles)	0	8.5	6.1	6.1	6.1	6.1
Decommission fill removal (cubic yards)	0	30,781	11,533	11,533	11,533	11,533

[a] Plantations would develop at their natural rate. [b] Meadows would revert to conifer or hardwoods. [c] Includes about 36 acres of potential ground-based yarding.

What alternatives were developed?

Map 2, Alternative 2a

Map 2, Alternative 2a

Map 3, Alternative 2b

Map 3, Alternative 2b

Map 4, Alternative 3

Map 4, Alternative 3

Map 5, Alternative 4

Map 5, Alternative 4

Map 6, Alternative 5

Map 6, Alternative 5

Map 7, Land allocations

Map 7, Land allocations

What environmental effects are predicted for each alternative?

CHAPTER 3

In chapter 3, we predict the likely effects of each action under each alternative; it is equivalent to the traditional section "Environmental Consequences". The Northwest Forest Plan, FEMAT report, Late-Successional Reserve Assessment, and the Yachats-Blodgett Watershed Analysis provide evidence for baseline environmental conditions from which direct, indirect, and cumulative effects are analyzed in chapter 3. These broad-based assessments of environmental conditions provide a cumulative view of environmental conditions at different landscape scales and consider past, present, and reasonably foreseeable actions.

One advantage of planning the Yachats Watershed Terrestrial Restoration Project at the landscape scale is an improved analysis of cumulative effects. Knowing the site-specific details of all projects in a large geographic area allows us to predict cumulative effects with more certainty than if projects were analyzed individually. The analysis of direct and indirect effects in this chapter inherently includes cumulative effects because most foreseeable future federal actions in the watershed are included in the analysis. Cumulative effects are disclosed under the section titled “Other Predicted Effects” and describe how all actions, including those expected from other landowners, affect each resource.

In this chapter, we predict the likely environmental effects of the proposed alternatives, whose outcomes are based on the assumption that the Forest standards and guidelines, the project design criteria (appendix A), and terms and conditions in the Biological Opinions associated with this project will be followed. The project design criteria are also used during formal consultation with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service to evaluate effects on listed species. The use of these criteria is reflected in the amount of take and in the terms and conditions provided in the biological opinions issued by these agencies.

Based on the science literature and our collective experience, we are confident in the accuracy of our analysis of the **current** conditions discussed in chapter 1. In chapter 3, when we describe the environmental effects of each alternative, we are **predicting** those effects based also on the literature and our collective experience; however, we recognize that predictions are inherently uncertain, some just a little and some highly.

Because of the similarities of environmental conditions and ecological processes found in the planning area, we expect site-specific effects and environmental responses to the proposed actions to be fairly uniform throughout. In the following pages, therefore, we expect our generalized discussions on effects can be applied to any given location in the landscape with a high degree of confidence that the effects described will fit the site.

When the District Ranger chose the members of the interdisciplinary team, he considered possible scenarios for this environmental assessment and determined what disciplines would illuminate decisions about them. Relying on his professional judgment and expertise, he chose the disciplines and formed the team of Forest experts in those disciplines. Team members reviewed areas where actions are proposed, reviewed relevant refereed literature and Forest

assessments for this planning area, and consulted disciplinary colleagues in the Forest Service, other agencies, universities, and elsewhere. Often, literature reviewed by team members was deemed incomplete and, though studies of similar environments and similar scenarios were reviewed, the expert's professional judgment was required to determine what information can be appropriately used here--and how strongly it supports predictions about what the environmental effects of proposed actions will be. Although team members benefit from the array of research information and the insights of colleagues, they are valued most highly for their experience in and knowledge about the project planning area.

Consultation with other experts helps assure that the literature review did not miss a valuable resource, and it provides opportunity to debate and strengthen the team expert's conclusions about how proposed actions are likely to affect the environment. After several team meetings and one-on-one discussions among team members on how each one's predictions might affect or be affected by all of the others, each team member wrote a section of this chapter. Then all of them reviewed the whole chapter to be sure they find the others' predictions clear and supportable.

In this chapter, team members' position titles accompany their written contributions to indicate that they believe the cited references are relevant, the inferences drawn from them are appropriate, and the predictions are supported by the cited literature and their own professional judgment. In this section, a single author uses "I"; when "we" is used, it means one or more other team members concur. Refer to appendix C for the list of team members that prepared or contributed to this document.

Predicted Effects of Activities to Address the Shortage of Late-Successional Habitat

Forest stand conditions

Managing 30 to 55 year-old plantations (Operations Manager/Zone Silviculturist)—Although all stands (plantations) proposed for commercial thinning are young and are the result of clearcutting in the Yachats watershed, there is still quite a range of ages and conditions between stands. In general, these stands are overstocked and highly susceptible to windthrow, insect, and disease damage (appendix B-1).

Integrated silvicultural treatments are based on the project design criteria (appendix A) that have been developed over time from monitoring of past similar thinning projects. Treatments are designed to facilitate tree growth and crown development, and enhance stand variability, trending to more natural conditions. Appendix A contains the design criteria for increasing stand structure and species diversity that will result in greater stand variability. Stand variability will be achieved by several interconnected treatment activities including treatment exclusions. The following treatment strategies provide a range of vegetative conditions across the landscape of the Yachats watershed:

- Thinning prescriptions will emphasize a wide range of spacing tolerances to achieve the "average" desired leave trees per acre. Clumping trees as well as generating small openings in the canopy will be part of each prescription. Emphasis is also placed on

retaining shade-tolerant conifer species, all hardwood species, and those trees having unique phenotypic characteristics such as large branches. Additionally, some smaller trees will be retained to enhance vertical diversity.

- Portions of almost every stand proposed for thinning will not be thinned and harvested. Of the 95 stands scheduled for thinning in the proposed-action alternative, only four have identical stand and harvest-unit acres. Cumulatively, harvest-unit acreage represents only 59 percent of the total stand acreage. Areas of the stands that will not be thinned and harvested (41%) will be delineated on the ground during the layout process with the majority of the areas falling into four major categories: (1) stream buffers and headwall areas wide enough to protect streams and adjacent slopes, (2) concentrations of hardwoods, (3) areas not feasible for commercial harvest, and (4) those portions of stands where the current health, vigor, and variable spacing of the conifer and hardwood vegetation is on a suitable trajectory toward attaining late-successional forest habitat without the need for treatment.

- Post-harvest stand variability will be enhanced through the creation of snags and coarse woody debris, and tree plantings. Where dense conifer exists in categories 1 and 3 above, trees may be non-commercially thinned (cut trees left on site), and/or some trees may become sources for snag and coarse woody debris creation. With five to 14 trees per acre being converted to snags and coarse woody debris in nearly every thinning unit (appendix B-2), opportunities exist at a smaller scale to further vary tree spacing and canopy closure, including varying the spacing of snags and CWD. For example, all the snags and coarse woody debris on an acre can be generated from one ¼-acre section of the acre and essentially create a small hole and break in the overstory canopy layer. Tree plantings in openings and understories of stands will reintroduce shade-tolerant conifer and hardwood species into the stands, enhancing the development of both species and structural diversity in the long term.

Stand variability will also be enhanced by natural events such as windthrow, endemic levels of disease (i.e. Phellinus weirii), insect infestations, and natural regeneration of conifers, hardwood, and brush species from sources in and adjacent to the thinned stands.

Treated stands will need to be reevaluated in 20 years to determine additional treatments needed to speed the development of stands towards late-successional forest conditions.

During stand evaluations, it was determined that several stands, totaling about 780 acres, do not require treatment at this time. These stands either have low stocking levels, resource concerns, or are located in areas that cannot be commercially thinned.

Alternative 1 (no action)—Up to 4,070 acres will continue to develop mostly as dense, single-storied Douglas-fir stands. Plantations will continue to grow over time, but they will develop differently from existing stands that have achieved old-growth dimensions (Tappeiner et al. 1997). Trees will have less opportunity to express dominance because they all have equal growing space as a result of past vegetation management and some prior pre-commercial thinning. Competition will continue to increase between individuals as trees compete for limited resources, especially light. Trees will grow taller as they strive to obtain sufficient sunlight, but

diameter growth will slow in response to loss of crown. As these trees become more dependent on neighboring trees for support they will become less stable. Trees will become more susceptible to insects, disease, and windthrow, and stand health will decline. When these trees fully occupy the available growing space, they will begin the stem-exclusion phase, which effectively prevents other trees from becoming established and starts killing the weaker trees in the stand (Oliver and Larson 1996). Mortality will increase dramatically as the intermediate and suppressed trees lose their ability to compete and die. These dead trees will increase snags and coarse woody debris, but they will be too small to be of high quality and are expected to decay rapidly. As understory vegetation continues to decline, bare mineral soil will become more prominent and some additional soil movement may be expected on steep slopes.

Because stands are fairly uniform, opportunities for establishing species or structural diversity through natural processes will remain low for many years, without major disturbance events. Eventually, over long periods, natural disturbance events will create openings in stands, allowing shade-tolerant species to become established in the understory, gradually creating additional structure and diversity. The lack of sufficient shade-tolerant conifer seed sources (from existing western hemlock, western red cedar and Sitka spruce) will be a major factor delaying the establishment and development of diverse mixed conifer stands in this watershed. This alternative provides no opportunity to accelerate development of complex, mature forest conditions. Late-successional reserve objectives will likely be delayed for many decades in these stands and likely may never be reached until natural disturbance resets the vegetation succession cycle.

Effects of applying this alternative are shown in the control plots on the Black Rock study site near Fall City, Oregon (Marshall, pers. comm.). The plots represent an 85-year-old stand that had 486 trees per acre at age 48. Although this stand contains more trees than most stands in the Yachats watershed, it does provide a basis for comparing the development of overstocked stands over a long time. Considerable mortality reduced stocking in this stand to 232 trees per acre by 1995, but little or no understory structure or diversity has developed. Although diameter growth has remained small, height growth has continued, producing tall, spindly trees prone to windthrow. Crowns widths and lengths have receded so trees are less vigorous and more prone to effects of insects, disease and other environmental factors. Large numbers of trees continue to die and fall over, but their growing space is already being used by other trees, preventing any appreciable light from entering the understory. Little vegetation is found on the forest floor; what is there is related to minor disturbances and unlikely to persist. This process will likely continue until affected by a major disturbance or until trees have had enough time to begin differentiating from their neighbors.

Similar results are predicted with a sample stand (Stand # 224, Five Rivers watershed) we analyzed previously with the ORGANON model. Those results indicate that:

- ⇨ Stands will continue to lose crown ratios from now through age 117, down to 18%.
- ⇨ By age 117, 58% of the stand (121 TPA) will die and become woody debris or snags. This wood will be relatively small; 92% of it will be less than 20 inches in diameter and 61% less than 15 inches.
- ⇨ Average stand diameter will be near 26 inches DBH at age 117.

- ⇨ Height of the 40 tallest trees per acre will be 208 feet. Trees will be very tall in relation to their diameters and remain susceptible to windthrow and breakage.
- ⇨ Crown ratios will continue to decline from now through age 117, indicating that stand vigor will degrade, becoming more susceptible to insects, diseases, and other environmental factors.

In addition to the projected ORGANON stand model, the Siuslaw National Forest uses adaptive management information from an ongoing stand-density administrative study that has 3 replications on the Forest (Yachats study, Yachats watershed; Cataract study, North Fork Siuslaw watershed; and the Wildcat study, Hebo Ranger District). Along with partners from Oregon State University and the Pacific Northwest Research Station, the Siuslaw National Forest is evaluating 8-year results following thinning on those sites. Preliminary study results for the control blocks were recently received from Sam Chan, PNW silviculturist (pers. comm.):

Control (unthinned) results to date:

- Live crown to bole length is continually dropping.
- Diameter at breast height (DBH) is still increasing but at a much slower rate than the treated or thinned plots.
- No differences yet in total height; trees are becoming tall with relatively small diameters.
- Percent available light is still very low (less than 5%).
- Crown ratios continue to drop except where adjacent trees have died or fallen.

Thus, under the no-action alternative, we expect stands would follow the pathway of development reflected in the control stands.

Alternatives 2a, 2b, 3, 4, and 5—After commercial thinning and associated actions are completed in existing plantations, we expect the action alternatives to change current stocking of plantations based on the following treatments (refer to appendix B-2 for stand-specific information and appendix A for prescription guidelines to enhance stand and species diversity):

- ➢ Under Alternatives 2a, 2b, and 5, a total of 93 stands would be commercially thinned, affecting about 2,039 acres. Fourteen (14) stands (298 acres) would be thinned to 90 TPA, 72 stands (1,448 acres) would be thinned to 60 TPA, and 7 stands (298 acres) would be thinned to 40 TPA. About 97 acres would be non-commercially thinned.

- ➢ Under Alternative 3, a total of 83 stands would be commercially thinned, affecting about 1,594 acres. Six (6) stands (55 acres) would be thinned to 90 TPA, 71 stands (1,345 acres) would be thinned to 60 TPA, and 6 stands (194 acres) would be thinned to 40 TPA. Because no new or existing temporary roads would be used, access to about 717 acres would be eliminated, shifting these acres to the noncommercial thinning category.

- ➢ Under Alternative 4, a total of 56 stands would be commercially thinned, affecting about 1,281 acres. Four (4) stands (38 acres) would be thinned to 90 TPA, 47 stands (1,055 acres) would be thinned to 60 TPA, and 5 stands (188 acres) would be thinned to 40 TPA. Because access is limited to key Forest roads, access to about 1,309 acres would be eliminated, shifting these acres to the noncommercial thinning category.

Growth projections and modeling of future stand conditions—To analyze effects, the ORGANON (Oregon Growth Analysis and Projection) model was used to model individual tree growth. This model uses data from permanent plots in western Oregon, Washington, and British Columbia taken by the Stand Management Coop (SMC) (Hann et al. 1997).

A sample stand from the central Oregon coast range—stand 224 from the Five Rivers watershed—is also typical of an average stand in the Yachats planning area. Stand 224 has been used to model future growth and development. It provides the middle range of conditions in managed stands that would be most common in the Yachats watershed. A summary of the ORGANON run for stand 224 indicates effects that can be expected from the proposed thinning treatments (USDA 2002a):

- Diameter growth rates will increase, as a direct result of thinning, by accelerating the development of large-diameter trees. At age 80, the average stand diameter will be about 30 inches in diameter at breast height (DBH), with 40 trees per acre (TPA); the dominant trees treated at 100 residual trees-per-acre will not reach this size until they are about 120 years old. Our treatments for stands in the Yachats watershed planning area are 30, 60, and 90 TPA with diameters projected to reach 30 inches DBH around ages 70, 90, and 115, respectively.

- Height growth rates are comparable for all treatments. Although stands thinned to 30 or 60 TPA have a higher risk of being blown down for a few years, height-diameter relationships are more favorable under these treatments, and trees are less prone to blowdown and breakage over time. In addition, "open-grown" trees will develop more extensive and stronger root systems over time and will be less susceptible to wind damage.

- By creating or allowing an understory to develop, stands thinned to 30 and 60 TPA will allow multi-aged, two-storied stands to develop earlier. Stands thinned to 90 TPA will continue to be dense and single-storied until further thinning or natural disturbances reduce their density.

- Increased growth rates will accelerate developing high-quality snags and large, coarse woody debris. Mortality will increase in the lightly thinned treatment (90 TPA), creating larger amounts of woody debris and snags (28 trees per acre over the next 80 years). Most of these will be small in size and have rapid rates of decay because of the high percentage of inner bark and sapwood. This physiologically active tree tissue will be the first component of downed trees to decay (Maser and Trappe 1984). Most of the mortality will be in trees less than 20 inches DBH. Stands thinned to 30 and 60 TPA will allow larger, longer lasting material to develop before becoming snags or coarse, woody debris. Natural mortality will account for about 4 trees per acre in the next 80 years, with much higher mortality in root-rot infected stands. The dead material will be relatively large, however, with sizes ranging from 20 to 30 inches in diameter.

- Live-crown ratios will increase under all treatments before beginning to decline, but there may be an initial period where crown size remains relatively constant. Conifers go through a replacement period within their crowns whereby needles maintained under low light conditions (shade needles) will be replaced by needles that are adapted for higher light

conditions (sun needles). Once that replacement has happened, crown growth will accelerate until crowns grow together and light again limits growth. Crown growth can be maintained by occasional thinning. Larger crown ratios will be maintained longer under the heaviest thinning. Crown ratios will remain above 30% until age 90 in the stands thinned to 60 TPA, compared to about ages 70 to 75 in the 90-TPA stands. Live-crown ratio can be considered an index of individual tree vigor (Oliver and Larson 1996). Trees with large crown ratios will not only grow faster, but will be more resistant to insects, diseases, and other environmental hazards.

Additional analysis indicates that:

- The preliminary results from the treatment blocks of the Yachats/Cataract/Wildcat study indicate the following responses from thinning to 100 TPA (light), 60 TPA (moderate), and 30 TPA (heavy):

    - Available light (for residual trees and planted understories) from thinning to 100 TPA is comparable to unthinned stands.
    - Percent available light was variable (from 7% in light thinning to 37% in heavy thinning).
    - Live crown ratios have increased in all thinning treatments; the greatest increases occur in moderate and heavily thinned areas.
    - DBH also increased in all thinning treatments.
    - Relationship between available light and basal area was not linear: A 50% reduction in basal area resulted in 15% available light; to achieve 30% available light, the basal area would have to be reduced by 75%.
    - The most important effect of thinning is the response of live-crown development.
    - Available light decreases about 2% per year, but is not linear.
    - Crown closure occurs at a faster rate in lightly thinned stands than in heavily thinned stands.

- In a study on 10 sites in the Oregon Coast Range, Tappeiner et al. (1997) found that trees in old-growth stands had little competition from one another because of low numbers of trees per acre. Young plantations, such as those in the Yachats watershed, were planted at 400 to 680 TPA. About half of the stands were non-commercially thinned to around 200 trees per acre. Currently, some of the stands have 300 or more TPA (appendix B-1). Therefore, we expect that stands thinned to 40 or 60 TPA will allow residual trees in those stands to develop on a trajectory more consistent with natural old-growth stand development.

- Tappeiner et al. (1997) also found that self-thinning was uncommon during the development of the older stands studied, indicating that canopy gaps in these forests were the result of conifer establishment as well as mortality of individual, large trees. Therefore, selecting trees for thinning based on a variable distribution should create numerous small openings in these stands that more closely mimic natural stand development.

- Thies and Sturrock (1995) compiled information from research findings and observations by forest pathologists and resource managers in the Pacific Northwest on the susceptibility of

tree species to laminated root rot. Susceptibility ratings representing a near consensus of pathologists working in western North America were presented. They found Douglas-fir highly susceptible, western hemlock intermediately susceptible, western redcedar resistant, and hardwoods immune. They recommended planting tree species immune or with low susceptibility to the disease (tolerant or resistant). Therefore, underplanting with immune hardwoods (bigleaf maple and red alder) and resistant species (western redcedar) are expected to reduce inoculum and spread of the disease. Because the level of laminated root rot in Yachats stands is relatively low—compared to neighboring drainages to the east—the prescriptive intent is not to eliminate this root disease from stands. Low levels of root rot are important natural processes that create diversity across the landscape and therefore, small disease pockets will remain in stands; heavier infestations will be treated to reduce spread of disease, however.

- Swiss needlecast has become a major disease problem in the Coast and Cascade ranges of Oregon. Some of the young managed stands in Yachats watershed show the characteristically yellowish crowns and poor vigor associated with this disease. Scientific studies are on-going to help managers decide on appropriate management actions for infected stands. A Swiss needlecast cooperative has been formed to share information and results. The best preventive measure may be maintaining healthy and diverse stands. Commercial thinning should develop strong, healthy trees with adequate crowns to maintain vigor during periods of Swiss needlecast outbreak, which may be cyclic. Thinning to favor trees other than Douglas-fir and underplanting with other conifers will also increase stand resistance in the future.

Stand diversity and structure—Understory planting of native conifers and hardwoods in openings will increase both the stand diversity and structure that provide the framework for developing multistoried stands.

Based on the Yachats/Cataract/Wildcat thinning study, the following results were obtained on the development of understory and forest vegetation:

- Douglas-fir survival is sensitive to overstory levels—only 64% survival occurs in areas lightly thinned. Western red cedar, western hemlock, and Sitka spruce survival is relatively unaffected—they have a greater than 90% survival rate.
- Western hemlock has the best overall underplanting survival.
- The best growth rates in the underplanted species are in the 30 TPA thinning areas where the greatest increase in available light was obtained.
- Between 10 to 20% available light appears most optimum; above that level growth increases at a slower rate.
- Douglas-fir seems to have acceptable growth rates where available light exceeds 20%.
- 100 TPA thinning offers minimal opportunities for creation of diverse two-story stands, without additional future treatment.
- In general, salmonberry shows the greatest response in the 30 TPA thinning; salal shows the greatest response in the 100 TPA thinning—these two shrub species compete with planted understory trees.
- The height of natural regeneration is only about 20% of the height of planted trees approximately the same age.

- 30 TPA to 100 TPA thinning shows great differences in microclimate—a 2-degree C change can effect plant growth.

Plantings in the Yachats watershed will be concentrated in openings such as root-rot pockets, corridors, landings, and under canopies with 30 to 60% open light. It is estimated that 100% of the stand acres with 40 TPA, 50% of stand acres with 60 TPA, and 5% of stand acres with 90 TPA will be underplanted. Only the larger holes in the canopy and planting blocks will have follow-up release treatments because the objective is to attain a variable distribution pattern for these understory trees. Of the acres underplanted, all of the planting in the 40 TPA stands, 10% of the underplanting in the 60 TPA stands, and 5% of the underplanting in the 90 TPA stands are considered "essential" reforestation.

After commercial thinning and associated actions are completed in existing plantations, we expect the action alternatives to change current stand diversity and structure of plantations based on the following treatments (refer to appendix B-2 for stand-specific information):

- Under Alternatives 2a, 2b, and 5, about 15 acres will be underplanted in stands thinned to 90 TPA; 926 acres will be underplanted in stands thinned to 60TPA; and 91 acres of stands will be underplanted in stands thinned to 40 TPA. A total of about 1,032 acres would be underplanted with hardwoods and shade-tolerant conifers, of which about 380 is essential reforestation.

- Under Alternative 3, about 3 acres will be underplanted in stands thinned to 90 TPA; 817 acres will be underplanted in stands thinned to 60TPA; and 49 acres of stands will be underplanted in stands thinned to 40 TPA. A total of about 869 acres would be underplanted with hardwoods and shade-tolerant conifers, of which about 264 is essential reforestation.

- Under Alternative 4, about 2 acres will be underplanted in stands thinned to 90 TPA; 667 acres will be underplanted in stands thinned to 60TPA; and 49 acres of stands will be underplanted in stands thinned to 40 TPA. A total of about 718 acres would be underplanted with hardwoods and shade-tolerant conifers, of which about 243 is essential reforestation.

Some of the 60 TPA stands may need additional treatment (stocking reduction of the planted trees) within 20 years to continue understory development. The 90 TPA stands will continue to develop as dense, single-storied stands unless additional stocking reduction is done in the overstory and understory within 10 to 15 years. The premise for a 90-TPA stand treatment is to provide a more diverse stocking at a landscape scale and assumes that additional thinning will be needed to maintain stand growth and development. Underplanting will be limited to sites where available light is greatest. Planting stock will be limited to shade-tolerant or disease-resistant species with the objective of re-establishing native species that have had seed sources removed.

Preliminary results from Yachats/Cataract/Wildcat study indicate that thinning to 60 TPA (with a resulting relative density of 20-25) and with a 15- to 20-year thinning interval offers the best compromise in achieving stand development objectives for both the overstory and the understory.

Snags and coarse woody debris—The presence of varying densities of snags and down logs is recognized as a necessary component in managed stands (LSRA 1997). Stand exams indicate that stands proposed for thinning generally contain less than one snag per acre, while coarse wood densities average between 112 and 3,800 cubic feet per acre. Research conducted by Spies and Cline (1988) indicate that natural levels of coarse wood in stand less than 80 years old average between 525 and 1,979 cubic feet per acre. Snag densities in natural stands vary widely by size and height class, with snags greater than 20 inches dbh identified as most critical for use by cavity nesters.

Prescriptions would be applied to commercially thinned stands that are meant to emulate natural conditions and meet habitat requirements of species using snags and down logs. Due to a lack of existing snags, 2 snags per acre would be created in every commercial harvest unit, with the exemption of stands 104 and 195 where no snags would be created to minimize fuel loading. Subsequent to logging in stands deficient in coarse wood, trees would be felled to augment ground-level structure. The density of increased down logs is dependent on the residual stem density. In stands with a residual of 40 TPA, a total of 14 trees per acre would be felled. Stands with residuals of 60 and 90 TPA would include felling 7 and 3 trees per acre, respectively, for coarse wood.

Methods for creating snags in plantations include sawing off the tops of trees and stem inoculation. Inoculation involves introduction of species of stem fungus including *Fomitopsis cajanderi*, *Fomitopsis pinicola*, and *Phellinus pini*. Each of these is naturally occurring, with no risk of root-to-root spread. No effects to nearest neighbor trees or increased risk of infection to non-inoculated trees is expected to occur (Hildebrand and Parks 1998). Successful snag creation from past inoculation efforts on the Forest is yet to be established due to a lack of monitoring data. For this reason, sawing off the tops of trees will be emphasized as the preferred method for snag creation in the Yachats planning area.

In summary, I believe that when considered together, ORGANON predictions, specific studies, and long-term observations suggest that thinning activities will provide the greatest opportunity for developing late-successional forest characteristics in the shortest time. Thinning will reduce stocking enough to allow for optimal or near optimal growing conditions for several years, as well as providing conditions suitable for establishing understory, recruiting snags and woody debris, and developing stand structure and species diversity. Thinning will provide adequate growing room for residual trees, which will maintain stand health and reduce the probability of large-scale outbreaks of insects or disease. As high-quality snags, coarse woody debris, and the planted understory develop over time, late-successional characteristics can be expected to improve gradually. These effects will differ depending on treatment intensity. Blowdown, with small insects and disease outbreaks, will assist development by increasing stand variability.

No adverse indirect effects are anticipated in areas proposed for commercial or noncommercial thinning. These actions will provide a long-term benefit by maintaining stand health and accelerating development into late-successional habitat. Within 20 years, stocking levels in most of these stands will need to be reduced further to maintain stand health and growth and increase stand structure and species diversity. Through time, relatively large blocks of multistoried stands will develop across the planning area, as natural and managed stands blend together.

Managing plantations up to 25 years old (Operations Manager)—About 2,621 acres of stands up to 25 years old, (age range 8 to 25), exist in the Yachats watershed planning area. Some of these stands (about 337 acres) have been non-commercially thinned prior to this analysis, leaving about 2,284 acres (as reflected on the maps) to be non-commercially thinned under this project. Timber receipts are expected to fund most of the noncommercial thinning.

Although many research projects have been initiated to study how stand management activities affect the development of late-successional forest conditions in older plantations, younger plantations have received little or no study. Anecdotal evidence suggests that initiating management activities that maintain species diversity and growth rates at a younger age will allow plantations to develop late-successional forest characteristics similar to older thinned stands but more effectively and at earlier ages. Therefore, early silvicultural intervention in young plantations is expected to allow them to develop late-successional characteristics at earlier ages than older plantations.

The normally prescribed spacing in this age class is 15 (194 TPA) to 20 (109 TPA) feet. This is preferred where future re-entry is needed and desirable. Some trials have been done using wider spacing and may hold promise for the future where re-entry is restricted because of access limitations or watershed concerns. Sites thinned to very wide spacing (up to 30 feet, or 48 TPA) will generate dense brush development that may preclude future efforts to develop multiple canopies through underplanting. Across the landscape, however, widely spaced young plantations will add more diversity, and therefore, should be prescribed for occasionally.

Alternative 1 (no action)—Most of these managed stands are between 15 to 25 years old, predominantly planted with Douglas-fir. They will continue to develop into dense, single-storied stands dominated by Douglas-fir. As they age, their development can be traced along the same pathway as that described for Alternative 1, managing 25 to 50 year-old plantations.

Some of the youngest stands, however, between 8 to 15 years old, have a different look from the older stands. Snags and down woody debris were retained or added to the site; burning may not have been used to prepare the sites for planting; shade tolerant species such as western red cedar, western hemlock and Sitka spruce were likely planted to a greater degree. Because of these management differences, the pathway will be slightly different from the 15 to 25 year-old stands described above. However, these overstocked stands will also stagnate and become more susceptible to damage from wind, insects, and disease through time.

Alternatives 2a, 2b, 3, 4, and 5—Effects of managing stocking on young plantations are expected to:

- ⇨ Reduce stand densities to more closely mimic natural stand development in the project area.
- ⇨ Maintain or enhance growth rates for several decades, with effects lasting longer in the stands proposed for heavy thinning.
- ⇨ Increase species diversity because existing native hardwoods will be retained and shade-tolerant conifers will be emphasized over shade-intolerant species. Retaining a wide variety of species will also help accelerate the development of multistoried stands. (It is not the objective of these treatments to manage all stands toward multistory characteristics. Not all mature natural stands in the Oregon Coast Range have multistory traits. Our objective is to

mimic a range of conditions that occur in mature, natural stands across the Yachats watershed).
- ⇨ Enhance spatial diversity by retaining untreated clumps and stand openings. Variable distribution patterns will allow additional understory vegetation and structure to develop.
- ⇨ Develop high-quality snags and large wood debris sooner because high growth rates can be maintained for long periods, providing early recruitment of large-diameter material.
- ⇨ Increase stand resistance to major disturbances from insects, diseases, or other environmental factors by enhancing stand diversity.

When all actions under Alternatives 2a, 2b, 3, 4, and 5 are completed, the following effects of treatments on stocking can be expected:

- ⇨ Young stands currently up to 25 years old, will contain about 80 to 120 trees per acre, with tree spacing generally ranging from 19 to 23 feet. These stands are primarily comprised of Douglas-fir, but they will also contain a component of western hemlock, western red cedar, Sitka spruce, and native hardwoods. About 10% of these stands (228 acres) will be thinned to spacing that ranges from 25 to 35 feet. To promote stand variability, about 10% of the total acres will be left in small holes less than ½ acre in size and another 10% will be left in undisturbed dense clumps.

Roadside thinning and salvage (Operations Manager)—Under Alternative 1, no commercial thinning will be done along key forest roads that are kept open for public and Forest management use. Roads next to overstocked stands or mature alder stands require additional maintenance. Over time, these roads will require more frequent maintenance as they become more susceptible to windthrown trees, road-adjacent slides due to unstable stands, hazardous snags, slick surfaces from decayed needle/leaf litter, moist surfaces, and poor visibility.

Under Alternatives 2a, 2b, 3, 4, and 5, some commercial thinning is proposed along key forest roads in stands between 20 and 60 years old, not considered for commercial thinning now, but having merchantable volume. These areas may be thinned within ½-site tree (130 feet) from above or below the road. Thinning spacing will range from 25 to 35 feet between residual trees.

Roadside salvage sales traditionally have been used to facilitate road maintenance objectives and the repair of minor problems in the road prism, including the original clearing limits. This proposal continues that practice also. In addition, treatment along natural stands, but limited to the original roadside right-of-way may be included, if needed. Young trees within the initial clearing limits of the road may be thinned as needed even when adjacent to older conifer stands.

The proposed 10 to 20-year rest period in the Yachats basin also makes it prudent to safeguard road and forest values now.

Roadside thinning and salvage treatments will have the following effects:

- ➢ Managing roadside vegetation will reduce the maintenance frequency required to maintain key forest roads;
- ➢ Up to 140 acres of roadside salvage and 173 acres of roadside thinning will be accomplished adjacent to key forest roads only;

- Treatment will include both conifers and hardwoods;
- Thinning will open-up roads to more sunlight, keeping road surfaces drier and reducing road maintenance;
- The need for additional roadside salvage sales will be reduced;
- Safer driving conditions will be achieved by establishing more wind-firm trees, maintaining cleaner and drier road surfaces, and increasing driver visibility (less shade);
- Receipts of roadside thinning can help fund other restoration work such as sidecast pullback, culvert repair, or noxious weed control;
- The need to treat future hazard trees in affected areas will be reduced; and
- Healthy, deep crowned trees adjacent to the roads will provide diversity and stability in their stands, regardless of whether the parent stands ever get thinned.

Harvest plan *(Resource Planner)*

Timber-sale economics—Commercial thinning will be conducted in late-successional and riparian reserves; very little matrix land exists in the watershed and no stands needing treatment fall under this land allocation. Under Alternatives 2a, 2b, and 5, about 29,085 thousand board feet (MBF) or 61,080 hundred cubic feet (CCF) will be produced; Alternative 3 will produce about 23,148 MBF or 48,611 CCF; and Alternative 4 will produce about 18,766 MBF or 39,409 CCF. A MBF to CCF conversion factor of 2.1 was used for this analysis.

Based on an average market rate for small-wood timber sales in Oregon and Washington during FY 03 (Oct. 1, 2002 through Sept. 30, 2003), the advertised rates for the sale of timber would be about $59 per CCF for Alternatives 2a and 2b; about $51 per CCF for Alternative 3; about $47 per CCF for Alternative 4; and about $46 per CCF for Alternative 5. The advertised rate is the minimum amount needed to cover Forest Service expenses associated with planning, sale preparation, and sale administration; logging and associated costs; the required minimum collection for the National Forest Fund (NFF); and costs for essential Knutson-Vandeberg (KV) projects (reforestation of canopy openings in commercially thinned stands). The lower advertised rates associated with Alternatives 3 and 4 reflect the greater dependence on helicopter logging because of limited road access—logging with helicopters costs more per CCF than skyline logging. In some cases, limited road access and lack of suitable helicopter service landings shifts some stands under Alternatives 3 and 4 to the noncommercial thinning category, reducing timber volume and sale value. The lower advertised rate for Alternative 5 is based on performing maintenance on about 38.4 miles of key forest roads to prepare the roads for log hauling. The total cost for key forest road maintenance is estimated at $779,450 (EA, chapter 3, public and management access).

Table 6 summarizes the total sale value, collections, essential and mitigation KV project costs, and the remaining sale value for Alternatives 2a, 2b, 3, 4, and 5 based on CCF dollars. Depending on future market values for small wood, the total sale value could increase or decrease (appendix A, tables 1 through 5, provide a list of KV projects and estimated costs by alternative).

The primary economic difference between the alternatives is illustrated by how well they fund non-essential KV projects (table 7). If timber sales are awarded at their advertised rates, the action alternatives would fall short in covering all the non-essential KV project costs, such as

those associated with noncommercial thinning, system-road decommissioning, upland understory planting, and early-seral (meadow) maintenance. When this occurs—about 35 to 40 percent of the sales on the Siuslaw South Zone are sold at the advertised rate—appropriated funds, grants, or other funding sources may be available to implement these projects. However, there are many variables that influence the value of timber at the time of sale, including market conditions, competition during bids for timber sales, the type of timber-sale contract used (e.g., stewardship contract), and flexibility in the seasons of operations that could result in little to no effect on the ability to fund all non-essential KV projects. Regardless, the goal is to accomplish all of the non-essential KV projects.

Table 6. Estimated total sale value, collections, payments to counties, essential and mitigation KV project costs, and remaining sale value

Alternative	Total sale value	Required minimum NFF collection	25% payment to counties	Essential KV and mitigation KV projects	SSF collections	Remaining sale value
2a	$3,603,720	$15,270	$1,261,302	$538,875	$1,027,642	$760,631
2b	$3,603,720	$15,270	$1,261,302	$538,875	$1,027,642	$760,631
3	$2,479,161	$12,153	$867,706	$381,890	$817,857	$399,555
4	$1,852,223	$9,852	$648,278	$352,560	$663,037	$178,496
5	$2,824,339	$15,270	$988,519	$538,875	$1,027,642	$254,033

Table 7. Estimated remaining sale value, non-essential KV project costs, and percentage of non-essential KV projects funded

Alternative	Remaining sale value[a]	Non-essential KV projects	Percentage of non-essential KV projects funded
2a	$760,631	$1,236,765	62
2b	$760,631	$1,369,465	56
3	$399,555	$1,682,130	24
4	$178,496	$1,408,880	13
5	$254,033	$1,369,465	19

[a] Values are from the last column in table 6.

Temporary roads—For Alternatives 2a, 2b, and 5, about 1.66 miles of new temporary road building is proposed, along with temporarily reopening about 8.8 miles of existing road (appendix B-3). Temporary roads serve to maximize acres for commercial harvest and minimize harvesting costs.

New temporary roads will allow access to 290 acres, using a skyline yarding system. All new temporary roads will be located on stable ridges and will be waterbarred, seeded, and closed after use (appendix A). Road lengths range from 0.02 miles (about 100 feet) to 0.25 miles. Acres accessed by these roads range from 3 acres, using 0.03 miles of road, to 61 acres, using 0.25 miles of road. The average planned road length is 0.06 miles (about 325 feet) and the average size of the treatment area accessed per road is about 10.7 acres.

No new temporary roads are planned for Alternatives 3 and 4, requiring these alternatives to depend more heavily upon helicopter yarding for commercial harvest. Because of the limited number of suitable helicopter service landings, acres available for commercial harvest would be reduced by about 445 acres and 758 acres, respectively. Although these acres can be non-commercially thinned, treating these acres will compete with other proposed activities, such as understory planting and other non-commercial thinning, for limited KV dollars.

Helicopter operations—For safety reasons, loaded helicopter flight paths are prohibited over private property (unless permission is granted by the property owner), heavily traveled roads, and powerlines. One helicopter service landing is located about 600 horizontal feet from private property. Because helicopter operations, including activities at service landings, are limited to the October 1 through February 28 operating season, daylight starting and ending times for operations should have a low potential for disturbance to the landowner or other affected landowners. Under Alternatives 2a, 2b, and 5, all other operations would be at least 0.6 miles from private property. Because Alternatives 3 and 4 require more helicopter harvesting, including areas near private property, the potential for disturbance to local landowners would increase.

Terrestrial species *(District Wildlife Biologist, USDA 2003d)*

The Forest Ecosystem Management Assessment Team report (USDA, USDI et al. 1993) summarizes the numerous publications that describe the structure and composition of late-successional and old-growth forest systems. Attributes included the presence of live old-growth trees, large snags and down logs, and multiple canopy layers. These authors also summarize the current understanding of ecological processes that affect the development of these systems, including tree growth and maturation, death and decay of larger trees, low-to-moderate-intensity disturbances, establishment of trees in gaps or under the canopy, and closing of canopy gaps by lateral canopy or understory growth. They suggested that some processes (such as growth, mortality, and understory development) can be accelerated through silvicultural practices, but others (such as maturation of trees and decay of tree boles) require time.

More recently, Tappeiner et al. (1997) conducted a study in the Oregon Coast Range that looked at diameters and diameter growth rates during the first 100 years of an old-growth stand. Their results suggest that old-growth stands regenerated at low tree densities with little self-thinning. They also suggest that dense young stands must be thinned in order to establish a trajectory for obtaining old-growth characteristics.

Because the amount of existing mature forest will remain the same under Alternatives 1, 2a, 2b, 3, 4, and 5, we concluded that natural processes and functions will be the dominant forces in creating the structure and composition of late-successional habitat for wildlife in existing natural stands under all alternatives. Current levels of interior-forest habitat will also remain unchanged under Alternatives 2a, 2b, 3, 4, and 5 since removal of mature trees as hazards will be limited to areas along road corridors and adjacent to openings such as plantations. Based on the conclusions reached in the section discussing forest stand conditions, Alternatives 2a/2b/5, 3, and 4 will provide more acres (2,039, 1,594, and 1,281 acres, respectively through commercial thinning; and 2,381, 3,001, and 3,500 acres, respectively through non-commercial thinning) with

the tree sizes, densities, and stand characteristics associated with mature forests sooner than will Alternative 1 (no action). Alternatives 2a, 2b, 3, 4, and 5 will increase the amount of coarse wood, snags, and tree species diversity in plantations and hardwood-dominated riparian areas, resulting in attributes more like the structure and composition found in natural stands. However, the degree of utilization and function of these attributes remains uncertain in such young stands. Species responses are expected to vary, with potential increases in species richness and diversity, and a low potential for negative impacts to local wildlife populations. Snag and coarse woody material retention and recruitment are designed to meet management criteria outlined in the LSR Assessment as reviewed and exempted from further review by the Regional Ecosystem Office.

Listed species—As required by the Endangered Species Act of 1973, as amended, a biological assessment (a project-file document) has been prepared for this project. This assessment evaluates and describes the potential effects of proposed actions on species listed--under the Endangered Species Act--that may be found on the Siuslaw National Forest. The analysis of effects to listed species for activities that would modify habitat is based on findings provided in the programmatic habitat modification biological assessment and associated biological opinion (FWS reference #1-7-05-F-0005). For activities that cause nesting disturbance, the analysis is based on findings provided in the programmatic disturbance biological assessment and associated biological opinion (FWS reference #1-7-04-F-1113). Because the planning area is outside the range or contains no suitable habitat for the Oregon silverspot butterfly, brown pelican, Nelson's sidalcea, western lily, or western snowy plover, none of the alternatives affect these species.

Marbled murrelet—Under alternative 1, no action, large trees with old-growth related structural characteristics, such as large diameter mossy limbs in the lower 2/3 of the tree, are not likely to develop under dense stocking conditions. Stands not thinned are likely to continue on current developmental trajectories that would delay transition to suitable habitat, thereby potentially delaying recovery of local populations. Since no projects would be implemented, there would be no disturbance effects to nesting murrelets.

Under Alternatives 2a, 2b, 3, 4, and 5, proposed commercial thinning treatments, including roadside thinning and salvage adjacent to key forest roads, are expected to have no effect on marbled murrelet critical habitat because personal observations and stand exams show that all stands do not contain the primary constituent elements that meet the definition of critical habitat. Because all stands are less than 80 years old and 18 inches diameter-at-breast-height, they do not meet the definition of suitable habitat. Thus, proposed commercial thinning treatments will have no effect on marbled murrelet suitable habitat.

Mature conifers associated with landings may be felled as hazard trees for safety reasons when used as guy-line trees for yarders during commercial thinning. The potential for adverse effects to murrelet nesting is generally low since guy-line trees are normally located along an edge where mature trees interface with younger plantations—a habitat zone where nesting birds would be exposed to predators and excessive wind influence. However, group selection and removal of mature trees can adversely affect murrelets by removing acres of habitat.

An estimated 40, 40, 30, 26, and 40 landings will be located in areas adjacent to mature trees under alternatives 2a, 2b, 3, 4, and 5, respectively. Because there may be no other guy-line trees

(such as plantation trees) available, up to 120, 90, and 78 mature trees under alternatives 2a/2b/5, 3, and 4, respectively could be used. At these sites, some smaller, suppressed trees and old stumps will be available for use as guy-line anchors and consequently, up to 10 trees may contain suitable murrelet nesting structure. Therefore, felling mature guy-line trees may affect, and is likely to adversely affect, murrelet suitable nesting habitat. Project design criteria are identified to minimize the potential for felling mature trees with structure (appendix A). Felling mature guy-line trees and hazard trees may affect critical habitat; however, since these trees are scattered throughout the watershed, this activity is not expected to alter the function of critical habitat. Mature trees felled for safety will be retained on site.

Marbled murrelets have been found primarily in mature and old-growth habitat and, in a few cases in Oregon, in younger (60 to 80 years old) forests that have trees with dwarf mistletoe or other deformations or structures that provide a nest platform (Mack et al. 2003). Pertaining to younger stands, the Level 2 Team recently issued direction concerning potential murrelet structure (Level 2 Team 2004). According to this direction, a tree with potential structure must have all of the following characteristics:

- It occurs within 50 miles (81 km) of the coast and below 2,925 ft. (900 m) in elevation.
- It is one of four species: Western hemlock, Douglas-fir, Sitka spruce or western red cedar.
- It is ≥ 19.1 in. (49 cm) (dbh) in diameter, > 107 ft. (33 m) in height, has at least one platform ≥ 5.9 in. (15 cm) in diameter, nesting substrate (e.g., moss, epiphytes, duff) on that platform, and an access route through the canopy that a murrelet could use to approach and land on the platform.
- And it has a tree branch or foliage, either on the tree with potential structure or on a surrounding tree that provides protective cover over the platform.

All stands proposed for commercial thinning were reviewed for the capacity to contain potential murrelet habitat and structure. Review of aerial photographs showed no residual mature trees present in stands proposed for treatment. All stands proposed for thinning are less than 60 years old. Based on personal observations, younger aged stands are not likely to develop limb platforms reaching 5.9 inches. Trees greater than 19 inches in diameter-at-breast height and greater than 107 feet in height do occur within some stands.

Cursory walkthrough surveys in several stands within the watershed, in addition to walkthrough surveys on hundreds of acres of similar stands throughout the South Zone District have revealed extremely rare instances of mistletoe broom and other deformities that would create a suitable nesting platform within managed stands. Given the young stand ages in the project area, the chance of potential nesting structure occurring within treatment stands is unlikely. However, the possibility cannot be ruled out. Surveys for potential structure within stands that have larger trees (average diameters greater than 15 inches and heights greater than 100 feet) will be conducted during the layout, cruising, or marking phase of pre-sale implementation. Any observed tree that has the required potential structure characteristics described above will be assessed by a unit wildlife biologist and protected according to Level 2 direction, if necessary (appendix A).

Under Alternatives 2a, 2b, 3, 4, and 5, proposed terrestrial restoration activities generating noise above ambient levels and implemented during the critical portion of the nesting season (April 1

through August 5) may affect, and are likely to adversely affect nesting murrelets due to disturbance if within 300 feet (depending on the type of activity) of known occupied sites, or suitable habitat that has not been surveyed. These same activities conducted between 300 feet and 0.25 mile of occupied sites or unsurveyed suitable habitat, may affect, but are not likely to adversely affect murrelet nesting.

Haul on roads with maintenance levels lower than primary and secondary roads may affect and is likely to adversely affect murrelets during the period April 1 through August 5 if within 300 feet of known sites or unsurveyed suitable habitat. Haul during this period, and occurring between 300 feet and ¼ mile of known sites or suitable habitat may affect, but is not likely to adversely affect murrelets. Haul on roads with primary and secondary maintenance levels within ¼ mile of known sites or unsurveyed suitable habitat may affect, but is not likely to adversely affect murrelets during the nesting season.

Activities generating noise above ambient levels and occurring within 300 feet to 0.25 mile of unsurveyed suitable habitat or an active nest site during the non-critical portion of the nesting season (August 6 through September 15) may affect, but are not likely to adversely affect nesting murrelets. Activities occurring outside the nesting period (September 16 through March 31), or further than 0.25 mile from an occupied site or unsurveyed suitable habitat during the nesting period, will have no disturbance effect on nesting murrelets.

All stands proposed for commercial thinning units are located within ¼-mile of unsurveyed suitable murrelet habitat. To minimize disturbance, thinning within 0.25 mile of unsurveyed suitable habitat and occurring during the period April 1 through September 15 will not begin until 2 hours after sunrise and will end 2 hours before sunset (appendix A). Portions of some stands are located within 300 feet of occupied murrelet sites (table 10), and will be harvested outside the marbled murrelet critical nesting period (after August 5).

Occupied murrelet sites exist within 300 feet of several potential commercial log-hauling routes. Due to scheduling of operations, hauling from three stands (046, 047, and 053) would be within 300 feet of occupied sites during the critical portion of the nesting season. Commercial hauling along these routes is estimated to be above ambient noise levels. Therefore, in order to avoid negative effects to murrelets potentially nesting within 300 feet, hauling associated with these stands will not occur during the period April 1 through August 5 (appendix A). Haul on these routes during the period August 6 through September 15 may affect, but is not likely to adversely affect, nesting murrelets. Table 8 summarizes the amount of harvest disturbance estimated for each alternative, while table 9 shows the determinations and levels of effects generated by activities under each alternative.

Table 8. Commercial thinning acres near marbled murrelet sites or habitat

Acres within ¼-mile of marbled murrelet sites/habitat	Alternatives 2a, 2b, and 5	Alternative 3	Alternative 4
Acres within 300 feet of occupied murrelet sites	482	482	380
Acres within ¼ mile of unsurveyed suitable murrelet habitat	2,352	1,907	1,594
Acres to be thinned within 300 feet of suitable habitat	476	318	289

Table 9. Proposed activities and expected disturbance effects on marbled murrelets

Marbled murrelet	Operating period and effects determination* for disturbance											
Activity	April 1 - July 7			July 8 - Aug. 5			August 6 - Sept. 15			Sept. 16 – March 31		
	MA-LAA			MA-LAA			MA-NLAA			NE		
	Alt 2a, 2b, 5	Alt 3	Alt 4	Alt 2a, 2b, 5	Alt 3	Alt 4	Alt 2a, 2b, 5	Alt 3	Alt 4	Alt 2a, 2b, 5	Alt 3	Alt 4
Commercial thinning (acres)	0	0	0	557	399	345	951	926	638	531	269	298
Noncommercial thining (acres)	0	0	0	0	0	0	0	0	0	97	717	1,216
Precommercial thinning (acres)	0	0	0	0	0	0	0	0	0	2,284	2,284	2,284
Hazard tree removal (trees)	0	0	0	0	0	0	0	0	0	10	10	10
Upland tree plant/release (acres)	0	0	0	0	0	0	0	0	0	1,032	869	718
Noxious weed control (mechanical only)	0	0	0	35	30	30	105	40	20	0	0	0
Plantation snag creation (acres)	0	0	0	0	0	0	0	0	0	2,039	1,594	1,281
Mature snag creation (trees)	0	0	0	0	0	0	0	0	0	249	249	249
Coarse wood creation (acres)	0	0	0	0	0	0	0	0	0	826	676	594
Early-seral maintenance (acres)	0	0	0	29	29	17	0	0	0	0	0	0
Road decommisson (miles)	0	0	0	0	0	0	8.5/6.1**	6.1	6.1	0	0	0
Temporary road work (miles)	0	0	0	10.6	0	0	0	0	0	0	0	0
Road repair work (miles)	0	0	0	38.4***	0	0	0	0	0	0	0	0
Fuels treatment (acres)	0	0	0	100	100	100	40	32	32	0	0	0
Roadside thinning and salvage (acres)	0	0	0	0	0	0	0	0	0	313	313	313

* MA-LAA = May affect, Likely to Adversely Affect, MA-NLAA = May Affect, Not Likely to Adversely Affect; NE = No Effect.

**8.5 miles for Alternative 2a; 6.1 miles for Alternatives 2b and 5.

***Road repair work would only be done under Alternative 5.

Bald eagle--Under Alternative 1, no action, would not thin or implement any activities within areas adjacent to known nest sites or unsurveyed suitable habitat. Therefore, potential short-term disturbance impacts to eagles would be avoided. Long-term benefits, including accelerating growth and development of 367 acres of future nesting habitat (stands within 1 mile of major rivers or ½ mile from major tributaries), would not occur. This alternative would not implement any activities within ½ mile of known nest sites or unsurveyed suitable habitat and would therefore not affect the bald eagle.

Under Alternatives 2a, 2b, 3, 4, and 5, no suitable bald eagle nesting habitat is located in stands proposed for commercial thinning or associated actions. Thus, no loss of suitable nesting habitat will occur from implementing these activities. Up to 367 acres of thinning treatments will occur within unsuitable habitat in areas with higher potential for nesting (within 1.0 mile of major rivers or 0.5 mile of major tributaries) under all action alternatives. Such treatments are expected to provide long-term benefits for eagles by accelerating tree growth, thereby speeding the transition from unsuitable to suitable habitat. Therefore, commercial thinning is expected to have no effect on bald eagles.

Felling of hazard trees used as guy-line anchors is expected to have no effect on bald eagle suitable habitat since landing locations generally are not in areas conducive to eagle nesting and management requirements direct tree selection away from suitable nest trees (appendix A).

No treatments are scheduled to occur within 0.25 mile or 0.5 mile line-of-sight of a known nest site. Some activities will occur within 0.25mile of suitable unsurveyed habitat. However, due to the lack of bald eagle sightings in the area, the potential for presence of an unknown nest is low. Therefore, disturbances from operations conducted within ¼ mile (1/2 mile line-of-sight) of unsurveyed suitable habitat may affect, but are not likely to adversely affect nesting bald eagles.

Northern spotted owl—Under Alternative 1, the managed stands in the project area would continue to develop without further silvicultural management (Bailey and Tappenier 1998). Typical attributes of spotted owl critical habitat, such as a multi-layered, multi-species canopy with large overstory trees, large trees with deformities, large snags, accumulations of coarse woody debris, and open flying space below the canopy, are absent in these managed stands, and development of such characteristics would be delayed without treatment (Oliver and Larson 1996). Managed stands in the area would continue to provide dispersal cover and marginal foraging habitat. However, the above-mentioned attributes typical of nesting and roosting habitat are likely to take much longer to develop compared to stands thinned under the action alternatives.

Stands in the planning area have reached density levels in which individual trees are competing with each other for growing space. Without thinning, trees have less chance to express dominance until the self-thinning process begins. If left untreated, some stands may never develop a diverse, multistory, multi-species canopy before the next major disturbance (Franklin et al. 2001). Snags and coarse wood would not be added to stands at the present time but would be recruited at a higher rate and volume over the next 10 to 20 years than in thinned stands; however, because of their small diameter, they would decay rapidly compared to the larger diameter snags and coarse wood in thinning stands. Since no actions would be implemented, there would be no noise-associated disturbance to spotted owls.

Under Alternatives 2a, 2b, 3, 4, and 5, changing canopy cover, or altering snag or coarse wood composition has the potential to modify forest habitats that support spotted owls. The plantations and areas adjacent to key forest roads were evaluated for thinning and are not considered suitable nesting, roosting, or foraging habitat for northern spotted owls. Thus, commercial thinning will have no effect on spotted owl suitable habitat. Commercial thinning may affect critical habitat, but since no loss of primary constituent elements is expected to occur, impacts are expected to be relatively minor. Thinning prescriptions for all stands occurring in critical habitat will maintain at least 40% canopy closure by thinning them to a minimum density of 60 trees per acre.

Stands proposed for commercial thinning are considered dispersal habitat. Treatments that reduce canopy closures to less than 40% over an entire stand where trees average greater than 11 inches diameter at breast height (DBH) are expected to remove owl dispersal habitat. Currently, all quarter townships in the analysis area exceed the minimum of 50% federal acres in dispersal habitat. Based on data obtained from stands thinned in the Oregon Coast Range (Forest Vegetation Simulator model), post-treatment canopy cover for stands 30 to 50 years old remains above 40% until trees per acre (TPA) densities fall below 45, 40, and 35 TPA for 30, 40, and 50 year-old stands, respectively. Since the action alternatives propose 60 and 90 TPA prescriptions for tree density retention for most stands and all treatments will retain more trees and canopy closure than the lower thresholds described above, no loss of dispersal habitat is expected. Several stands proposed for treatment are less than 30 years old, but treatments are still expected to retain dispersal habitat in these stands due to the time lag between completion of this report and implementation of thinning.

Under Alternatives 2a/2b/5, and 3/4, a total of about 129 acres and 70 acres, respectively (stands 65, 147, and 148), will be thinned to 40 TPA to retain greater than 30% canopy closure. Consequently, short-term loss of dispersal habitat in these stands is expected. However, dispersal habitat in all quarter townships is expected to remain above 50% after thinning. Based on results obtained by Emmingham (1996) and Chan (pers. comm.) in the Oregon Coast Range, canopy closure in stands thinned to 30 TPA is expected to return to 40% in 5 to 7 years. Therefore, canopy closure in stands thinned to 40 TPA under this project is expected to return to 40% in less than 5 to 7 years.

Mature stands occur adjacent to plantations proposed for commercial thinning and along open roads, thereby creating the potential for cutting some mature trees that become hazard trees when used for anchoring a log-yarder tower or to secure open roads. Occupational Safety and Health Administration (OSHA) standards require that an overhead hazard must be removed, which means felling a tree if it is tall enough to reach the yarder if the tree were to be pulled over. An estimated 40, 40, 30, 26, and 40 landings will be located in areas adjacent to mature trees under Alternatives 2a, 2b, 3, 4, and 5, respectively. Mature trees may be used as guy-line trees since there may be no alternative guy-line trees (such as adequate-sized plantation trees) available. Up to 120, 90, and 78 mature trees under alternatives 2a/2b/5, 3, and 4, respectively could be used as guy-line trees, and may be felled to meet safety requirements at landings.

Project design criteria will be applied to minimize felling of mature trees and suitable nest trees, including no felling of known nest trees, felling of suitable nest trees as a last resort, and no felling of suitable nest trees during the nesting season. Due to the location of guy-line and other

hazard trees (along an edge, adjacent to road corridors) use of such trees for spotted owl nesting is less likely. However, the possibility exists that a potential active nest tree not known to be active could be felled outside the nesting season—estimated at up to 5 trees. Therefore, felling of mature guy-line trees and other hazard trees may affect, and is likely to adversely affect spotted owls. Felling hazard trees may affect critical habitat; however, since these trees are scattered throughout the watershed, felling these trees is not expected to alter the function of critical habitat.

Actions implemented during the critical portion of the owl nesting season (March 1 through July 7) may affect, and are likely to adversely affect nesting owls due to disturbance if they create noise above ambient levels within 300 feet (depending on the type of activity) of known nest sites, activity centers, or suitable habitat that has not been surveyed. Activities generating noise above ambient levels and occurring within 300 feet of unsurveyed suitable habitat or an active nest site during the non-critical portion of the nesting season (July 8 through September 30) may affect, but are not likely to adversely affect nesting owls. Activities occurring outside the owl-nesting period (October 1 through February 28) will have no effect on nesting owls. Thinning and associated actions as well as other project actions were considered in making these determinations.

No commercial thinning or associated actions (including temporary road reopening and building, and log hauling) are scheduled to occur within 300 feet of active owl nests or unsurveyed suitable habitat during the critical portion of the owl-nesting season (March 1 through July 7). Three activities—upland planting, release, and fuels treatments—are scheduled to occur during the critical portion of the nesting season. Fuels treatments consist of broadcast burning in two units, one of which (unit 104) is within ¼ mile of a known owl nest site. However, since topography buffers above-ambient noise levels from reaching the nest site, broadcast burning is expected to have no effect on owl nesting at this site. The remainder of proposed activities will be implemented outside the critical portion of the owl-nesting season. The effects on owls from noise-associated disturbance during management activities associated with the action alternatives are summarized in table 10. The "Alt2" columns reflect Alternatives 2a, 2b and 5.

Listed species cumulative effects—Alternative 1, no-action, will have no adverse cumulative effects on existing northern spotted owl and marbled murrelet suitable habitat. However, failure to treat and release existing overstocked conifer stands is expected to have long-term adverse consequences for these species, including inhibited population expansion and recovery of local populations.

Currently, there are no other commercial thinning operations planned or operating on National Forest System lands in the Yachats watershed. Some additional timber harvesting is expected on private lands (see Other Predicted Effects section in this document). Since projects on federal land will span up to 8 years, it is likely that some operations on private lands will coincide with those on federal lands, potentially increasing overall disturbance. Road-haul permit requests for commercial haul on Forest Service roads in the watershed are likely to occur regardless of the status of this project's implementation. In addition, public use of open Forest Service roads in the watershed for a variety of commercial and recreational activities is expected to continue.

While short-term overlaps in federal and private land disturbance activities will likely occur, such disturbance is not expected to be substantial since very little suitable habitat is found on private lands in the watershed. In the long-term, thinning overstocked stands on federal lands is expected to benefit species dependent on late-successional habitat such as the marbled murrelet and northern spotted owl, offsetting short-term disturbances.

Table 10. Proposed activities and expected disturbance effects on northern spotted owls

Northern spotted owl	Operating period and effects determination* for disturbance											
Activity	March 1 - July 7			July 8 - Aug. 5			August 6 - Sept. 30			Oct. 1 – Feb. 28		
	MA-LAA			MA-NLAA			MA-NLAA			NE		
	Alt 2a, 2b, 5	Alt 3	Alt 4	Alt 2a, 2b, 5	Alt 3	Alt 4	Alt 2a, 2b, 5	Alt 3	Alt 4	Alt 2a, 2b, 5	Alt 3	Alt 4
Commercial thinning (acres)	0	0	0	557	399	345	951	926	638	531	269	298
Noncommercial thining (acres)	0	0	0	0	0	0	0	0	0	97	717	1,216
Precommercial thinning (acres)	0	0	0	0	0	0	0	0	0	2,284	2,284	2,284
Hazard tree removal (trees)	0	0	0	0	0	0	0	0	0	10	10	10
Upland tree plant/release (acres)	0	0	0	0	0	0	0	0	0	1,032	869	718
Noxious weed control (mechanical only)	0	0	0	35	30	30	105	40	20	0	0	0
Plantation snag creation (acres)	0	0	0	0	0	0	0	0	0	2,039	1,594	1,281
Mature snag creation (trees)	0	0	0	0	0	0	0	0	0	249	249	249
Coarse wood creation (acres)	0	0	0	0	0	0	0	0	0	826	676	594
Early-seral maintenance (acres)	0	0	0	29	29	17	0	0	0	0	0	0
Road decommisson (miles)	0	0	0	0	0	0	8.5/6.1**	6.1	6.1	0	0	0
Temporary road work (miles)	0	0	0	10.6	0	0	0	0	0	0	0	0
Road repair work (miles)	0	0	0	38.4***	0	0	0	0	0	0	0	0
Fuels treatment (acres)	0	0	0	100	100	100	40	32	32	0	0	0
Roadside thinning and salvage (acres)	0	0	0	0	0	0	0	0	0	313	313	313

* MA-LAA = May affect, Likely to Adversely Affect; MA-NLAA = May Affect, Not Likely to Adversely Affect; NE = No Effect.

** 8.5 miles for Alternative 2a; 6.1 miles for Alternatives 2b and 5.

***Road repair work would only be done under Alternative 5.

Sensitive species—Of the sensitive species listed for the Siuslaw National Forest, only the Pacific shrew, southern torrent salamander, the Pacific fringe-tailed bat, and western pond turtle occur in the project area. The remaining sensitive species will not be affected by project actions because they either do not occur in the project area or suitable habitat elements for these species are lacking in and adjacent to the project area.

Pacific shrew—This species is known to occur on the Forest and habitat elements appear to be suitable in the project area. Habitats include riparian habitat adjacent to or in forested areas, especially areas with salmonberry and alder (Maser 1998). Important habitat elements include

large, down logs. By adding coarse wood (down logs) and not removing existing down logs in commercially thinned plantations, the action alternatives are expected to enhance habitat for Pacific shrews. Proposed treatments may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Alternative 1, no action, will have no effects on Pacific shrews or their habitat.

Southern torrent salamander—Preferred habitat includes forested areas with high humidity and dense canopy cover. Small, cold streams with water seeping through moss-covered gravel are preferred (Corkran and Thoms 1996). Larvae are found in the gravel of streams and seeps. Adults are rarely found more than a meter from a stream edge. No individuals have been reported in the vicinity of the project area; however, no surveys specific to torrent salamander have been conducted.

Actions that remove habitat, alter microclimates, and introduce sediment to streams are detrimental to this salamander. No-cut buffers adjacent to streams in plantations extend beyond the expected distribution of this species and are expected to maintain existing habitat and avoid sedimentation of streams. Proposed treatments may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Alternative 1, no action, will have no effect on this species.

Pacific fringe-tailed bat—Christy and West (1993) describe fringe-tailed bats as using caves, mines, and buildings for hibernation, maternity, and solitary roosts. None of these structures will be affected by the action alternatives. They feed predominately on moths along forest edges, roads, or open areas in the forest. Guenther and Kucera (1978) stated this species uses, but is not dependent upon snags and down material. Under the action alternatives, proposed thinning treatments are expected to benefit this species by opening canopies, thereby improving forage habitat. Creating snags in plantations and adjacent mature stands is also expected to benefit fringe-tailed bats. Alternative 1 will have no effect on this species.

Western pond turtle—This turtle inhabits marshes, sloughs, lakes, ponds, and slow-moving portions of creeks and rivers. Both fresh and brackish water may be used. The turtle generally requires emergent basking sites such as partially submerged logs, vegetation mats, rocks, or mud banks. It also seems to favor sites providing underwater refuge such as undercut banks, submerged boulders, and roots.

No suitable habitat for this species exists in stands and other areas proposed for treatment. Proposed activities under the action alternatives will have no effect on western pond turtles. Alternative 1 will have no effect on western pond turtles.

Land birds—Land birds, including migrant and resident species, are those that generally use terrestrial and wetland habitats. The project area contains habitats these species use such as forest canopies, snags, understory vegetation and structure, and existing openings. Some landbirds expected in the project area include olive-sided flycatchers, tree swallows, Swainson’s thrush, and black-throated gray warblers.

When comparing land-bird use in thinned versus unthinned young stands, studies have shown a variety of responses, ranging from dramatic increases for some species to decreases for others

(Hayes 2001, Hagar and Howlin 2001, Hagar 1999). According to research, no bird species endemic to the Oregon Coast Range is unique to closed-canopy stands with limited understory development (Hayes et al. 1997).

Under Alternative 1, dense young forests will continue to limit the number and species of land birds that use them.

There is potential for physical disruption of land-bird nesting by commercial thinning operations conducted during the breeding season. By scheduling thinning operations to the period after July 7, a large portion of the land-bird nesting season will be avoided, and a majority of thinning (73%) will occur after August 5 when nesting is completed or outside the nesting season for most species (USDA 1992). For these reasons, the project is not expected to adversely affect local populations of land birds through nesting disturbance.

Proposed treatments under the action alternatives are expected to benefit species dependent upon more open stands as well as stands with more developed understories. Thinning will increase these habitat conditions. Foraging opportunities for cavity nesters are expected to increase by creating over 6,700 snags in the project area. Long-term benefits for species relying on mature conifer habitat are expected since treatments will accelerate growth and development of mature stand characteristics in forests that may otherwise stagnate for long periods in the younger age classes.

Opening young, dense stands in close proximity to pasture and farmlands may increase the incidence of nest parasitism from brown-headed cowbirds (Hagar and Howlin 2001). Approximately 122 acres of commercial thinning would occur adjacent to pasture lands, and may increase the potential for nest parasitism. Due to the small area, however, adverse effects to local populations are not expected. The risk of parasitism will diminish in 5 to 10 years as tree canopies close.

Since no species are expected to be completely displaced from stands by thinning, the amount of habitat affected is relatively small, and thinning operations will be scheduled late in the nesting season or outside the nesting season, local populations of land birds are not expected to be adversely affected by any of the action alternatives and no intentional take of migratory birds is expected.

Survey-and-manage animal species--Standards and guidelines in the Northwest Forest Plan (USDA, USDI 1994b) require surveys for certain species of rare plants and animals before ground-disturbing activities are conducted. Under the recent Record of Decision (ROD) To Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines (USDA, USDI 2004b), this project has fully complied with S&M mitigation measure standards and guidelines in effect at that time. Following ROD direction for ongoing and current management activities (page 9), no additional surveys are required.

The red tree vole (*Arborimus longicaudus*) and Oregon megomphix (*Megomphix hemphilli*) are the only survey-and-manage species in the project area.

By not thinning under Alternative 1, no effects on these species are expected.

Under Alternatives 2a, 2b, 3, 4, and 5, surveys are not required for the red tree vole because affected areas do not contain the required habitat conditions. Snag creation for mature trees is not expected to have substantial adverse impacts on the species' habitat, life cycle, microclimate, or life support requirements.

Under the action alternatives, surveys are not required for the Oregon megomphix. Protocol surveys for this species have been conducted on about 8,200 acres of the Forest's South Zone since 1997. To date, no positive accounts of this species have been found. Consequently, the potential for impacts to habitat or species occurrence in managed conifer stands is extremely low. Because project activities will avoid suitable habitat such as large coarse wood or big-leaf maple, no adverse effects on this species are expected.

Management-indicator species--Marten, spotted owl, pileated woodpecker, and the primary cavity nesters were selected as indicator species because they are associated with habitat conditions of late-successional and mature forests, such as multiple-storied stands containing large mature trees, defective trees, large snags, and down wood. Ruffed grouse were selected as indicator species because they are associated with the habitat conditions of hardwood and conifer-hardwood mixed stands.

Under alternative 1, no short-term adverse effects on these species will occur. However, it will take longer to develop mature forest characteristics in plantations, thereby delaying the development of habitat that is preferred by all management-indicator species except ruffed grouse. Alternative 1 is expected to have no effects on ruffed grouse.

With the exception of creating snags from mature trees and felling mature trees to remove hazards from logging operations (guy-line trees), activities proposed under Alternatives 2a, 2b, 3, 4, and 5 occur outside suitable habitat for martens, spotted owls, and pileated woodpeckers, and are not expected to have adverse effects on local populations or habitats. Thinning is expected to benefit these species in the long term by speeding the development of mature forest conditions. Snag creation from mature trees is expected to provide short- and long-term benefits for martens and spotted owls, while providing forage for pileated woodpeckers and primary cavity nesters. The cumulative effects of activities on these species would be to increase their suitable habitat in the long term, thereby having an increasing effect on local populations. No effects on local populations of ruffed grouse are expected as a result of any management action.

Early-seral maintenance and wildlife habitat enhancement—Because most of forest management emphasizes promotion of late-successional habitat, there is a need to maintain or enhance at least some level of early-seral habitat. Early-seral serves as foraging habitat for several species of landbirds such as tree swallow, western screech owl, rufous hummingbird, and common nighthawk, as well as other species, including deer, elk, and bear. Under Alternative 1, about 29 acres of existing meadows would be lost over time as trees encroach on them. Under Alternatives 2a/2b/5, 3, and 4, about 29, 29, and 17 acres of existing meadows would be maintained, respectively. In addition, Alternatives 2a/2b/5, 3, and 4 would encourage the growth of herbaceous vegetation on 108, 10, and 6 acres, respectively, through underburning stands 011, 012, 065, 087, and 504280 after commercial thinning and before snag and down wood creation. Based on the existing ground-vegetation layer of these stands, there is a likelihood that the

herbaceous layer would spread over treated acres after burning, further increasing the availability of early-seral vegetation while retaining a conifer overstory.

Listed, sensitive, and survey-and-manage plants (Forest Botanist)—This project was initiated in October 2002. The project area and activities of all alternatives were evaluated following S&M standards and guidelines in effect during the spring and summer of 2003. Under the recent Record of Decision (ROD) To Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines (USDA, USDI 2004b), this project has fully complied with S&M mitigation measure standards and guidelines and special status plant species policies in effect at that time. Following ROD direction for ongoing and current management activities (page 9), no additional surveys are required.

The Forest botanist has evaluated the potential effects of the proposed activities under the action alternatives on listed (threatened and endangered) and sensitive plants. He concluded that no listed or sensitive plant species or potential habitat is known or suspected in or adjacent to proposed project sites and project activities will have no direct or indirect effects on these species.

Loose-flowered bluegrass, *Poa laxiflora*, a species protected under a conservation strategy (USDA 1993a), is found in the project planning area. Four protected conservation strategy populations of this species are identified in the Yachats basin. None of the conservation strategy populations are located in proposed project sites. Two of the conservation strategy populations, Meeks Meadow population # 45 and School Fork population #42, are located in riparian buffers near stands proposed for commercial thinning. Design criteria, such as no-cut buffers along riparian areas, are expected to provide adequate protection for these two populations; therefore, no effects to them are expected. Proposed activities under the action alternatives are not expected to adversely affect the loose-flowered bluegrass populations in the Yachats 5th-field watershed. Alternative 1 will have no effect on this species.

Proposed activities under the action alternatives and their potential effects on survey-and-manage fungi, lichens, bryophytes and vascular plant species (USDA, USDI 2001) were evaluated by the Forest Botanist. Surveys were conducted for six survey-and-manage plant species where proposed activities are located in potential habitat for species requiring pre-disturbance surveys (categories A and C). One category-A survey-and-manage lichen site (*Ramalina thrausta*) was found. The site is located in a mature conifer stand proposed for snag creation in the North Yachats sub-watershed. A 300-foot buffer will be implemented around the site (appendix A) to eliminate potential adverse effects. Based on the 300-foot buffer and location of other proposed project activities, no direct effects to current survey-and-manage (category A and C) plant species are expected from the action alternatives. Because project actions under the action alternatives are designed to promote the development of complex and diverse late-successional habitat in young managed stands, beneficial indirect effects to these species could result over the long term. Alternative 1 will have no effect on these species.

Noxious and undesirable weeds (Forest Botanist)—Ground disturbing activities which result in exposed mineral soil on sites with moderate to full sunlight exposure greatly increase the potential for noxious or undesirable weed colonization and establishment. Thinning prescriptions

that leave residual stand densities of 60 to 100 trees per acre generally provide adequate canopy cover to prevent most noxious and undesirable weeds from colonizing.

Under the action alternatives, building new temporary roads (Alternatives 2a, 2b, and 5 only), temporarily reopening roads (Alternatives 2a, 2b, and 5 only), removing and depositing sidecast waste material (Alternatives 2a, 2b, and 5 only), removing culverts, using landings with fan-shaped settings, and prescribing 50 trees per acre or less for some commercial thinning stands, increase the potential for weed colonization and establishment. Stands accessed by road systems that support moderate to high weed populations are at great risk of weed colonization and establishment. Decommissioning roads generally reduces the potential for weed colonization and establishment over the long-term by eliminating frequent ground disturbance associated with road maintenance operations, eliminating heavy equipment and vehicle traffic as a potential weed-seed vector, and allowing forest vegetation and canopy development over the road (USDA 2003b).

Based on information gathered from a summer 2002 noxious weed survey for the Yachats watershed, the Forest noxious weed coordinator evaluated the potential for weed colonization of disturbed sites as a result of project actions for each alternative. The amount of temporary road construction and unclassified road reopening, proposed logging systems, silvicultural prescriptions, and the proximity of known weed infestations and seed sources/vectors were used in assessing risk of weed colonization for each proposed commercial thinning unit and other project sites under the various action alternatives. Established weed species in the project vicinity that are expected to colonize at least some of the affected areas include Scot's broom (*Cytisus scoparius*), Himalaya berry (*Rubus procerus*), evergreen blackberry (*Rubus lacinatus*), bull thistle (*Circium vulgare*), and tansy ragwort (*Senecio jacobaea*).

Preventive measures identified in appendix A are expected to provide adequate resistance to noxious weed colonization over the majority of the project area. Colonization of disturbed sites by noxious weeds is anticipated in some specific areas of the project, primarily in moderate and high risk units located in subwatersheds with well-established weed populations adjacent to roads. Unless remedial action, weed colonization and establishment is likely to occur on about 245 acres under alternatives 2a, 2b, and 5, 147 acres under alternative 3, and 99 acres under alternative 4. The KV plan includes high-priority funding for controlling the spread of weeds in these acres because noxious weed control is deemed to be mitigation. An "early treatment" vegetation management strategy will be implemented, using a single application of manual, mechanical, or biological control methods to provide sufficient control of weeds to allow desirable species to occupy disturbed areas.

In summary, by following preventive measures in appendix A, the risk of noxious weed infestation on disturbed areas should be reduced to acceptable levels over most of the project area. By monitoring the effectiveness of preventive measures and including additional weed treatments where warranted, weed infestation levels are not expected to exceed current levels and may likely be reduced below current levels in the project area in the foreseeable future. In the long term, noxious weed infestation is expected to decline in the project area as tree-crown cover increases. Alternative 1 is expected to maintain current weed infestation levels in the foreseeable future.

Sediment Production (*District Hydrologist*)

Introduction—"Sediment is the product of erosion, whether it occurred as surface, gully or soil mass erosion" (Brooks, et al, 1991). Sediment can be both harmful and helpful to the proper functioning of streams. For instance, landslides are an important natural process that inputs sediment and wood for spawning habitat, yet they can also be a chronic source of fine sediment that can damage young salmonids or foul water systems (USDA 2003a).

Alternative 1 will not change existing slope stability in stands proposed for commercial thinning, since no activities will occur in them. Sediment will continue to be generated from poorly maintained roads. By not reopening and closing any roads for thinning or decommissioning 8.5 miles of road, about 30,781 cubic yards of fill over 33 culverts—including 12 stream channel crossings—will be maintained over streams. This material could potentially enter streams if culvert inlets become obstructed or aging culverts collapse. About 1,000 cubic yards of side-cast material along about 2,800 feet of roads in four sub-basins (North Fork, School Fork, Upper Yachats, and Yachats) will not be stabilized.

Thinning and sediment from surface or gully erosion—Based on past observations of similar projects, commercially thinning stands and areas adjacent to key forest roads proposed under the action alternatives is not expected to increase sediment from surface or gully erosion that could enter streams. Project design criteria such as stream buffers and minimum suspension requirements during yarding of logs to landings, have been shown to be effective in preventing sediment from entering streams.

Thinning and sediment from landslides—A variety of factors were used to determine landslide failure risk (USDA 2003a). Existing site-specific field data was used to apply failure risk factors to each commercial thinning unit. Table 11 lists units with at least three landslide risk factors.

To investigate the question of effects of thinning on landslide risk, the South Zone of the Siuslaw National Forest (Mapleton, Oregon Dunes, and Waldport Districts) conducted a review of about 144 units have been thinned in the South Zone since 1982. Forty-four (44) units of interest were identified, based on topography, which were then reviewed in the field. One slide was detected in a unit, which apparently originated from a road. Another slide was in a buffered area, apparently unrelated to thinning. Based on these reviews, we conclude that commercial thinning on steep slopes does not appear to accelerate the natural rate of landslides (Karnes, pers. comm.).

Several design criteria are in place that further minimizes the risk of landslide failures. These include no-harvest areas adjacent to streams and on unstable soils (unstable soils are generally located in no-harvest areas) and restricting road locations to stable areas (appendix A, USDA 2003a).

Based on observations of logging practices and environmental consequences of thinning operations and the local data collected, there is no evidence that thinning increases failure risk and no unit listed in table 11 has a high risk of landslide failure due to thinning activity. Thus, Alternatives 2a, 2b, 3, 4, and 5 are not expected to increase risk of landslide failure in any stand proposed for thinning. Alternative 1 is not expected to alter current landslide risk conditions.

Thinning overstocked, small-diameter trees would help speed the growth and development of conifer in riparian zones, thus making large wood available for stream channels sooner when debris flows occur.

Table 11. Proposed thinning units with a relatively high risk of slope failure, based on slope gradient, soil type, or aspect (all action alternatives)

Watershed	Unit	Landslide Risk Factors				
		Aspect	SRI	WA model	GIS >70%	Stand exam >70%
Lower Yachats	506064	x		x	x	
North Fork Yachats	506001			x		
	506014	x		x	x	
	506041	x		x	x	x
	506042		x		x	x
	506047			x	x	x
	506053	x		x	x	x
	506178			x	x	x
School Fork	506043		x	x	x	x
	506056	x		x	x	x
	506073	x			x	
Stump Creek	506144	x	x			
	506155	x		x	x	x
	506160	x			x	
Upper Yachats	506133	x	x	x	x	
	506154	x	x	x	x	x
	506161		x		x	
	506166	x	x	x	x	x
	506170	x	x			x
Yachats	506037		x		x	
	506058				x	
	506084	x	x			x
	506136	x			x	
	506137	x	x			

Road decommissioning—Under Alternative 2a, about 8.5 miles of non-key roads will be decommissioned, removing about 30,781 cubic yards of fill material from 33 stream crossings. Under Alternatives 2b, 3, 4, and 5, about 6.1 miles of non-key roads will be decommissioned, removing about 11,533 cubic yards of fill material from 33 stream crossings (this range reflects the fill volume reductions estimated from dipping road 5491 where it crosses streams—about 9,910 cubic yards). In addition to removing the fill material, unstable fill from road prisms will be placed in stable areas and water bars will be installed across road surfaces to channel water off the road in stable areas and away from streams.

Roads were chosen for decommissioning based on risk to resources and future expected use. Based on monitoring several road-decommissioning projects on the Siuslaw National Forest, short-term, localized increases in fine sediment occur at fill removal sites. Project design criteria, such covering raw banks adjacent to stream channels with brush, substantially limits erosion and provides roughness for sediment deposition during the first winter. Within one year, vegetation will become established over about 80% of bare-soil areas adjacent to streams based on past observations of similar projects. Most of the sediment transported downstream following road decommissioning originates from the sediment plain that often forms just upstream of culverts. Where large sediment plains exist, brush and logs are placed into the opened channel to help stabilize the sediment plain. Based on design criteria to be used and past observations, Alternatives 2a, 2b, 3, 4, and 5 are not expected to have any measurable impacts on stream sedimentation in the short term and are expected to increase soil stability in the long term.

Table 12 compares the road decommissioning effects of the alternatives on the existing road density of all known roads in each subwatershed and the entire 5th-field watershed, including state, county and private roads.

Table 12. Comparing road decommissioning effects on road density

Sixth Field Watershed	Alternative	Current Road Density (mi/mi^2)	Temporarily Reopen Roads[a] (mi)	New Temporary Roads[a] (mi)	Decommissioned Roads (mi)	Projected Road Density (mi/mi^2)
Lower Yachats	1	2.57	0.0	0.0	0.0	2.57
	2a, 2b, 5		0.62	0.07	0.84	2.48
	3 and 4		0.0	0.0	0.84	2.48
North Fork	1	3.40	0.0	0.0	0.0	3.40
	2a, 2b, 5		2.88	0.86	0.50	3.36
	3 and 4		0.0	0.0	0.50	3.36
School Fork	1	1.96	0.0	0.0	0.0	1.96
	2a, 2b, 5		1.04	0.05	0.0	1.96
	3 and 4		0.0	0.0	0.0	1.96
Stump Creek	1	3.01	0.0	0.0	0.0	3.01
	2a, 2b, 5		0.04	0.04	1.80	2.60
	3 and 4		0.0	0.0	1.80	2.60
Upper Yachats	1	3.98	0.0	0.0	0.0	3.98
	2a		2.04	0.14	4.90	3.15
	2b and 5		2.04	0.14	2.50	3.56
	3 and 4		0.0	0.0	2.50	3.56
Yachats	1	2.76	0.0	0.0	0.0	2.76
	2a, 2b, 5		2.20	0.62	0.50	2.70
	3 and 4		0.0	0.0	0.50	2.70
Yachats Fifth Field Watershed	1	3.01	0.0	0.0	0.0	3.01
	2a		8.82	1.78	8.54	2.81
	2b and 5		8.82	1.78	6.14	2.87
	3 and 4		0.0	0.0	6.14	2.87

[a] Temporary roads do not affect road density because they are decommissioned after use.

Reducing road densities through road decommissioning is expected to improve the stream-flow regime by reducing impacts to subsurface flow, shortening artificially extended stream channels, and reconnecting stream channels to allow for the passage of wood and sediment. Thus, Alternative 2a would be expected to most beneficial effect in the watershed in the long term compared to Alternatives 2b, 3, 4, and 5, but only by a negligible amount. Alternative 1 would not reduce the current road density in the watershed, and therefore would have the greatest amount of road-caused turbidity.

Temporary road reopening and road and landing building—Under Alternatives 2a, 2b, and 5, about 8.8 miles of roads will be reopened, used during thinning operations, then closed afterwards. Most of these roads have maintained their stability for a period of time and are likely to remain stable. Four culverts have failed and are contributing minor amounts of sedimentation to four different streams. These culverts will be removed and temporarily replaced with new ones. After thinning operations are completed, the new culverts and about 370 cubic yards of fill material will be removed, restoring the natural stream channels.

Design criteria (appendix A), such as covering bare-soil areas with brush, substantially limits erosion from excavated fills during the first winter. Within one year, vegetation will become established over about 80% of bare-soil areas based on past observations of similar projects; therefore, minor amounts of sediment are predicted to enter nearby streams in the short term. Other design criteria, such as installing waterbars across road surfaces, will control surface water erosion. After thinning operations are completed, about 1,000 yards of unstable sidecast material will be removed from affected reopened roads and deposited in stable areas away from streams. Because of distance between temporary roads and streams, sediment production is not expected to be measurable. In addition, removing unstable sidecast material will reduce the potential for sediment entering streams in the long term.

Under Alternatives 2a, 2b, and 5, about 1.7 miles of temporary roads, will be built on stable areas (generally on ridgetops), will not cross streams, and will be waterbarred and closed after use. These roads are not expected to affect sediment production. About 3 acres of skyline landings and 2 acres of helicopter service landings will be built on stable areas, generally on ridgetops, and are not expected to affect sediment production.

No roads will be temporarily reopened and no temporary roads built under Alternatives 3 and 4. Short-term sedimentation caused by these actions, as described for Alternatives 2a, 2b and 5, will be avoided. By not reopening roads, the four failed culverts will not be removed and the natural stream channels will not be restored. These four sites will continue to cause minor amounts of sediment to enter streams. In addition, about 1,000 cubic yards of unstable sidecast material will not be removed and placed in stable areas. Because the sidecast is generally shallow, well vegetated, and is not adjacent to streams, only minor amounts of sediment may enter streams. Alternatives 3 and 4 would build the seven helicopter service landings, with no effects on sediment production expected.

Log hauling—In the short term, turbidity and sediment inputs from Alternatives 2a, 2b, and 5 may increase locally during the log hauling on some roads. Wet-season log hauling has the greatest potential for producing sediment that could enter streams. Wildlife and fisheries

biologists and hydrologists have identified operating seasons to meet the needs of all listed species. For example, summer operations are maximized where operations will not disturb listed wildlife species; winter operations are maximized where adverse effects to listed fish are negligible.

Project design criteria such as requiring monitoring of surface conditions of aggregate roads, placing sediment containment devices in ditches, and temporarily suspending log hauling where needed will be included in timber-sale contracts. These criteria are expected to keep sediment increases small, of short duration, and very limited in geographic extent. Based on the design criteria and proximity to streams, wet-season hauling on aggregate-surfaced roads is not likely to measurably increase turbidity of streams. (USDA 2003c). Effects under Alternatives 3 and 4 will be less than those associated with Alternatives 2a, 2b, and 5 because less stream crossings and less miles of roads will affected by hauling. By limiting access to key forest roads only, sedimentation from log hauling would least under alternative 4. No effect on streams is expected from log hauling on paved roads or bridges over streams under any of the action alternatives because no sediment will be generated from them.

Soil productivity (*District Hydrologist*)

Past timber harvesting in the Yachats River watershed has resulted in the creation of roads, skid trails, and landings where soil compaction and displacement (removal of the upper layers of soil) have altered soil productivity. Typically, soils in this area are surfaced with crushed aggregate to facilitate winter use and compacted by heavy equipment. Soils that were once porous and easily penetrated by water are now susceptible to overland flow and surface erosion. Where topsoil has been removed or excessively compacted, only shrubs, alders, and undersized conifers will grow. Froehlich et al. (1985) and Wert and Thomas (1981) found slow rates of natural recovery of compacted soil restricted primarily to the top 6 inches. Wert and Thomas (1981) observed that heavy compaction persisted at the 8- and 10-inch depths.

Bulk density of soil is often used to characterize compaction. Froelich (1976) has reported that most productive soils in the Pacific Northwest are characterized by relatively low bulk densities, ranging from about 0.5 g/cm^3 to 0.9 g/cm^3, and as a result have high macroporosity, high infiltration rates and low soil strength. Heilman (1981) found that the roots of Douglas-fir seedlings could no longer penetrate soil at about 1.8 g/cm^3. For reference, a road surfaced with igneous rock and then heavily compacted would exceed 2.0 g/cm^3. Pure, igneous rock would be about 2.65 g/cm^3.

Under Alternative 1, no commercial thinning (yarding), temporary road building, road decommissioning or fuels treatment will be done. Soil productivity will not be affected.

Under Alternatives 2a, 2b, and 5, new soil compaction and displacement will be kept to a minimum by reusing existing roads and landings as much as possible, restricting about half of the commercial thinning operations to the dry season, and using helicopter yarding where access is limited. Building new skyline landings will impact (compact and displace) about 3 acres of soil, new helicopter service landings will impact about 2 acres, and new temporary roads will impact about 2.6 acres. About 1.7 miles of new temporary road will be built and located on stable ridgetops to access 27 plantations under Alternatives 2a, 2b, and 5. Road lengths will

range from 100 to 1,300 feet, and based on a 12-foot wide roadbed. Although these roads will be hydrologically stabilized and closed after use, they will remain compacted over the long term. Reusing existing roads and landings is not expected to increase compaction in those areas. Aulerich et al. (1974) and Power (1974) have shown that skyline-yarding systems cause little impact to soil.

No new skyline landings or temporary roads would be built under Alternatives 3 and 4, but building the seven helicopter service landings would occur. Table 13 compares alternative effects on compaction.

Ground-based yarding is planned under Alternatives 2a, 2b, and 5. Ground-based equipment such as harvesters may be used for yarding logs if they operate from roads, or on ground less than 25% adjacent to roads, are limited to the dry season, use logging slash as a buffer between the tread and the ground, and use designated log-skid trails (appendix A). Based on field reconnaissance, maps, and aerial photos, an estimated 45 acres are suitable for ground-based yarding, affecting stands 001 (5 acres); 011, 012, and 504280 (9 acres); 037 (8 acres); 041 (7 acres); 065 (3 acres); 159 (8 acres); and 179 and 180 (5 acres). Based on a trail width of 12 feet and spacing of 150 feet, about 1.8 acres of possible compaction or displacement would be expected. Project design criteria will allow for temporarily stopping ground-based operations if summer rains cause rutting and puddling on skid trails. Specialists, in cooperation with the sale administrator, will determine need for stopping operations. No ground-based yarding would be done under Alternatives 3 and 4.

Helicopter yarding lifts trees, minimizing soil compaction and displacement. Based on past observation, helicopter-yarding effects on soil productivity are expected to be less than skyline yarding.

Based on field reconnaissance, soil compaction and displacement from past timber harvest activities are less than 5% in each plantation, with one exception: stand 175 has about 5-10% compaction and displacement due to several tractor skid roads in its southern portion. Based on restrictions that will limit soil compaction and displacement (appendix A) and past observations on similar projects, we expect soil displacement and compaction to increase in each plantation by no more than 5% under any action alternative. After harvesting is completed, total soil displacement and compaction in each plantation (except stand 175), including past effects and effects of new temporary roads and ground-based equipment skid roads, is expected to be below 10%. In stand 175, compaction and displacement is expected to be below 15% after harvesting is completed. Therefore, effects on soil compaction and displacement are expected to be under the Siuslaw Forest Plan threshold of 15% in any given plantation proposed for commercial thinning. Subsoiling was considered to reduce road compaction in plantations. Because subsoiling also displaces soil, disturbs vegetation (including tree roots) that is serving to decompact roads, and interrupts other natural decompation processes for little to no improvement in soil structure, subsoiling these roads was discarded.

Decommissioning roadbeds will not create any additional soil compaction and displacement because soil movement will be limited to the previously compacted and disturbed roadbed.

Table 13. Comparing effects of alternatives on soil compaction

Yarding system and new temporary roads	Alternative 1	Alternatives 2a, 2b, & 5	Alternative 3	Alternative 4
Skyline-yarding acres	0	1,876	750	289
Helicopter-yarding acres	0	118	844	992
Ground-based yarding acres	0	45	0	0
Ground-based compacted acres	0	1.8	0	0
New temporary road miles	0	1.7	0	0
New temporary road compacted acres	0	2.6	0	0
New skyline landing compacted acres	0	3	0	0
New helicopter service landing compacted acres	0	2	0	0

Alternatives 2a, 2b, 3, 4, and 5 include fuels treatments such as hand piling and burning in commercially thinned stands adjacent to key forest roads, affecting 30 stands and about 36 acres; hand piling and burning in commercially thinned stands adjacent to property boundaries in the wildland-urban interface, affecting 11 stands and about 51 acres; and broadcast underburning in commercially thinned stands located in the wildland-urban interface, affecting 2 stands and about 53 acres. These treatments can potentially affect soil chemistry and productivity through intense heating. Because hand piling and burning affects only about 3 to 5% of the area treated, soil chemistry and productivity should not be adversely affected overall. Because broadcast burning is intended to remove only the fine fuels at low burn intensities, soil chemistry and productivity should not be adversely affected (Walstad et al. 1990).

Water quality—temperature *(District Hydrologist)*

Each 6th-field sub-watershed in the Yachats 5th-field watershed has at least one stream that appears on the DEQ 303(d) list for increased summer stream temperatures. Listed streams include Depew Creek, School Fork Creek, Stump Creek, Williamson Creek, North Fork Yachats River, and the Yachats River. Streams in the analysis area are not listed for any other parameter (DEQ 1998).

Analysis of the effects of the Yachats Terrestrial Restoration Project on summer stream temperatures focused on effective stream shade, since the principal source of heat for small forest streams is solar energy striking the stream surface (Brown 1969). Conditions where effective shade is greater than 80% of complete shading should exhibit no increase in stream temperature (DEQ 1999). Analysis for this planning effort includes modeling the basin for effective shade. Table 14 shows model results in tabular form.

Table 14. Shade model results

Sixth Field Sub-Watershed	Percent of the watershed that is federally managed	Existing Effective Shade	Potential Effective Shade	Shade Loss
Lower Yachats	64%	45%	63%	18%
North Fork Yachats	82%	48%	78%	30%
School Fork	95%	29%	81%	52%
Stump Creek	92%	29%	80%	51%
Upper Yachats	89%	40%	82%	42%
Yachats	66%	30%	76%	46%

Existing effective shade (column 3) is composite, for the basin, of the amount of solar radiation that is prevented from reaching the stream on August 1 due to vegetation within 10 meters of the stream center, topography, and aspect. Potential effective shade (column 4) is the amount of shade that is possible for the basin if vegetation within 10 meters of stream center grew to its potential height. Shade loss (column 5) is the difference between existing effective shade and potential effective shade. The water quality restoration plan (USDA 2003c) describes the limitations of the shade model.

Zwieniecki and Newton (1999) found that 80% of existing shade was maintained adjacent to clear-cuts with no-harvest buffers of less than 33 feet on 14 forested streams in western Oregon. They also found that when stream temperature did increase, the increase was quickly dissipated as the stream moved into a forested reach downstream of the impact. Data on file at the Siuslaw National Forest has also documented reductions in stream temperature as streams move downstream from openings into forested riparian areas.

Alternative 1 does not change the current effective shade during the summer, or the recovery trajectory for the vegetation within ten meters of the stream center.

Before- and after-harvest monitoring of stream temperature from two sites in the Blue Bird commercial thinning sale (Big Blue Project EA, 1996) in Cape Creek watershed (Cummins/Tenmile 5th field), which used similar buffer design criteria as proposed for this project, has found no measurable increase in stream temperature after harvest. Field measurements of effective shade in one of the Blue Bird thinning units, commercially thinned in 1999, showed average effective shade at 80% after harvest. All streams in all stands proposed for commercial thinning with this project were analyzed for effects on stream temperature. Table 15 compares the alternatives and describes the reasons why Alternatives 2a, 2b, 3, 4, and 5 are not expected to affect solar radiation, and therefore, not affect summer stream temperatures. The water quality restoration plan (USDA 2003c) provides more detailed information regarding the effects of commercial thinning on stream temperature.

Thinning under the action alternatives is expected to increase the growth rate of trees in the units and result in taller trees and better shade. This effect is not expected to measurably increase effective stream shade, decrease solar radiation, or reduce summer stream temperatures because less than 1% of the effective shade would be affected in the watershed. Commercial thinning is

not expected to affect other factors that influence summer stream temperatures, such as stream connection to subsurface flow, air temperature, and stream flow regime.

Table 15. Comparing alternative effects on solar radiation

Reasons	Alternatives			
	1	2a, 2b, & 5	3	4
No streams in or adjacent units	0 units 0 ac	16 units 185 ac	15 units 111 ac	11 units 102 ac
Only intermittent streams	0 units 0 ac	28 units 542 ac	27 units 437 ac	16 units 339 ac
Units north of perennial streams	0 units 0 ac	5 units 0 ac	4 units 0 ac	2 units 0 ac
North flowing streams	0 units 0 ac	10 units 301 ac	10 units 244 ac	6 units 173 ac
Riparian areas >100' wide with deciduous trees	0 units 0 ac	20 units 434 ac	16 units 332 ac	13 units 280 ac
Adequate shade within 10m of stream center	0 units 0 ac	5 units 114 ac	4 units 94 ac	2 units 37 ac
Effective shade changed less than 1/100% for sub-basin	0 units 0 ac	9 units 335 ac	9 units 299 ac	7 units 288 ac
Total	0 units 0 ac	93 units 2,038 ac	85 units 1,594 ac	57 units 1,278 ac

Road decommissioning proposed under Alternatives 2a, 2b, 3, 4, and 5 would not have a measurable effect on summer stream temperatures because short-term shade loss at perennial stream crossings is less than 0.01% of effective shade in each 6th-field basin. Shade gained as vegetation recovers at these stream crossings is also less than 0.01% of effective shade in these basins. Road decommissioning restores other watershed processes—such as the flow of large woody debris and sediment across the road prism, and the stream-flow regime—which indirectly lower summer stream temperatures.

Water quality—domestic water sources

About 45 domestic and municipal water sources exist in the Yachats watershed. Of these, about 38 domestic water sources could be affected by proposed activities.

Under Alternative 1, sediment will continue to enter streams from poorly maintain roads and potentially affect domestic water sources. About 30,781 cubic yards of fill material would remain over 33 culverts, some of which could enter streams and affect the water sources if culvert inlets become obstructed or aging culverts collapse. About 1,000 cubic yards of side-cast material would remain along about 2,800 feet of roads in four sub-basins (North Fork, School Fork, Upper Yachats, and Yachats), with little potential for affecting the water sources.

Based on the discussions in the sediment-production section and the design criteria in appendix A, Alternatives 2a, 2b, 3, 4, and 5 are not expected to have any measurable effects on domestic

water sources. By removing the fill material that could potentially affect the water sources, long-term benefits are expected.

Aquatic species (*District Fish Biologist*)

The effects on aquatic species from commercial thinning are primarily related to the long-term development of large trees that are eventually recruited into streams. The short-term direct effects to aquatic species are related to short-term changes on small wood recruitment, potential changes in stream temperature, and potential sedimentation associated with log hauling, road use, and road management.

Large wood production—By not thinning, Alternative 1 will not accelerate the development of large wood in the riparian area. By not decommissioning roads, about 33 culverts would remain in place under Alternative 1 and will prevent wood from moving into large streams. Large woody debris (large wood) creates pools of cool-water refugia and rearing habitat in the summer; provides slack-water refugia during winter high flows for fish and other aquatic species; and provides nutrient input and traps sediment, including gravel required for spawning habitat. Small woody debris (small wood) does function in both small and large streams but its effect on aquatic processes is much different than large wood. Large wood is more effective at forming deep pools, creating floodplain habitat and connecting the aquatic and terrestrial ecosystems during high flows than small wood in all stream sizes during high flows. These large pieces also play a role as key pieces (>24 inches, minimum length 34 feet) resisting downstream transport as well as anchoring and retaining other pieces of wood. Key pieces represent the long-term wood retention ability of the stream (Flitcroft, Jones, Reis and Thom 2002).

Under Alternatives 2a, 2b, and 5, thinning is expected to benefit fish habitat by allowing large wood to develop sooner in areas where large wood can enter streams through natural processes.

Under Alternative 3, the effects from thinning would be similar as described for Alternatives 2a, 2b, and 5. However, by not reopening existing roads or building new temporary roads, about 445 acres of land will not be feasible for commercial thinning operations, including about 350 acres in riparian reserve. Depending on availability of funding, these acres may not be thinned and the opportunity to accelerate the development of large wood for fish habitat may be lost.

Under Alternative 4, the effects from thinning would be similar as described for Alternatives 2a, 2b, 3, and 5. However, by not reopening existing roads or building new temporary roads and limiting access to key Forest roads, about 758 acres of land will not be feasible for commercial thinning operations, including about 629 acres in riparian reserve. Depending on availability of funding, these acres may not be thinned and the opportunity to accelerate the development of large wood for fish habitat may be lost.

Alternatives 2a, 2b, 3, 4, and 5 will include 50-foot, no-cut buffers on perennial channels. The buffer size was used to satisfy consultation with the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries), leaving some of the riparian areas with dense conifer untreated. These untreated areas do not allow for accelerated development of large wood in riparian areas. Based on this research, there is an indication that the 50-foot, no-cut buffers may retard growth and development of trees in the long term because

of our effort to overcome concerns for possible short-term effects such as increase in stream temperature, sedimentation, and loss of small woody debris (Maki 2000).

Under all action alternatives, sources of short-term small wood for streams will be maintained in buffers. Currently, vegetation that is similar in size to that being harvested or larger dominates 82% of the area within 200 feet of streams, providing a large source area of small wood. Sources of long-term large wood for streams will be maintained in the plantations as residual trees (USDA 2003a, appendix A).

Stream temperature—Stream temperatures affect all metabolic and reproductive activities of fish (Barnhart 1986) along with distribution and use of habitat within the entire watershed. Alternative 1 will not implement any activities that could increase summer stream temperature and will not affect coho salmon and other aquatic species. Alternatives 2a, 2b, and 5 will help restore the large conifer to the riparian areas. This large conifer may help reduce stream temperatures by providing shade and down large wood. Because Alternatives 2a, 2b, 3, 4, and 5 are not expected to have immediate affect on summer stream temperatures, no temperature effects on coho salmon and other aquatic species are expected in the short term. Decreases in summer maximum stream temperature will benefit salmonid species that have had their habitat constricted by human-caused temperature increases.

Sedimentation—Sources of sediment can be either harmful or helpful to the function of streams and the species that live in them. Large landslides or road fill failures in small streams lacking large wood can create instable spawning bars and channel widening with secondary erosion as the sediment moves downstream (ODFW 1997). Excess sediment can also reduce the pool abundance and quality needed to sustain aquatic species. The Yachats watershed is lacking large wood needed to help stabilize stream channels in the event that a large landslide or road failure should occur.

Surface erosion of fines from roads and chronic sources of exposed soils can degrade spawning areas and reduce egg to fry survival for salmonids and other aquatic species. Fine sediment, however, is necessary for habitat for other aquatic species such as the Pacific lamprey (Lampetra tridentata). During its larvae stage it burrows into the soft sediment in shallow areas where it lives and feeds from 4 to 6 years (Close et. al. 2002).

Chronic fine sediment or large amounts of sediment may also reduce the capacity of the stream directly by reducing available rearing habitat and indirectly reducing the production of invertebrate food (Barnhart 1986) for the aquatic species in the watershed.

Alternative 1 does not decommission 8.5 miles of roads or stabilize roads that would be reopened for commercial thinning. This alternative would maintain about 30,781 cubic yards of fill over 33 culverts, including 12 stream-channel crossings. This material could potentially enter streams either as a landslide or as a chronic source of sediment if culvert inlets become obstructed or aging culverts collapse. Four (4) culverts, containing a total of about 370 cubic yards of material, are located in original logging spur roads and affect four different streams. These culverts have failed and are a chronic source of a minor amount of sedimentation, creating negligible adverse effects on aquatic species. Two (2) exposed areas of about 20,000 square feet on the 5491 are chronic sediment sources in the sub-basin of the Upper Yachats. In addition, about 1,000 cubic

yards of potentially unstable side cast material along about 2,800 feet of roads in four sub-basins (North Fork, School Fork, Upper Yachats, and Yachats) will not be removed and placed in stable areas. Three of these sites are in units with a high risk of delivering sediment to fish habitat (primarily coho), although the side cast material is shallow and some distance from streams, which moderates this risk.

Due to road decommissioning design criteria for Alternatives 2a, 2b, 3, 4, and 5 (appendix A) and distance between decommissioning sites and coho habitat, road decommissioning is not expected to adversely affects coho salmon (USDA 2003a and USDC 2003). Effects on other salmonids and aquatic species are expected to be minor and short-term. Commercial thinning operations are not expected to cause sedimentation of streams and affect coho salmon, other salmonids, and aquatic species.

Road decommissioning under Alternative 2a will remove barriers (culverts and fills) to wood transport (individually and in debris torrents) from road 5491 so that wood can accumulate in historic locations, be transported downstream at natural rates, and not deprive the stream channels of wood to help store sediments. About 29,160 cubic yards would be removed. Fill material will be removed and deposited in stable areas away from streams from two (2) exposed fill sites along the 5491 road during decommissioning. Alternatives 2b, 3, 4, and 5 reduce the amount of fill acting as barriers to stream channels in road 5491 by about 1/3 or 9,700 cubic yards, but do not remove the barriers.

Because of distance between temporary roads and streams, temporarily reopening roads and building temporary roads under Alternatives 2a, 2b, and 5 are not expected to adversely affect salmonids or aquatic species. By maintaining the 2.4 miles of the 5491 road in Alternatives 2b, 3, 4, and 5, the reduced amounts of material remaining in the channels and the increased culvert sizes will act as less of a barrier than currently exists (Alternative1) to the downstream passage of large wood. The potential still exists for this material to enter streams in the long term, causing possible adverse effects to salmonids and other aquatic species at some point in the future.

Under Alternatives 2a, 2b, and 5, four failed culverts and associated fill material and unstable side-cast material will be removed from roads that will be temporarily reopened. This will eliminate the potential for up to 2,000 cubic yards of sediment entering streams in the long term, benefiting salmonids and other aquatic species. By not removing these 2,000 cubic yards of material, Alternatives 1, 3, and 4 will maintain the potential for this sediment to enter streams in the long term, causing minor adverse effects to other salmon (non coho) and other aquatic species.

Wet-season log hauling has the greatest potential of all activities for adversely affecting coho salmon. Monitoring of several thinning operations on the Siuslaw National Forest have found that very little sediment is eroded downstream when project design criteria are followed. Design criteria, such as requiring monitoring of surface conditions of aggregate roads and limiting haul on road 5491 to the dry season (appendix A), are expected to keep sediment increases small, of short duration, and very limited in geographic extent. Thus, effects to aquatic species from log hauling under all action alternatives are expected to be minor and short-term.

Comparing the alternatives, effects under Alternatives 2a, 3, and 4 will be less than those associated with Alternatives 2b and 5 because less stream crossings and miles of roads will be affected by log hauling. By limiting access to key forest roads only, sedimentation from log hauling would be least under Alternative 4. By repairing and maintaining key forest roads used for log hauling, Alternative 5 is expected to reduce stream sedimentation from that associated with Alternative 2b. After all log hauling is completed, long-term, road-related stream sedimentation is expected to be less under Alternative 5 than that associated with Alternatives 1, 2a, 2b, 3, and 4. In addition, although the potential for a spill is low, the greater the number of stream crossings during haul, the greater the potential for a hazardous spill that can impact streams; therefore, Alternatives 2b and 5 would have the highest risk, while Alternative 4 would have the least risk.

No effects on coho salmon, other salmonids, or other aquatic species are expected from log haul on paved roads or bridges over streams because no sediment will be generated from them. Based on the design criteria and proximity to coho streams, wet-season hauling on aggregate-surfaced roads is not likely to adversely affect coho salmon, other salmonids, or other aquatic species (USDA 2003a).

Fish migration—Robison et al. (1999) documented that upstream migration of juvenile salmonids is prevented or restricted at culverts when outlet drops exceed 6 inches, gradients exceed 0.5%, velocities exceed 2 feet per second, or the depth of the outlet pool is less than 12 inches. Not only are juvenile salmonids restricted, but other aquatics species may not be able to pass through these culverts. Barriers can alter species diversity by causing the local disappearance of some species, making changes to the abundance of remaining species, causing the local extinction of upstream and downstream migrating species, creating unsuitable living or breeding conditions, causing fish to congregate at a barrier leaving them open to disease and predators, limiting passage of fish to feeding grounds, creating isolated populations and reducing gene flow between populations, and restricting migration of fish for spawning (NSW 2001). Up to 9 culverts—8 in the Upper Yachats (road 5491) and 1 in the North Yachats sub-watersheds—on roads planned for decommissioning meet these conditions.

Road 5491 and several of the streams it crosses were surveyed in the field in May 2003. Based on this survey, there are two streams below two culverts that contain fish and the culverts are currently restricting up-stream fish passage. These two streams contain a total of about 0.3 mile of additional fish habitat above the culverts (habitat for other aquatic species exists beyond the fish habitat). Alternative 1 would maintain these fish-passage restrictions. By removing these culverts as under Alternative 2a or replacing them to improve fish passage as under Alternatives 2b, 3, 4, and 5, this additional 0.3 mile of habitat would become more accessible to fish. This 0.3-mile of habitat is 1 % of all fish habitat available in the Yachats watershed and 3% of the fish habitat available in the Upper Yachats 6th field watershed. Of the six remaining culverts in road 5491 that meet the above conditions that restrict fish passage, three contain potential fish habitat above and below the culverts, but no fish were found in each case; and three are in streams that have marginal fish habitat above and below the culverts. Alternative 2a would reconnect the channels of these six streams, potentially increasing habitat for fish and other aquatic species. Alternatives 2b, 3, 4, and 5 may improve fish passage for some of these six streams, depending on availability of funds.

Essential fish habitat—Actions to address the shortage of late-successional habitat under all action alternatives are not expected to adversely affect essential fish habitat for coho salmon, chinook salmon, groundfish, or coastal pelagic fish species (USDA 2003a). This conclusion is based on the design criteria to be implemented, the distance between activity sites and habitat, the minor amounts of sediment that may enter stream channels, no changes in stream temperature, and no lack of small woody debris in the entire watershed.

Because of type, extent, and location of all other proposed activities under Alternatives 2a, 2b, 3, 4, and 5, these activities are not expect to affect coho salmon and other aquatic species; nor will they affect essential fish habitat.

Fire (*Forest Fuels/Fire Planner*)

Based on Forest fire records since 1975, the Siuslaw National Forest has averaged 11 fires, burning about 35 acres a year. People caused about 95% of those fires; in other words, on this Forest, most fires are in accessible areas. As roads continue to deteriorate under Alternative 1, access will continue to become more difficult or be reduced. Therefore, the risk of fire ignitions is likely to be reduced over time. Though commercial thinning may increase fuel loading under Alternatives 2a, 2b, 3, 4, and 5, reduced access associated with road decommissioning is likely to reduce the risk of fire ignitions. Because the potential for fire ignition cannot be eliminated, however, the team is obligated to disclose the potential for wildfire as a result of an ignition in a commercial thinning unit.

Under the action alternatives, about 36 acres of commercially thinned stands that lie adjacent to key forest roads would be treated. Fuel treatments such as burning hand-piled slash would be done adjacent to and within 25 feet of these roads, after thinning operations are completed, to mitigate the potential for wildfire. About 104 acres of commercial thinning units adjacent to private property and within the wildland-urban interface pose an increased fire hazard. Burning hand-piled slash and/or broadcast underburning slash will be done after thinning to mitigate wildfire potential. Because slash volumes are relatively small and treatment areas are scattered, adverse effects to air quality are expected to be short-term and localized.

Road 5492 is in the wildland-urban interface and is currently maintained to provide access for the Bonneville Power Administration and a private landowner. No additional road-surface treatments are required for road 5492 to provide access for fire suppression equipment in case of fire emergency under the action alternatives. If needed, road 5500-518—to be decommissioned under another project—may be used for access by a tractor in a fire emergency.

Andersen (1982) developed aids to assist fuels and fire behavior analysts in determining an appropriate fuel model or models for estimating potential fire behavior. He developed 13 fuel models representing the various components of living and dead vegetation in forest or range-lands across North America. Andrews' (1986) fire-behavior program (BEHAVE) predicts fire behavior characteristics such as fireline intensity, rates of spread, and resistance to control. Using these tools—along with local knowledge and weather variables from Cannibal Mountain—I expect thinning under Alternatives 2a, 2b, 3, 4, and 5 to have the following effects on fuels and the potential results from fire ignitions:

- Commercial thinning in the managed stands will increase fuels on the forest floor, as will adding coarse woody debris gradually.
  - Fuels created from slash will result in the thinning units' falling under the light-slash fuel model (fuel model 11) in the light-to-moderate thinning units and the medium-slash fuel model (fuel model 12) in moderate to heavy thinning units.
  - The fuels are expected to decay over time, decreasing the risk of wildfires. Observations of past thinning have shown decomposition of the fine fuel component (needles and twigs) in 3 to 4 years. This period would be when the thinning slash could support a surface fire.
  - Leaving whole trees on the ground as coarse wood increases resistance to control by fire suppression resources beyond that for fine fuels. Coarse wood does not contribute much to fire hazard because it is mainly the fine fuels that contribute to rapid rates of fire spread. With the addition of coarse wood, fire hazard is expected to remain low due to climate, incremental additions of coarse wood over time, location of coarse wood within stands (favor lower, more moist slopes), average coarse wood pieces per acre throughout the watershed, low coarse wood prescriptions for stands that are in the wildland-urban interface, and reduced access.
- Fire behavior in thinning slash in late summer would create fireline intensities and flame lengths difficult for hand and engine crews to suppress safely and successfully by direct attack.
  - Roads and skid trails would be the primary control lines in indirect suppression, likely increasing the number of acres burned.
  - The late-successional reserve objective to limit the size of all wildfires in the reserve would be difficult to meet.
- Increased fireline intensity could increase the cumulative effects on other resources.
  - Soils could be damaged by fire if nutrients and organic matter are consumed, increasing the potential for overland flow.
  - The severity of any damage would be directly linked to the intensity of the fire.
- Increasing the number of thinned units in a given area increases the hazard with a larger area of contiguous fuels. Spotting from one thinned unit to another is likely, given the wind speed that would be expected on a high fire-danger day.

Human uses and influences

Heritage resources (*Forest Archaeologist*)—A thorough literature search was conducted to determine if heritage resources (prehistoric or archaeological sites) are known to exist in the planning area, or have the potential to be adversely effected by proposed project activities. Included in the literature search were district site files, homestead records, land and cultural resource surveys, maps, land status atlas and local historical publications. The literature search indicated that no known sites will be impacted by proposed activities described for Alternatives 2a, 2b, 3, 4, and 5. These findings are consistent with known cultural landscape patterns across the steep-sloped uplands of western Oregon, where cultural activities were focused near major watercourses with limited, transient cultural activities in upland forest areas. No treaty resources are in the project planning area. Activities will be consistent with our programmatic agreement with the State Historic Preservation Office and will meet the requirements of the National Historic Preservation Act.

Proposed activities such as commercial thinning, building or reopening temporary roads and landings, and underplanting conifers and hardwoods in existing plantations, are on previously disturbed sites and will not require field inventories, based on our 2004 Programmatic Agreement with the State Historic Preservation Office (appendix A, page 5, provides additional information about our agreement). No effects to heritage resources are expected from implementing Alternatives 1, 2a, 2b, 3, 4, and 5. Therefore, proposed activities will meet the requirements of the National Historic Preservation Act.

Recreation (*Interpretive Specialist*)—The primary consequence of the proposed activities under alternatives 2a, 2b, 3, 4, and 5 would be to change from motorized to non-motorized access, a process already happening through closure and decommissioning of non-key roads across the Forest. The highest concentration of vehicle travel on the interior forest will continue to be associated with hunting seasons. Based on the roads that will be used for commercial thinning operations and other proposed management activities, the action alternatives will have little to no impact on vehicle travel through the Cape Perpetua Scenic area.

None of the alternatives will change current management of or access to the Keller Creek dispersed recreation site. The existing recreation opportunities will be maintained. The capacity of the parking area will not be changed.

No established Forest Service trails exist in the planning area; therefore, no effects to existing trails will occur.

Proposed action alternatives are not expected to affect recreational fishing in the short term because existing habitat conditions will not be measurably altered and access to fishing areas will be maintained. Thinning in riparian areas and road decommissioning are expected to improve fish habitat in the long term, potentially benefiting recreational fishing.

Scenery (*Forest Landscape Architect*)—The Yachats River valley is a narrow, winding valley with a flat valley floor. Traveling County Road 804, the dark forested hills of the Coast Range are in view on at least three sides of the valley. About a mile to the west from the western boundary of National Forest in the proposed project area, the Yachats River joins the Pacific Ocean, and the valley opens to the ocean view.

The valley is a landscape that has been and is currently being used for farming and timber harvest. As elsewhere in Oregon, on land along creeks and rivers immediately east of Highway 101, the valley is used agriculturally and includes many small farms. The hills—both privately owned and managed by the Forest Service—have obviously been managed for timber harvest in the past.

County Road 804, is a secondary road leading from Highway 101 to the proposed project area, and wanders with the Yachats River through the valley. The road is rated as a sensitivity level-two road according to our Forest visual maps and current observation. This means that traveling along this route, people generally place an intermediate level of importance on landscapes views from travelways and use areas. To put it in perspective, Highway 101 is rated as sensitivity level 1, the highest level; the lowest rating is at level 3. This method of rating the importance of

landscapes is part of the visual (scenery) management system identified in the 1990 Siuslaw Forest Plan.

Within the project area and when viewing it, the scenic integrity of the valley hills is moderate. Although the vegetation on the hills is obviously modified, the contrast is not so high that it disrupts the overall natural appearance. Scenic integrity of the river and creeks on the valley floor is low in some instances, where stream-adjacent vegetation is lacking.

The proposed project area does not appear to be visible from Highway 101—the Pacific Coast Highway corridor—because higher-elevation land between Highway 101 and the stands proposed for thinning under the action alternatives blocks possible views. Several units proposed for thinning will be visible from various points in the valley and along County Road 804.

Concerns related to timber harvest under the action alternatives include the possibility of creating human-caused lines of high contrast in vegetation pattern, in particular where rectangular shapes are created as the result of different vegetation patterns along land ownership boundaries. It is expected that some lines of contrast will be visible from County Road 804 along stand 506104, depending on how private land adjacent to it is managed.

Another concern is the scattered appearance of thinned stands across the landscape. Areas proposed for thinning were harvested and planted about 25 to 50 years ago. The stand boundaries are unrelated to the natural forms that make up the landscape, or appear unrelated. However, thinning these stands is expected to increase the scenic quality of the Yachats watershed in the long term by restoring a more continuous appearance to the forest hills as viewed from County Road 804.

Finally, temporary roads that are reopened or built can reduce the scenic integrity of areas viewed from County Road 804 and within the watershed. Temporary roads that are reopened or built under Alternatives 2a, 2b, and 5 are not expected to be visible from County Road 804 because of topography, road location, and/or the screening of the residual trees left in stands. These roads would be water-barred and re-closed or decommissioned at the end of the project. Because Alternative 3 does not reopen or build temporary roads in the watershed, expected short-term effects on scenic integrity in the watershed would be reduced from that of Alternatives 2a, 2b, and 5. Alternative 4 would have the least short-term effects on scenic integrity in the watershed because access to stands would be limited to the existing key forest road system. By thinning stands, alternatives 2a, 2b, 3, 4, and 5 are expected to improve the long-term scenic quality of the Yachats watershed sooner than alternative 1.

Special forest products (Kurt Davis)—Opportunities to gather special forest products through permits and leases will continue. Limited vehicle access will make collecting special forest products more difficult. More difficult access has a lowering effect on the sale values of special forest products such as evergreen huckleberry, firewood, moss, mushrooms, salal, and swordfern.

Public and management access (*Forest Transportation Planner*)

A roads analysis was conducted for this project as a guide for managing the National Forest System (NFS) roads in the Yachats planning area. The roads analysis considered such road-related items as risk to resources, future expected use, public and private access, emergency access, maintenance costs and safety. The roads analysis was initially guided by the Siuslaw National Forest Access and Travel Management Guide (ATM). Following direction in Forest Service Manual 7700 adopted under the January 2001 Roads Rule; the Siuslaw National Forest completed a Forest level roads analysis in January 2003. The Siuslaw National Forest Roads Analysis (Forest Roads Analysis) met the requirements to conduct roads analysis at the Forest level. Since this project includes alternatives that would change access within the analysis area, the District Ranger directed the interdisciplinary (IDT) team to conduct a roads analysis at the project scale. Completion of the Forest Roads Analysis during the timeline of project planning allowed the team to incorporate the Forest Roads Analysis guidance in the planning process.

The ATM guide selected a set of key forest roads to maintain and keep open for public access, permitted commercial use, and administrative use. Key forest roads selected include those that make connections to roads maintained by other public agencies to provide community connections and those that provide recognized public and administrative traffic needs. The Forest Roads Analysis validated the ATM road selections and now guides the planning process for all roads in a project area.

The desired condition of the Forest transportation system is a safe and efficient network that serves public needs and management objectives within available funding. There are about 770 miles of key forest roads in the Siuslaw National Forest (USDA 2003b). The Forest is funded at about 25% of the need to accomplish annual routine maintenance on the key forest road system. The Forest Roads Analysis recommends prioritizing the available funding across the key forest road system as needs arise. Consequently, few roads receive full routine maintenance as available funding is applied to prioritized individual segments. Additionally, changes in forest management direction have reduced the availability of cooperative deposits associated with timber sales and reduced the ability to use timber-generated funds for reconstruction and repair of the road system (USDA 2003b). This reduction in routine maintenance funding and a lack of appropriated funds to address the increasing maintenance backlog is resulting in continued deterioration of the key forest road network in the watershed. This continued deterioration of roads is increasing driving hazards, risk to resources, and road repair costs; and is decreasing the asset value of roads. Therefore, the Forest Roads Analysis recommends seeking additional funding to address the maintenance backlog, where available.

This maintenance backlog has resulted from road repair items not being performed when scheduled, with the expectation that the repair would be performed at some future period. Maintenance needs may be categorized as critical or non-critical. Critical needs are requirements that address a serious threat to public health or safety, a natural resource, or the ability to carry out the mission of the organization. Non-critical needs are requirements that address potential risk to public or employee safety or health; compliance with codes, standards, regulations, etc.; or needs that address potential adverse consequences to natural resources or mission accomplishment.

The current system does not meet the desired condition in part due to deferral of needed road maintenance over the past decade. In the planning area, there are about 38 miles of key forest roads with a backlog of maintenance needs, requiring about $1.7 million to correct**.** Key forest roads needed for transporting logs are in a structural condition that currently will not support commercial traffic. Although the roads are being used by noncommercial traffic, adding commercial traffic to the existing recreational and administrative traffic will increase safety risks. The current traffic consists of passenger car and light pickup trucks—sight distances, uneven road surfaces, and structural strength are inadequate to allow safely mixing the traffic with commercial-sized vehicles such as log trucks. Some portions of the key roads that will be used to haul timber extend outside the project area boundaries to make connections with state, county, or federal highways. Maintaining these community connections on the key road system is consistent with overall road management objectives and recommendations in the Forest Roads Analysis.

Most Forest roads not selected as part of the key forest road network (non-key roads)-were stabilized with waterbars and either closed with physical barriers, or left to be closed naturally by vegetation encroachment. The non-key roads are typically maintained only when access is needed for specific project activities such as vegetation management or habitat restoration. The lack of maintenance on the non-key roads has resulted in many roads being inaccessible or accessible only with a high-clearance vehicle, sometimes requiring four-wheel drive.

Alternative 1 (no action) would maintain the current road management objective to keep the existing key forest roads open. While currently suitable for non-commercial traffic, with no immediate threat of failure from non-commercial use, maintenance needs on key forest roads would continue to accumulate due to lack of funding, further deteriorating the existing key forest road system. Prioritized road maintenance and repair will continue to be accomplished within existing budgets, addressing some of the needed maintenance and correcting critical maintenance items as they are identified. At some point, all or portions of key forest roads will become unsuitable for administrative and public uses, resulting in additional road closures, reduced access, loss of capitol investments, and adverse impacts to aquatic resources from road failures. Non-key roads will continue to grow closed and become less accessible for vehicle use, including high-clearance vehicles. Under the no-action alternative, no additional road miles would be either actively opened or closed to public use on the National Forest System. The result would be a continued reduction in miles of roads accessible by vehicle as they deteriorate or grow closed by vegetation, decreasing vehicle access for all uses. No additional miles of existing roads would be decommissioned and those roads considered for decommissioning in the action alternatives would continue to deteriorate over time due to lack of maintenance.

Alternatives 2a, 2b, 3, 4, and 5 will not make changes in current selection of key forest roads in the planning area. Alternative 2a would decommission about 8.5 miles of existing non-key roads, including about 2.4 miles of road 5491. Alternatives 2b and 5 are similar to 2a, except that Alternatives 2b and 5 would retain and improve road 5491 from the junction with key road 5800 to the junction of non-key 5492, reducing road decommissioning to about 6.1 miles. Like Alternatives 2b and 5, Alternatives 3 and 4 would maintain and improve road 5491 and decommission about 6.1 miles of road. The decommissioned roads will be taken off the road system and closed to all vehicle traffic by removing stream crossings, waterbarring road surfaces, and closing entrances with barricades such as earthen berms, large rocks, or guardrails.

About 39 miles of non-key roads not currently being periodically maintained will continue to become less accessible to vehicle traffic. During logging operations, there may be some short-term road closures on non-key roads and some delays on key roads.

Alternative 2a proposes to decommission the 2.4-mile road segment of 5491 because it is a mid-slope road that crosses several streams and would be costly to repair. The fill volumes over streams within this segment are relatively high. Because of its maintenance history, the road requires more frequent monitoring and maintenance than most to reduce the risk of culverts becoming plugged and debris slides. To maintain access for Forest management, Bonneville Power Administration transmission line and tower maintenance, and private land use, road 5500-520 would need to be extended (under another project) to link key road 5500 with non-key road 5492. Recent information indicates that this proposed road extension would be more costly to build and maintain and the long-term stability of the road more uncertain than originally estimated. Consequently, Alternatives 2b, 3, 4, and 5 would retain road 5491 and include treatments to improve fish passage, reduce existing fill volume by dipping the road over culverts in streams, and improve the road surface drainage system.

Under Alternatives 2a, 2b, and 5, temporary roads opened or built for commercial thinning operations will be designed as low-standard access for logging vehicles. New temporary roads will be waterbarred and closed when not used during or after commercial thinning operations. Roads that are temporarily reopened will be stabilized by removing unstable sidecast material and temporary culverts and closed after completion of thinning operations. Temporary roads will generally be limited to commercial thinning use; these roads may provide opportunities for limited, short-term public use during the dry season. Open-road density for National Forest System (NFS) roads will be reduced slightly from the current 1.8 miles per square mile to 1.6 miles per square mile. When state, county, and other public agency road miles and ownership acres in the analysis area are considered, the open-road density is reduced from 2.5 miles per square mile to 2.4 miles per square mile. The project makes no changes in roads administered by other public agencies or private landowner roads in the project area.

Alternatives 3 and 4 would have essentially the same effects on public and private access as Alternative 2b and 5, including decommissioning 6.1 miles of existing NFS roads. However, Alternatives 3 and 4 will not reopen existing temporary roads and no new temporary roads will be built, eliminating the opportunity for short-term public use of these roads. Alternative 4 uses only key forest roads for logging operations and no logging would be done from non-key roads. Like Alternatives 2a, 2b and 5, Alternatives 3 and 4, may have short-term closures or delays during logging operations conducted on existing NFS roads.

Alternatives 2a, 2b, 3, and 4 would not address the backlog of needed maintenance and repair on key forest roads. Consequently, structural strength and surfacing of roads would remain inadequate to support commercial timber haul or safely accommodate mixed commercial and passenger traffic. Without maintenance and repair, conditions will not meet the existing road management objectives for a safe and efficient key-road system with mixed traffic types. The risk of resource damage will increase, loss of road investments will increase, and unsafe conditions for all traffic will increase. Some repairs and maintenance would be required to allow any access by vehicles the size and weight needed for log haul. By not increasing structural strength, replacing culverts, and adding surfacing to roads, the risk of road failure increases, the

potential for culverts to become plugged or to fail increases, and the potential for sediment associated with log hauling increases. In addition, lack of adequate roadside clearing to maintain sight distances on key roads associated with commercial haul, and not repairing surface cracks and depressions associated with failing road fill and shoulder settlement, will create unsafe driving conditions. If these items are not corrected, drivers cannot clearly locate road turnouts or safe-stopping areas when dealing with oncoming traffic on single-lane roads. Commercial log hauling on the key forest roads under these alternatives would require additional monitoring by the Forest Service of road conditions. Log hauling would be suspended if it is determined that substantial damage to roads or resources would occur.

Generally, public traffic is allowed on key roads used for log hauling. Timber sale contracts require posting of warning signs, using traffic flaggers when necessary in the vicinity of logging operations, and allowing limited short-term road closure during logging operations. Some of the safety concerns with mixed commercial and public traffic can be decreased by posting reduced speeds, rerouting traffic to alternative routes if available, closing key roads to all public traffic, or setting scheduled times the public could use the roads. Although these measures separate the two traffic types, they do not meet the road management objectives for the key road system. Non-key roads are typically closed to public access during logging operations.

For the past several years, Forest program funds have not been sufficient to maintain and repair six key forest roads (roads 5300, 5360, 5400, 5500, 5590, and 5800), resulting in a backlog of maintenance and repair needed to meet road-management objectives. Alternative 5 is similar to alternative 2b, except it includes performing maintenance and repair work on these six key forest roads inside and outside the watershed because they will be used as haul routes for transporting logs from plantations to be commercially thinned (table 16). Maintenance items are limited to those needed to make the haul routes stable and safe for a mix of commercial and public use. Activities are designed to improve the structural strength and stability of roads, improve drainage of road surfaces, and resurface roads where needed. Activities include replacing inadequate or failing ditch-relief culverts, adding ditch-relief culverts where spacing is inadequate, replacing selected culverts in streams, patching surfaces on asphalt roads, adding structural patches on failing road fills, and resurfacing roads with either gravel or asphalt. Conversion from asphalt to gravel surfacing is considered where it is economically more beneficial than repairing failed asphalt surfacing and sub grade.

Table 16 shows the total miles of the six key forest roads in the watershed, the estimated miles of the key forest roads that will be treated under Alternative 5, the estimated costs—associated with Alternative 5—of performing maintenance and repair work on these key forest roads, and the total costs to address the backlog of maintenance and repair to meet the management objectives for these roads inside and outside the watershed. Maintenance beyond the minimum to facilitate project access and transportation of timber will be accomplished with funding not associated with this project. Continued deferral of non-critical maintenance will normally result in increased maintenance costs. Costs associated with maintaining non-key roads, such as reopening overgrown roads to access project sites, are expected to be included in individual project costs.

Table 16. Estimated miles and costs associated with the six key forest roads

	5300	5360	5400	5500	5590	5800	Totals
Total miles in the Yachats watershed	9.4	4.4	1.8	3.2	3.6	4.8	27.2
Miles to be treated under Alternative 5*	13.9	9.0	1.8	4.2	3.6	5.9	38.4
Maintenance and repair costs associated with Alternative 5	$355,750	$140,750	$98,450	$17,500	$40,000	$127,000	$779,450
Total costs of maintenance and repair needed to meet road-management objectives	$707,000	$234,500	$165,950	$47,880	$205,000	$300,000	$1,660,330

*Some of these miles reflect roads used for hauling that are outside the Yachats watershed.

A summary of the effects of the alternatives is shown below. Table 17 summarizes the estimated economic effects by alternative. Annual maintenance costs reflect funds needed to perform full routine maintenance operations on system roads.

Alternative 1:

- No changes in the current maintenance strategy of existing National Forest System roads, including key and non-key roads.
- No changes in key or non-key road maintenance costs.
- No changes in mileages of open road on National Forest System lands.

With limited maintenance funds under Alternative 1, vegetation adjacent to some roads will continue to grow and gradually close these roads.

Alternatives 2a:

- Decommissions 8.5 of National Forest System roads.
- Reduces open-road mileage of National Forest System roads in the watershed from about 68 miles to 59.5 miles.
- Retains the existing key forest road network.

Alternatives 2b, 3, and 4:

- Decommissions 6.1 miles of National Forest System roads.
- Reduces open-road mileage of National Forest System roads in the watershed from about 68 miles to 61.9 miles.
- Retains the current key forest road network.

Alternative 5:

- Decommissions 6.1 miles of National Forest System roads.
- Reduces open-road mileage of National Forest System roads in the watershed from about 68 miles to 61.9 miles.
- Retains the current key forest road network.
- Performs maintenance and repair on about 38.4 miles of key forest roads to make the roads suitable for a mix of commercial, administrative, and public use.

Table 17. Road cost summary by alternative

Alternative	Routine annual road maintenance	Decommission costs	Repair road 5491	Key forest road maintenance and repair	Total
1-No Action	$55,180	$0	$0	0	$55,180
2a	$48,555	$77,575[a]	$0[b]	0	$126,130
2b	$51,155	$11,775	$198,500	0	$261,430
3 and 4	$51,155	$11,775	$198,500	0	$261,430
5	$51,155	$11,775	$198,500	$779,450	$1,040,880

[a] Estimated decommission cost for road 5491 is $65,800.
[b] Estimated cost for extending road 5500-520 under another project ranged from $130,000 to $170,000.

Other Predicted Effects

Cumulative Effects *(The Team)*

The Council on Environmental Quality defines cumulative effects on the environment as those that result from the incremental actions of a proposal added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes them (40 CFR 1508.7).

For purposes of analyzing cumulative effects, the geographic area potentially affected by the alternatives is the 28,000-acre planning area in the Yachats River watershed. The Team considered the need to extend the geographic area for each of the affected resources, but believed that effects were not meaningful or measurable beyond the Yachats River watershed planning area.

The Yachats-Blodgett Watershed Analysis (USDA 1997c) indicates that current forest conditions—primarily influenced by past timber harvesting on federal and non-federal lands—lack late-successional forest habitat to support species such as the northern spotted owl and the marbled murrelet. According to the watershed analysis, past timber harvesting has also reduced the suitability of late-successional forest habitat by reducing the amount of interior forest habitat.

The watershed analysis also discloses that road building and maintenance and converting forest to agricultural uses have reduced large conifer trees in riparian areas and accelerated sedimentation. Valley-bottom and mid-slope roads also interrupt natural stream-channel

processes such as debris flows and aquatic species migration. These past actions have resulted in current conditions that fall short of the habitat capability of streams to support coho salmon and other aquatic species.

In this document, the analysis provided for each alternative and resource area reflects the sum of most planning actions on federal lands in the near future, including the effects from changes in the transportation system for Forest users and adjacent landowners. Other likely future actions on federal lands in the Yachats Watershed Terrestrial Restoration Project area include activities associated with the Yachats Aquatic Restoration Project (USDA 2004) that are designed to enhance watershed function, ongoing road maintenance and repair of key Forest roads, and harvesting of special forest products such as firewood, salal, swordfern, and moss. Stand 506112 (T15S, R11W, section 1) is part of a long-term study (USDA 1993b) designed to evaluate the effects of different thinning regimes on the development of understory trees. To maintain this understory, an additional commercial thinning entry, affecting about 12 acres, is likely to occur in the next two years.

On private land, which comprises 23% of the project area, the Team expects landowners to continue current practices and uses of their land, following current county and state land-use regulations. Current uses include industrial timber harvesting, farming, rural-residence living, livestock grazing, and limited non-industrial timber harvesting. Based on local industrial timber management objectives and practices, we expect harvest activities on industrial lands before those stands reach 80 years of age. Currently, many of these stands are younger than 25 years. Based on personal communications, industrial timber management plans for the Yachats River watershed include clear-cut harvesting of about 530 acres in the next two years—about 220 acres in the Lower Yachats, 30 acres in the North Yachats, and 280 acres in the Upper Yachats sub-basins; and about 920 acres in the next 3- to 10 years—all in the Lower Yachats sub-basin. Considering current national-development trends along coastal areas, an increase in the quantity of rural residences in the watershed is expected.

Currently, the Bureau of Land Management has no plans for treating lands under their jurisdiction. These lands comprise about 1% of the project area.

On state and county land, actions are expected to be limited to maintaining roads. Lincoln County—through the Mid-coast Watersheds Council—is replacing culverts that hinder fish passage, although none are planned for the Yachats watershed in 2004. Riparian planting is planned for 2004.

Cumulative effects are measured relative to the baseline conditions described in chapter 1. Where specific effects are not described for a particular resource, cumulative effects are not expected to be measurably different from those under baseline conditions. Terrestrial and watershed actions under Alternatives 1, 2a, 2b, 3, 4, and 5 are expected to have the following cumulative effects:

Alternative 1 (No action)

- Managed-stand health and growth will continue to decline, increasing the severity and extent of damage from insects, disease, and wind; late-successional forest conditions in managed stands will take longer to develop.
- Habitat preferred by species dependent on late-successional forest will take longer to develop; mid-seral species habitat will remain on the landscape longer; habitat preferred by early-seral species will gradually decline as trees encroach on existing meadows and other forest openings; and short-term cumulative effects will be limited to noise disturbance from maintaining and repairing key Forest roads.
- Aquatic species habitat recovery will depend on natural processes and take much longer.
- Sedimentation from non-key roads will increase as roads deteriorate from lack of maintenance.
- Shading and large wood for streams will take longer to develop before temperature will be reduced.
- Watershed function will not be improved because of continued use of nearly the entire road network.
- Fire response time will increase as roads fail or roadside vegetation grows and closes roads naturally.
- Recreation experiences will become more non-motorized as roads close naturally; landscape scenic conditions will take longer to achieve a more natural setting; and public and management access and road maintenance costs will remain unchanged, except where roads fail.

Alternatives 2a, 2b, 3, 4, and 5

Forest stand conditions—Thinning managed stands under Alternatives 2a/2b/5, 3, and 4, will speed the development of late-successional forest characteristics on about 2,039 acres, 1,594 acres, and 1,281 acres (commercial thinning acres), respectively; and on about 2,706 acres, 3, 066 acres, and 3,379 acres (noncommercial thinning acres) respectively. These changes will reduce fragmentation and accelerate development of late-successional forest characteristics on federal land. Stands adjacent to private industrial lands and rural-residential properties may likely be subject to more frequent harvesting, increasing fragmentation between land ownerships **(**Alig 2003).

Terrestrial species (listed, sensitive, survey-and-manage, and management-indicator)—In the short term, disturbances from noise associated with treating managed stands and decommissioning roads are likely to have minor adverse effects on all terrestrial species to some degree. The dispersal in timing and distribution of these actions across the watershed, however, are such that impacts are expected to be localized and not lead to adverse cumulative effects. In the long term, accelerated development of late-successional forest conditions is expected to cumulatively benefit species dependent on these conditions. Habitat for species dependent on early-seral conditions will be reduced as decommissioned roads and other forest openings become forested over time, except for openings such as meadows that are maintained as early-seral habitat, or stands adjacent to recently harvested industrial lands and private rural residences. It is also expected that mature habitat adjacent to rural

residences will be of lower value as a result of noise disturbance and competition between native and domestic species.

Aquatic species—When viewed as a whole, all proposed actions are likely to have minor, short-term effects on aquatic species during project implementation and up to 2 years later. In the long term, net improvements to aquatic habitat are expected to accrue with reduced sedimentation and risk of failure from roads and accelerated growth of trees in riparian areas of managed stands. These actions are expected to substantially benefit aquatic species on federal lands. Considering we expect no significant changes in management of private lands, we expect streams in and immediately downstream from these lands to have lower quality habitat for salmonids due to higher stream temperatures, shortage of large wood, and higher stream sedimentation.

Sediment production—Reopening existing roads, using roads, and decommissioning roads will increase fine sediment in the short term. Stabilizing and closing reopened roads, and decommissioning other roads will reduce sedimentation in the long term. Potential pulses of sediment associated with harvesting timber on private land, along with chronic sources of sediment from rural residences and livestock grazing are expected to continue. Overall, Alternatives 2a, 2b, 3, 4, and 5 are expected to cumulatively reduce sedimentation in the project planning area.

Soil productivity—Considering past and proposed logging operations, the detrimental soil condition (i.e., compacted and/or displaced) for one plantation is expected to be less than 15 percent; the detrimental soil conditions for all other plantations is expected to be less than 10 percent. Therefore, each plantation will be under the 15-percent threshold established by the Siuslaw Forest Plan for National Forest system lands.

Stream flow—The Yachats River is considered to be over-allocated for water withdrawals (USDA 1997c) Thinning managed stands will not measurably affect stream flows. Decommissioning roads will reduce peak and storm flows resulting in a net cumulative decrease over the long term. Continued development of small rural residences is likely to require additional water withdrawal for domestic and agricultural use. The City of Yachats has expressed an interest to develop their water right on the Yachats River. Until existing water rights are adjudicated, it is difficult to ascertain if the Yachats River is only over-allocated on paper or in actuality.

Stream temperature—Based on project design, thinning managed stands is not likely to have any measurable effect on stream temperature; road decommissioning is likely to improve watershed function and negligibly lower stream temperatures, resulting in a cumulative decrease in temperature.

Fire—Thinning managed stands is expected to increase fuel loading and associated wildfire risk in the short term (3 to 5 years). By reducing public access, however, road decommissioning will cumulatively reduce the risk of human-caused fire ignition in the long term. Where the wildland-urban interface is an issue, access for fire-emergency equipment will be maintained. Although fire suppression response time will increase where roads are decommissioned, the cumulative effect on wildfire risk over time will be reduced.

Heritage resources—Thinning managed stands and road decommissioning will have minimal risk because actions are on previously disturbed ground. Adverse cumulative effects are not expected.

Recreation—Thinning managed stands will not substantially change the recreation experience. Decommissioning roads will cumulatively shift the recreation experience from motorized to non-motorized.

Scenery—All actions will be consistent with the scenic quality objectives for the planning area. By speeding the growth and development of trees in plantations, thinning actions are expected to move landscape scenic conditions to a less fragmented, more natural forest setting sooner.

Public and management access—Decommissioning roads across the watershed will reduce public and management vehicle access to public lands for several activities including recreation, hunting, special forest products gathering, and Forest Service monitoring. Road maintenance costs will be reduced and limited maintenance funds will be shifted to maintaining the key-Forest road system. Open-road density in the watershed would be reduced from 2.5 miles per square mile to 2.4 miles per square mile.

Private landowners, federal agencies, and commercial and community interests have various easements, permits, and access agreements in effect at the time of this project. All project alternatives are designed to facilitate existing agreements. Additional access needs will be reviewed and authorized case-by-case as requested. Generally, permit holders will be required to perform maintenance items on National Forest System roads related to the permitted uses.

Listed, sensitive, and survey-and-manage plants—No adverse cumulative effects on listed, sensitive, and survey-and-manage species are expected.

Noxious weeds—Current weed infestation levels will be maintained and infestation levels are expected to decline in the foreseeable future as tree canopies grow closed.

In summary, considering other ongoing and likely actions on federal, state, county, and private lands in the Yachats River watershed, Alternatives 2a, 2b, 3, 4, and 5 are expected to reduce the adverse cumulative effects of past actions on the landscape, thereby accruing net beneficial cumulative effects for most resources. The cumulative effects are generally beneficial over time and an improvement over existing conditions.

Comparing Likely Effects

Table 18 compares how well the alternatives address the problems (issues).

Table 18. Comparing likely effects of Alternatives 1, 2a, 2b, 3, 4, and 5 based on the issues, objectives, and outcomes.

Issue, objective, and outcome	Alt. 1 (no action)	Alts. 2a, 2b	Alt. 3	Alt. 4	Alt. 5
Increase late-successional habitat in late successional and riparian reserves	Stand health and growth will decline in plantations Stands will develop at a rate different from natural stands of comparable age	Maintains stand health and speeds growth of trees in plantations Increases stand complexity and diversity in plantations	Maintains stand health and speeds growth of trees in plantations Increases stand complexity and diversity in plantations	Maintains stand health and speeds growth of trees in plantations Increases stand complexity and diversity in plantations	Maintains stand health and speeds growth of trees in plantations Increases stand complexity and diversity in plantations
Percentage of non-essential KV projects funded*	0	62 (2a), 56 (2b)	24	13	19
Restore watershed health	Maintains existing road density Maintains effects of road-related fine sediment on streams Does not reconnect stream channels	Reduces existing road density Reduces effects of road-related fine sediment on streams Reconnects stream channels under 2a and to a lesser extent under 2b	Reduces existing road density Reduces effects of road-related fine sediment on streams Reconnects stream channels like 2b	Reduces existing road density Reduces effects of road-related fine sediment on streams Reconnects stream channels like 2b	Reduces existing road density Reduces effects of road-related fine sediment on streams Reconnects stream channels like 2b

*Percentages reflect timber sales sold at advertised rates. Market conditions, competition during bids for timber sales, type of timber-sale contract used, and flexibility in seasons of operation can result in sales being sold above the advertised rates.

Table 18 (cont.). Comparing likely effects of Alternatives 1, 2a, 2b, 3, 4, and 5 based on the issues, objectives, and outcomes.

Issue, objective, and outcome	Alt. 1 (no action)	Alts. 2a, 2b	Alt. 3	Alt. 4	Alt. 5
Aquatic conservation objectives	Watershed differs from historical conditions and does not meet all objectives	Moves toward historical conditions under 2a and to a lesser extent under 2b, and meets all objectives	Moves toward historical conditions like 2b and meets all objectives	Moves toward historical conditions like 2b and meets all objectives	Moves toward historical conditions like 2b and meets all objectives
Maintain and repair key forest roads	No changes in the current maintenance strategy	No changes in the current maintenance strategy	No changes in the current maintenance strategy	No changes in the current maintenance strategy	Performs maintenance and repair on six key forest roads

Aquatic Conservation Strategy

On March 22, 2004 the USDA Under Secretary for Natural Resources and the Environment signed Record of Decision (ROD) amending the Northwest Forest Plan. The decision clarifies provisions relating to the application of the ACS. Specifically, the amendment removes the need for deciding officials to certify that individual projects meet ACS objectives at the site-specific level and short time frames. Instead, the ROD requires individual projects to meet ACS standards and guides and that ACS objectives be met at watershed or larger scales (5th field hydrologic fields or greater) and over longer time periods of decades or more. Project records must also demonstrate how the decision maker used relevant information from watershed analysis to provide context for project planning.

Relevant information from the Yachats-Blodgett Watershed Analysis (USDA 1997c), the Water Quality Restoration Plan, Yachats River Watershed (USDA 2003c), and the fisheries Biological Assessment, Yachats Watershed Terrestrial Restoration Project (USDA 2003a) was incorporated by reference into this environmental analysis. Based on this information, all project activities will meet the ACS standards and guides, and all ACS objectives will be met at the 5th-field watershed scale and over longer time periods of decades or more.

Short-Term Uses and Long-Term Productivity (*The Team*)

The use or protection of natural resources for long-term, sustained yield is the legislated basis of management and direction for the Forest Service (USDA, USDI 1994a, p. 321). Short-term uses include actions such as commercial thinning and road decommissioning. The design criteria were developed to incorporate the standards and guides of the Siuslaw Forest Plan as amended by the Northwest Forest Plan. We expect that applying them to the proposed management actions will

reduce the potential for long-term loss in productivity of forest soils that may result from short-term uses. They will also allow for the long-term development of late-successional habitat and improvement of watershed function.

Unavoidable Adverse Effects (*The Team*)

Implementing any alternative would result in some adverse environmental effects that cannot be avoided. The design criteria, along with Forest standards and guides, are intended to keep the extent and duration of these effects within acceptable rates, but adverse effects cannot be completely eliminated. The following adverse environmental consequences would be associated to some extent with Alternatives 2a, 2b, 3, 4, and 5:

- Short-term, localized reductions in air quality from dust, smoke, and vehicle emissions resulting from management actions and forest users.
- Short-term, localized inputs of fine sediment from road decommissioning.
- Temporary increase in fire hazard from waste material left on the ground from commercial thinning, non-commercial thinning, and brush-release actions.
- Disturbance to wildlife when their habitat is disturbed by management actions or recreation activities.
- Decrease in habitat for wildlife species dependent on early-seral forest conditions.
- Temporary increase in large vehicle traffic during commercial thinning operations.
- Loss of vehicular access through the Forest as roads are decommissioned.

Irreversible Resource Commitments (*The Team*)

Irreversible commitments of resources are actions that disturb either a non-renewable resource (for example, heritage resources) or other resources to the point that they can only be renewed over 100 years or not at all. The design criteria--along with Forest standards and guides--are intended to reduce these commitments, but adverse effects cannot be completely eliminated. For example, the continued use of existing roads that access the Forest is an irreversible commitment of the soil resource because of the long time needed for a road to revert to natural conditions.

Irretrievable Commitment of Resources (*The Team*)

An irretrievable commitment is the loss of opportunities for producing or using a renewable resource for a period of time. Almost all activities produce varying degrees of irretrievable resource commitments. They parallel the effects for each resource discussed earlier in this chapter. They are not irreversible because they could be reversed by changing management direction. The following irretrievable commitments of resources are expected:

- Loss of soil productivity as a result of new temporary roads and landings (Alternatives 2a and 2b).
- Loss of vehicular access through the Forest as roads are decommissioned (all action alternatives).

Environmental Justice (*Bruce Buckley*)

Effects of alternatives on the human environment (including minority and low-income populations) are expected to be similar for all human populations regardless of nationality, gender, race, or income. No disproportionately high and adverse human health or environmental effects on minority populations and low-income populations are expected as a result of implementing actions described for the action alternatives.

Other Disclosures (*The Team*)

Based on the Team's evaluation of the effects, we concluded:

- None of the alternatives would affect minority groups, women, and consumers differently than other groups. These groups may benefit from employment opportunities and by-products that proposed actions will provide; the no-action alternative would have neither adverse nor beneficial effects. None of the alternatives adversely affects civil rights. All contracts that may be awarded as a result of implementation would meet equal employment opportunity requirements.
- None of the proposed actions will affect known prehistoric or historic sites because no new disturbance on previously undisturbed ground is expected. As outlined in the American Indian Religious Freedom Act, no effects are anticipated on American Indian social, economic, subsistence rights, or sacred sites.
- No adverse effects on wetlands and flood plains are anticipated; and no farm land, park land, range land, wilderness, or wild and scenic rivers will be affected.
- This environmental assessment is tiered to the Siuslaw Forest Plan FEIS, as amended by the Northwest Forest Plan, and is consistent with those plans and their requirements.
- The proposed project is not in or adjacent to an inventoried roadless area.
- The proposed project is consistent with the Coastal Zone Management program.
- None of the proposed actions are expected to substantially affect human health and safety.
- Proposed activities are consistent with the Clean Air Act because effects from activities such as log hauling (dust) and prescribed burning are localized and short-term.
- Because of the design criteria to be applied (appendix A), this project is expected to be consistent with the Clean Water Act.
- The proposed project is not expected to measurably affect global warming. The USDA Forest Service will continue an active leadership role in agriculture and forestry regarding the reduction of greenhouse gas emissions (Joyce and Birdsey 2000).
- These actions do not set a precedent for future actions because they are similar to actions implemented in the past.

Who was consulted about this project?

CHAPTER 4

The National Marine Fisheries Service (NMFS) has been consulted about effects on coho through a fisheries biological assessment (USDA 2003a) that was completed for this project on February 25, 2003. Based on their letter of concurrence (April 18, 2003; reference 2003/00223), project activities are not likely to adversely affect listed coho salmon if the project design criteria (appendix A) are followed, especially those associated with commercial thinning and road decommissioning. NMFS has also determined that project activities will not adversely affect designated essential fish habitat.

In their biological opinions of the following Siuslaw National Forest biological assessments, the U.S. Fish and Wildlife Service (FWS) has concurred with our findings that the project will not jeopardize the continued existence of bald eagles, northern spotted owls, and marbled murrelets:

- Programmatic Biological Assessment of Fiscal Year 2004-2005 Activities in the North Coast Province Which Might Disturb Bald Eagles, Northern Spotted Owls, or Marbled Murrelets. (FWS biological opinion reference #: 1-7-04-F-1113).

- Biological Assessment of Habitat-Modification Projects Proposed During Fiscal Years 2005 and 2006 in the North Coast Province, Oregon that Would Affect Bald Eagles, Northern Spotted Owls, or Marbled Murrelets, or Would Modify the Critical Habitats of the Northern Spotted Owl or the Marbled Murrelet. (FWS biological opinion reference #: 1-7-05-F-0005).

The FWS terms and conditions are included in the project design criteria.

The Confederated Tribes of Coos, Lower Umpqua, and Siuslaw; and Siletz were informed of the proposed action during scoping. No comments on the proposed action were received from them.

The Bureau of Land Management (BLM) has been consulted regarding possible use of about 200 feet of road and 1 existing landing on BLM land to facilitate commercial thinning of plantations 001 and 179. The BLM land in is located in T14S, R11W, section 10. Should the Forest Service need the landing and road access, the BLM would agree to allow its use. About 20% of the affected 7 acres of BLM land would be felled to make corridors to facilitate skyline yarding. Trees felled to create corridors would be sold by the BLM (appendix A).

Who was consulted?

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Glossary

Most definitions of the terms in this glossary were taken from, or adapted from, the glossaries of the following documents:

- 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 (USDA, USDI 1994a);
- Forest Ecosystem Management: An Ecological, Economic, and Social Assessment (USDA, USDI et al. 1993);
- Forest Stand Dynamics: Update Edition (Oliver and Larson 1996); and
- Siuslaw National Forest Road Analysis (USDA 2003b).

Access and travel management (ATM) roads—National Forest System roads managed under one of the following categories established by the Siuslaw Access and Travel Management Guide (September 1994):

- Primary forest road, all highway vehicle travel is encouraged;
- Secondary forest road (low clearance), passenger car travel acceptable; or
- Secondary forest road (high clearance), passenger car use is discouraged.

Adaptive management--Changing practices based on management activities that are planned, monitored, and evaluated, with learning considered along with resource objectives. Because learning from forest practices often takes many years, adaptive management must initially focus on providing information for future decisions. Adding aspects of the scientific method to management practices can increase confidence in the interpretation of outcomes.

Aquatic ecosystem--Any body of water, such as a stream, lake, or estuary, and all organisms and nonliving components within it, functioning as a natural system.

Best management practices (BMP)--Methods, measures, or practices designed to prevent or reduce water pollution or other environmental damage.

Biodiversity--The variety of life forms and processes, including a complexity of species, communities, gene pools, and ecological functions.

Biological opinion--The document resulting from formal consultation with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, stating a finding about whether a federal action is likely to jeopardize the continued existence of listed species or result in destroying or adversely modifying critical habitat.

Broadcast underburning—An activity designed to reduce fire hazard risk in certain commercially thinned plantations within the wildland-urban interface boundary. This is accomplished by burning (prescribed) the fine fuels on the plantation floor.

Canopy closure--The degree to which the canopy (the forest layers above people's heads) blocks sunlight or obscures the sky.

Classified road—A road wholly or partially in or adjacent to National Forest system lands that are determined to be needed for long-term motor vehicle access, including state, county, and private roads, National Forest system roads, and other roads authorized by the Forest Service.

Closed road--A road on which vehicle traffic has been excluded (year-long or seasonal) by natural blockage, barricade, or by regulation. A closed road is waterbarred and can remain on the National Forest transportation system under a storage strategy for future use. (see "decommissioned road").

Coarse woody debris--Portions of a tree that has fallen or been cut and left in the woods.

Code of Federal Regulations (CFR)--A codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the federal government.

Commercial thinning--The removal of generally merchantable trees from an even-aged stand, usually to encourage growth of the remaining trees.

Conservation strategy--A management plan for a species, group of species, or ecosystem that prescribes standards and guidelines which, if implemented, provide high likelihood that the species, groups of species, or ecosystem, with its full complement of species and processes, will continue to exist, well-distributed, throughout a planning area.

Critical habitat--For listed species, specific parts of the geographic area occupied by a federally listed species that have physical and biological features essential to conserving the species, and that may require special management consideration or protection; also specific areas outside the geographical area occupied by a species but essential for its conservation. Designated critical habitats are described in 50 CFR 17 and 226.

Crown--The upper part of a tree that carries the main system of live branches and foliage.

Crown ratio--The percentage of total tree height comprising live branches and foliage.

Debris flow--A rapidly moving mass of rock fragments, soil, and mud, with more than half of the particles larger than sand.

Decommissioned road—An unneeded road that has been closed and removed from the National Forest transportation system. The objective of road decommissioning is to stabilize and restore unneeded roads to a more natural state. Treatments are designed to reduce long-term adverse effects on aquatic resources and typically include removing unstable portions of embankments, partially or completely removing stream-crossing culverts and accompanying fill material, decompacting surfaces of valley-bottom or mid-slope roads, waterbarring roadbeds, seeding to reduce erosion and provide forage, and closing road entrances (see "closed road").

Deferred road maintenance—Maintenance on classified roads that is not routinely performed according to maintenance standards and scheduling, but is deferred to some later date. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased repair costs, and decreased asset value. Deferred maintenance needs can be categorized as critical or non-critical at any point in time. An example of non-critical deferred maintenance is not periodically grading a low-standard, high-clearance road, thus allowing some surface rutting. An example of critical deferred maintenance is not maintaining a culvert in a perennial stream that supplies water to a public water source, thus increasing the risk of culvert obstruction and the potential for sediment entering the public water source. Continued deferral of non-critical maintenance will normally result in an increase in critical deferred maintenance.

Developed recreation--Recreation that requires facilities, resulting in concentrated use of an area, such as for a campground. Facilities might include roads, parking lots, picnic tables, toilets, drinking water, and buildings.

Dispersed recreation--Recreation use outside developed recreation sites, including activities like hunting, fishing, scenic driving, hiking, bicycling, horseback riding, and recreation in primitive environments.

Domestic water sources—Streams on National Forest System lands used as sources for providing surface waters to facilities that treat and/or distribute water for domestic purposes. These purposes include normal household uses such as drinking, food preparation, bathing, washing clothes and dishes, watering lawns and gardens, and other similar uses.

Ecosystem management--At the core of ecosystem management is the idea that ecosystems are complex assemblages of organisms interacting with their environment and changing in complex ways over time. Science-based knowledge of how ecosystems work is important to managing forests to maintain their biodiversity and long-term productivity. The first step has often been to reallocate or rezone forests to meet new primary objectives. Concepts of joint production are emerging, however, that attempt to manage for multiple objectives, with no single objective considered primary, and focusing on finding compatible groupings of objectives where possible. An alternative concept to reallocation being proposed and tested is disturbance-ecology-based management. This idea centers on the concept that organisms are more adapted to the historical disturbance patterns than to specific successional states, and that management could more closely emulate natural disturbances and ecosystem responses to disturbance, as a way to maintain diversity and long-term productivity and at the same time continue limited resource extractions.

Fifth-field watershed--The geographical area of a watershed that is 50,000 to 100,000 acres in size.

Floodplain--Level lowland bordering a stream or river onto which the flow spreads at flood stage.

Forest-development road--A forest road under the jurisdiction of the Forest Service.

Forest ecosystem--The entire assemblage of organisms (trees, shrubs, herbs, bacteria, fungi, and animals, including people) together with their environmental substrate (the surrounding air, water, soil, organic debris, and rocks), interacting inside a defined boundary. Because ecosystem boundaries are arbitrarily set as a research tool, they can be defined at many scales, from a leaf surface to the entire planet. Forest ecosystems are often studied in bounded watersheds draining to a monitored stream.

Fragmentation--Reducing size and connectivity of stands that compose a forest.

Ground-based logging—The dragging or carrying of trees or logs from the stump to the landing using various types of self-propelled machines such as tractors, skidders, or forwarders.

Fuel--Live or dead vegetation available for consumption by fire. **Fine fuels** include small needles, sticks, and branches of trees generally less than 3 inches in diameter.

Hardwoods--A term used to describe the deciduous trees known to occupy the project planning area, including red alder, Oregon bigleaf maple, cascara, and wild cherry.

Heritage resource--The remains of sites, structures, or objects resulting from past human activity that have important sociocultural value, whether historic, prehistoric, archaeological, or architectural. For this project, "heritage resource" refers only to actual physical things--places, structures, or artifacts that are material evidence of a past way of life--rather than to traditions, customs, or modern life styles. Heritage resources are fragile and nonrenewable; their values, once destroyed, cannot be recreated.

Heritage site--Any definite place of past human activity with important socio-cultural value--historic, prehistoric, archaeological, or architectural--identifiable through field survey, historical documentation, or oral evidence.

Inoculation--Introducing a native heart-rot fungus to a selected tree for the purpose of producing "soft-core" snag characteristics at an early age as the tree continues to grow.

Key Forest roads—The Siuslaw National Forest Road Analysis adopted the ATM road management categories (see access and travel management (ATM) roads) in selecting the road system managed for continued access to the Forest:

- Primary forest road, all highway vehicle travel is encouraged;
- Secondary forest road (low clearance), passenger car travel acceptable; or
- Secondary forest road (high clearance), passenger car use is discouraged.

Knutson-Vandenberg (KV) Act--This act--created in 1930 and later amended by the National Forest Management Act of 1976--is the authority for requiring purchasers of National Forest timber to make deposits to finance primary actions (**essential KV** actions) that ensure reforestation of harvested areas and secondary actions (**non-essential KV** actions) to enhance tree health and growth in stands, wildlife habitat, watershed health, fish habitat, and recreation.

Landing--Any place on or adjacent to the logging site where logs are collected for further transport.

Landscape--A heterogeneous land area with interacting ecosystems repeated in similar form throughout.

Late-successional forest--Forest in the seral stages that include mature and old-growth age-classes.

Late-successional reserve--A mature or old-growth forest reserved under the record of decision for the Northwest Forest Plan.

Listed species--Those plant and animal species listed in the Federal Register as threatened or endangered.

Management-indicator species--Species identified in the Siuslaw National Forest Land and Resource Management Plan for special consideration because their population changes are believed to indicate the effects of management activities on the health of mature forests.

Mature conifer stand--A mappable stand of trees for which the annual net rate of growth has peaked. Stands are generally older than 80-100 years and younger than 180-200 years. Stand age, diameter of dominant trees, and stand structure at maturity vary by forest cover types and local site conditions. Mature stands generally contain trees with smaller average diameter, less age-class variation, and less structural complexity than do old-growth stands of the same forest type.

Matrix--Federal lands outside reserves, withdrawn areas, and managed late-successional areas and primarily managed for timber harvest.

Mitigation measures--Modifications of actions to avoid adverse effects by not taking a certain action or parts of an action; minimizing adverse effects by limiting the scope or intensity of the action; rectifying adverse effects by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating adverse effects over time by preserving and maintaining operations during the life of the action; or compensating for adverse effects by replacing or providing substitute resources or environments.

Monitoring--A process of collecting information to evaluate whether the objective and anticipated or assumed results of a management plan or project are being realized or whether projects are being implemented as planned.

Multistoried--Forest stands that contain trees of various heights and diameter classes and therefore support foliage at various heights in the stand's vertical profile.

National Forest System road--A classified forest road under the jurisdiction of the Forest Service. These roads were formerly called Forest-development roads—the two terms are synonymous.

Non-ATM roads--National Forest System roads managed under the Siuslaw Access and Travel Management Guide's designation as "other forest road", including short-term, project, or special-use roads. These roads will receive various degrees of maintenance, depending on their current use or nonuse. Some roads will be closed for safety, some for resource protection.

Noncommercial thinning--The stocking reduction of plantations that results from cutting excess trees and leaving them on the site so that remaining trees grow faster. Plantations in this category are thinned later than normal—generally at least 25 years old—due to changes in access, variable stocking, and poor commercial thinning potential.

Non-key roads—National Forest System roads not managed as part of the key Forest road system. These roads are similar to roads formerly called non-ATM roads and include short-term, project, or special-use roads. These roads will receive various degrees of maintenance, depending on their current use or nonuse. Some roads will be closed or decommissioned for safety, some for resource protection.

Noxious weed--A plant specified by law as being especially undesirable, troublesome, and difficult to control.

Old-growth forest--A forest stand usually at least 180 or more years old, with moderate to high canopy closure; a multilayered, multispecies canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood; numerous large snags; and heavy accumulations of wood, including large logs on the ground.

Overstory--Trees that provide the uppermost layer of foliage in a forest with more than one roughly horizontal layer of foliage.

Peak flow--The highest amount of stream or river flow in a year or from a single storm event.

Pre-commercial thinning--The stocking reduction of plantations that results from cutting or girdling excess trees so that remaining trees grow faster. Cut trees are left on the site because affected plantations are generally less than 25 years old and trees are generally too small to be merchantable.

Prescription—A written statement defining goals and objectives and the actions or treatments needed to attain the goals and objectives.

Quarter-township--An area about 3 miles square containing nine sections of land.

Road analysis—An integrated ecological, social, and economic science-based approach to transportation planning that addresses existing and future road management options.

Road maintenance--The ongoing upkeep of a road necessary to retain or restore the road to its approved road management objective.

Riparian area--A geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect it; it includes floodplain, woodlands, and all areas within a horizontal distance of about 100 feet from the stream channel's normal high-water line or from the shoreline of a standing body of water.

Riparian reserve--Designated riparian areas outside late-successional reserves and reserved under the record of decision for the Northwest Forest Plan.

Ripping--The process of breaking up or loosening compacted soil from temporary roads and landings to better assure penetration of roots of forest vegetation.

Sensitive species--Species mentioned in the Federal Register as proposed for classification or under consideration for official listing as endangered or threatened species, on an official state list, or recognized by the Forest Service or other management agencies as needing special management to prevent their being placed on federal or state lists.

Seral--A biotic community that is in a developmental, transitory stage in an ecological succession.

Site productivity--The ability of a geographic area to produce biomass (total quantity of living organisms), as determined by conditions (for example, soil type and depth, rainfall, temperature) in that area.

Snag--Any standing dead, partially dead, or defective tree at least 10 inches in diameter at breast height and at least 6 feet tall.

Soil compaction--An increase in bulk density (weight per unit volume) and a decrease in soil porosity resulting from applied loads, vibration, or pressure. The actual physical change is primarily reduction of noncapillary pore space, which in turn reduces infiltration, permeability, and gaseous exchange.

Soil displacement--The removal and horizontal movement of soil from one place to another by mechanical forces such as a bulldozer blade.

Special forest products--Forest products sold for commercial use such as fern, salal, and moss; also others offered for personal use such as shrubs for transplanting, Christmas trees, and firewood.

Stand (tree stand)--An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition to be distinguishable from the forest in adjoining areas.

Stand diversity--The diversity in stands measured by the variety of tree and shrub species, tree ages and sizes, and structure.

Standards and guides--The primary instructions for public land managers. Standards address mandatory actions, and guides are recommended actions necessary to a land management decision.

Stand exams--An inventory process used to determine stand composition including the amount and type of tree and shrub species, tree heights and diameters, and stand structural components.

Stream reach--An individual first-order stream or a segment of another stream that has beginning and ending points at a stream confluence. Reach points are normally designated where a tributary confluence changes the channel character or order. Stream reaches are normally 0.5 to 1.5 miles long.

Structural diversity--The diversity of forest structure, both its horizontal and vertical elements, that provides a variety of forest habitats resulting from layering or tiering of the canopy and the die-back, death, and ultimate decay of trees.

Structure--The various horizontal and vertical physical elements of the forest including trees, canopy layers, snags, and coarse woody debris.

Subsoiling--The process of breaking up or loosening compacted soil from temporary roads and landings to help restore productivity of forest soils.

Subwatershed--A land area (basin) bounded by ridges or similar topographic features, encompassing only part of a watershed.

Succession--Forest succession is a sequence of changes in the plant species composition (with associated animals and microbes) and stand structures over time, at a stand or larger scale--without major external disturbances like wind and fire that restart the sequence. Natural successional sequences are thought to have predictable patterns of development, and in the Pacific Northwest are thought to begin with disturbance-adapted species, move to dense conifers that exclude understory vegetation, and often end in late-seral stages (with large trees, canopy gaps, understory vegetation, logs, snags). An anomaly for the Pacific Northwest is Douglas-fir, where an individual tree can persist in all stages. New research is pointing out that natural disturbances are more diverse than previously thought, leading to more diverse and complex patterns of development than had been recognized. Also, natural disturbances are more often being found that reset the sequence more frequently than previously recognized.

Survey-and-manage species--Species that are closely associated with late-successional or old-growth forests whose long-term persistence is a concern. Species are listed in the record of decision (table C-3) for the Northwest Forest Plan. Mitigation measures and standards and guidelines for managing survey-and-manage species are amended by the Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines (USDI, USDA 2001).

System road--A classified road in the National Forest necessary to protect, administer, or use the Forest or its resources.

Temporary roads--Short-term use roads authorized by contract, permit, lease, other written authorization, or emergency operation not intended to be a part of the National Forest transportation system and not necessary for long-term resource management. Temporary roads are reopened or built to accomplish a management objective, such as thinning older plantations or maintaining meadows. After the project is completed, these roads may be decompacted and water barred, stream-crossing culverts and fills removed (if any), and road entrances barricaded (if necessary).

Threatened species--Those plant or animal species likely to become endangered throughout all or a significant portion of their range in the near future. A plant or animal identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register.

Unclassified road--A road on National Forest System land that is not managed as part of the National Forest transportation system, such as an unplanned road, abandoned travelway, and off-road vehicle track that has not been designated and managed as a trail; and those roads that were under permit or other authorization and were not decommissioned upon termination of the authorization.

Underplant--A management activity designed to create a second-story stand and to enhance species diversity in homogeneous stands such as older plantations.

Understory--Trees and other woody species growing under the canopies of larger adjacent trees and other woody growth.

Waterbar--A berm or ditch-and-berm combination that cuts across roads at an angle so that all surface water running on the road and in the road ditch is intercepted and deposited over the outside edge of the road. Water bars normally allow high-clearance vehicles to pass.

Watershed--The drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a stream or lake.

Watershed analysis--A systematic procedure for characterizing watershed and ecological processes to meet specific management and social objectives. Watershed analysis provides a basis for ecosystem management planning to be applied to watersheds of about 20 to 200 square miles.

Wildfire--Any wildland fire that does not meet management objectives, thus requiring a fire-suppression response. Once a fire is declared wild, it is no longer considered a prescribed fire.

Wildland-urban interface (WUI)—The line, area, or zone where structures and other human development meet or intermingle with National Forest System lands that contain undeveloped wildland or vegetative fuels. Because of their location, these structures are vulnerable to fire should an ignition occur in the surrounding area. Actions on National Forest System land (e.g.

commercial thinning) in the WUI that increase fire-hazard risks by increasing the fuel loading near residential properties are mitigated through prescribed burning or other fuel-reduction measures.

Yarding—A machine for cable logging consisting of a system of power-operated winches and a tower used to haul (yard) logs from the stump to a central concentration area or landing.

Appendix A

Yachats Watershed Terrestrial Restoration Project
Design Criteria

These design criteria for the Yachats Watershed Terrestrial Restoration Project were developed to ensure that standards and guides of the 1990 Siuslaw Forest Plan (SFP) as amended by the 1994 Northwest Forest Plan (NFP) are met. In addition, consultation documents that provide protection measures for Federally listed species or designated critical habitat were used as sources of project design criteria. Where applicable, pertinent standards and guides from these Plans are cited. The design criteria apply to all action alternatives, unless otherwise specified. Appropriate specialists will be consulted before any design criteria for proposed activities are changed.

I. Design Criteria Common to All Activities

1. Formal and informal consultation

While coho salmon were listed as an ESA Threatened species, consultation was initiated with NOAA Fisheries with the submittal of a biological assessment on February 25, 2003. NOAA Fisheries concluded consultation with the issuance of a letter of concurrence on April 18, 2003 (reference 2003/00223). This letter of concurrence agreed with the Forest Service determination that this project may affect, but is not likely to adversely affect coho salmon, due to the project's design criteria (appendix A), especially those associated with commercial thinning and road decommissioning. Since the initial consultation, the ESA status of the coho listing has changed and coho salmon are currently proposed as a threatened species, with a final rule on their status expected in June 2005.

The April 18, 2003 letter of concurrence from NOAA Fisheries also agreed with the Forest Service determination that project activities will not adversely affect Essential Fish Habitat, as designated by the Magnuson-Stevens Fishery Conservation and Management Act.

NOAA Fisheries, on December 14, 2004, proposed the designation of critical habitat for Pacific salmon and steelhead in Washington, Oregon, and Idaho. This proposed rule designated some of the streams within the project area as critical habitat for Oregon Coast coho salmon. Effects to the streams proposed for designation as critical habitat were addressed in detail with the Forest Service February 25, 2003 biological assessment. Consultation with NOAA Fisheries will occur if streams within the project area are formally designated as critical habitat in the final rule, expected to be issued in June 2005.

The US Fish and Wildlife Service (FWS) has concurred with our findings that the project will not jeopardize the existence of northern spotted owls, marbled murrelets, and bald eagles. The biological assessments are listed below along with the corresponding biological opinion reference number. The FWS terms and conditions are included in the project design criteria:

- Programmatic Biological Assessment of Fiscal Year 2004-2005 Activities in the North Coast Province Which Might Disturb Bald Eagles, Northern Spotted Owls, or Marbled Murrelets. (FWS biological opinion reference #: 1-7-04-F-1113).

- Biological Assessment of Habitat-Modification Projects Proposed During Fiscal Years 2005 and 2006 in the North Coast Province, Oregon that Would Affect Bald Eagles, Northern Spotted Owls, or Marbled Murrelets, or Would Modify the Critical Habitats of the Northern Spotted Owl or the Marbled Murrelet. (FWS biological opinion reference #: 1-7-05-F-0005).

Coho salmon

a. No new permanent roads will be built. The density or adverse effects of existing classified (permanent) or unclassified (permanent) roads in the Yachats watershed will be reduced.

b. Reduce the density or adverse effects of existing classified (permanent) or unclassified (permanent) roads in the Yachats watershed by at least an equivalent mileage or adverse effect of temporary roads not decommissioned in the same dry season they are built. Roads to be decommissioned or effects to be reduced will be identified before or at the same time new temporary roads to remain for more than one dry season (semi-permanent) are built. Roads to be decommissioned that serve a sale unit may be decommissioned up to five years after the sale closes.

c. In all plantations proposed for commercial thinning, prohibit commercial thinning within 50 feet of coho salmon streams.

d. Generally limit the season of operation for in-stream work—such as replacing or removing culverts in temporary roads and road decommissioning—to July 1 through September 15. Obtain a waiver from the State where needed to conduct the work after September 15. A waiver may be granted after a fish biologist has determined that no fish are spawning in the area or downstream from the area and that water levels are sufficiently low. Refer to the following section for other timing restrictions that affect building and reopening temporary roads.

Bald eagle, marbled murrelet, and northern spotted owl habitat

Bald eagle, marbled murrelet, and northern spotted owl

a. A wildlife biologist shall participate in the planning and design of all projects affecting listed species.

b. The administrative units, to the extent feasible, shall schedule the implementation of projects within 0.25 mile of suitable or potential habitat outside of the entire breeding period of that species. These **breeding periods** are:

Bald eagle:	January 1 to August 31
Northern spotted owl:	March 1 to September 30 (critical period: March 1 to July 7)
Marbled murrelet:	April 1 to September 15 (critical period: April 1 to August 5)

c. Project activities (including associated site evaluation, road construction, hauling, planting, *etc*.) shall not take place within disturbance distances stated within the 2005/2006 Habitat Modification BA for spotted owl nest sites or the activity center of any known pair (unless known to be unoccupied, as defined by protocol), or for a known occupied marbled murrelet site, during the critical nesting period (March 1 - July 7 for owls, and April 1 - Aug. 5 for murrelets). The unit wildlife biologist may modify the distance and timing based on site-specific information.

d. Immediately evaluate for potential effects and restrict to prevent disturbance any activity within disturbance distances identified in the 2005/2006 Habitat Modification BA if a new bald eagle, marbled murrelet, or spotted owl nest is discovered in the project area.

e. Give priority to existing stumps and smaller trees (less than 24 inches dbh) for selection as guy line anchors when landings are adjacent to mature stands. Avoid nest trees when possible. Where only mature trees larger than 24 inches are available, use trees without murrelet or spotted owl nesting structure as anchors. If a tree with nesting structure must be used as an anchor, then do not fall the tree during the nesting season.

f. Involve a wildlife biologist in any activity that proposes to remove mature conifers.

Marbled murrelet

All thinning, down salvage, and individual tree removal actions that may affect murrelet critical habitat, or suitable, or potential habitat of the murrelet shall comply with the standards of the May 13, 1997 biological opinion for programmatic activities within designated murrelet critical habitat.

Survey stands **43, 56, 92, 93, 94, 129**, and **175** for potential murrelet nesting structure during the pre-sale phase of implementation. If a potential structure is found, the unit wildlife biologist will evaluate and protect if necessary, according to Level 2 direction.

Northern spotted Owl

LSR thinning treatments in stands that are 55 years old or older, and within 0.5 mile of a known spotted owl site within LSR, and that has less than 40 percent suitable habitat within its provincial home range, will be reviewed by the Level 1 Team.

Bald eagle, northern spotted owl, and marbled murrelet disturbance

Bald eagle, marbled murrelet, and northern spotted owl

a. A wildlife biologist shall participate in the planning and design of all projects affecting listed species.

b. The administrative units, to the extent feasible, shall schedule the implementation of projects within 0.25 mile of suitable or potential habitat outside of the entire breeding period of that species. These **breeding periods** are:

Bald eagle	January 1 to August 31
Northern spotted owl	March 1 to September 30 (critical period: March 1 to July 7)
Marbled murrelet	April 1 to September 15 (critical period: April 1 to August 5)

c. Schedule activities during the breeding period that might adversely affect listed species as late in the period as feasible to reduce potential impacts to listed species.

d. Do not implement projects or associated activities between January 1 and August 31 within 0.25 mile or a 0.5-mile sight distance of a known bald eagle nest site unless the unit biologist verifies that the nest is unoccupied.

e. Do not use blasting during these species' entire breeding period (listed above) as part of any proposed action covered under this assessment.

f. To minimize the risk of attracting predators to activity areas, contain or remove all garbage (especially food products) daily from the vicinity of any activity.

g. Do not begin helicopter operations until August 6 in any given year where operations will be within 0.25 miles of suitable occupied, unsurveyed suitable, or potential habitat.

h. Do not implement activities (including associated site evaluation, road building, log hauling, planting, etc.) within 0.25 mile of a known occupied site, nest, or activity center (unless known to be unoccupied, as defined by protocol) during the critical nesting period for owls or murrelets (March 1 through August 5).

i. Do not implement pile driving operations within 0.25 mile of occupied, unsurveyed suitable, or unsurveyed potential murrelet habitat between April 1 and August 5, or within 0.25 mile of occupied or unsurveyed suitable spotted owl habitat between March 1 and July 7. These seasonal restrictions may be waived by the unit wildlife biologist if nest sites or habitats are verified to be unoccupied.

j. Follow the operating season table for stands that will be commercially thinned.

k. Prevent disturbing any new bald eagle, marbled murrelet, or spotted owl nest site that may be discovered in the project area—within disturbance distances identified in the

2005/2006 Habitat Modification BA—by immediately evaluating potential disturbance effects and restricting any activity within 0.25 mile of the nest site (0.5 mile line-of-sight for bald eagle nests).

l. All activities associated with projects that may affect murrelets (including sound disturbances, visual disturbances [human intrusion] or physical disturbances [e.g. underburning in an adjacent stand]) within 0.25 mile of known occupied, unsurveyed suitable, or potential murrelet habitat and implemented between April 1 and September 15 shall not begin until two hours after sunrise and shall end two hours before sunset.

m. Restrict haul for stands 506046, 506047, and 506053 to occur only outside the period April 1 to August 5. Stands are located on road 5305 in T14S, R11W, section 26.

n. Units with winter operations (beginning 10/1) may build and reopen temporary roads and landings during September 1 through September 30. During the period from September 1 through September 15, operations shall not begin until two hours after sunrise and shall end two hours before sunset.

o. Do not use Type I and II helicopters within 0.5 mile (vertical or horizontal), or use Type III and IV helicopters within 0.25 mile (vertical or horizontal), of spotted owl or murrelet occupied or unsurveyed suitable or potential habitat during the critical breeding periods (spotted owl: March 1 to July 7; murrelet: April 1 to August 5)

2. Other requirements

a. Follow Siuslaw Plan standards and guides (FW-114 through FW-118) to meet water-quality standards outlined in the Clean Water Act for protecting Oregon waters, and apply practices as described in General Water Quality Best Management Practices, Pacific Northwest Region, November 1988. Design criteria, including these practices, are incorporated throughout the project, such as in project location, design, contract language, implementation, and monitoring. The State has agreed that compliance with these practices will ensure compliance with State Water Quality Standards (Forest Service Manual 1561.5, R-6 Supplement 1500-90-12).

b. If the total oil or oil products storage at a work site exceeds 1,320 gallons, or if a single container (e.g., fuel truck or trailer) exceeds a capacity of 660 gallons, the purchaser shall prepare and implement a Spill Prevention Control and Countermeasures (SPCC) Plan. The SPCC plan will meet applicable EPA requirements (40 CFR 112), including certification by a registered professional engineer. (SFP: FW-119, 120, 122).

c. The literature was searched for possible heritage resources (historical or archaeological sites) in the project planning area. No known sites were identified that could be affected by this project. All actions, except riparian planting, will all be on previously disturbed ground and will not require field inventories. Locate riparian planting to avoid homestead-building sites. To avoid impacts to unknown sites, a certified cultural resource technician will monitor riparian planting areas. Should heritage resources be discovered

as a result of any project activities, cease work in that area and consult with the Forest Archaeologist. Protect, preserve, and treat sites in accordance with the National Historic Preservation Act.

d. Follow the Vegetation Management Analysis to guide the managing of competing and unwanted vegetation. The plan was developed in compliance with the Record of Decision for the "Managing Competing and Unwanted Vegetation" FEIS (November 1988) and the subsequent Mediated Agreement.

e. Required survey-and-manage protocols will follow the Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines including the results of the 2001 Annual Species Review (USDA, USDI 2001).

f. Forest Service direction, regulations, and standards and guides for resource protection may change over time. Should changes occur prior to completion of any actions under this project, complete an addendum to the project EA and modify contract(s) to reflect mandatory changes.

II. Commercial Thinning and Post-harvest Activities

1. Thin and harvest operations

Proposed, Endangered, Threatened, and Sensitive (PETS) Species:

a. Base thinning prescriptions in the late-successional reserves on the management triggers, criteria, and appropriate activities outlined in table 7 of the Late-Successional Reserve Assessment, Oregon Coast Province-Southern Portion (USDA 1997).

b. Operating seasons have been established for units to minimize noise-associated disturbances to northern spotted owls and marbled murrelets. Base time frames and corresponding thinning areas (in percent acres) accordingly: No more than 50% of the operation acres between July 8 to September 30.

c. Add provisions (such as CT6.25 and CT9.52) to contracts to protect any of these species that may be discovered when the project is implemented. The Forest wildlife biologist will determine the need for reinitiating consultation with the U.S. Fish and Wildlife Service, and the Forest fish biologist will determine the need for reinitiating consultation with the National Marine Fisheries Service (SFP: FW-035, 037).

d. Include applicable hourly and seasonal operating restrictions in timber-sale contracts.

e. To minimize the number of guyline trees that need to be felled to meet OSHA standards, use existing stumps if available and suitable, select the smallest tree within reach of the yarder, use the same tree between landings if effective and within reach, and avoid trees with nesting structure.

Survey-and-Manage Species:

a. No surveys are required for terrestrial mollusks due to lack of suitable habitat in project areas. No surveys for red tree vole presence are required because stands do not contain habitat conditions that require surveys.

b. Implement a 300-foot buffer around the survey-and-manage lichen site (*Ramalina thrausta*, category A) located northwest of stand 025 in the North Yachats sub-watershed to protect the site from the effects of mature tree topping.

c. Two conservation strategy populations of Poa laxiflora (Meeks Meadow population #45 and School Fork population #42) are located in riparian buffers near stands and should not be affected by commercial thinning.

d. Follow current management recommendations for known sites of survey-and-manage species.

Stand and Species Diversity (NFP: p. C-12):

a. Emphasize variable spacing in distributing leave trees to mimic natural stands. Within operational and economical limits, provide significant spacing tolerance for each prescription when selecting the trees necessary to meet the average residual trees per acre as specified for each thinning unit in Appendix B-2. The tolerances will allow for clumping trees and creating small holes as well as meeting items b to f below.

b. Retain western redcedar, Pacific yew, and native hardwoods in stands, to maintain existing species diversity. Consider retaining western hemlock if it is a minor component in stands. Buffer wet areas, hardwood clumps **(**as much as feasible**)**, and other unique features to maintain existing stand diversity.

c. Retain and create trees with unique phenotypical differences (such as large limbs) compared to the rest of the stand for future wildlife habitat. Up to 5% of the trees are expected to be in this category.

d. After retaining trees identified in “b” and “c” above, favor the largest, healthiest trees in selecting leave trees.

e. Retain at least 30% canopy cover in each stand proposed for commercial thinning. In general, 30% canopy cover is retained when 30 or more TPA are retained.

f. Although emphasis is placed on retaining trees identified in "b", "c", and "d" above, select for retention where possible, smaller trees that are currently contributing to structural diversity in the stand.

Snags (NFP: 2; p. C-14):

a. Where safe and feasible, retain existing snags that provide suitable wildlife habitat.

Soils and Aquatic Resources (NFP: p. B-11, 8, 9; p. C-15; TM-1, p. C-31, 32; RA-1 & 2; FW-1, p. C-37):

Streams and Riparian Vegetation

a. Implement protective vegetation leave areas or buffers around all streams, potentially unstable areas, and wet sites to maintain stream temperature, maintain stream-adjacent slope stability (including headwalls), and protect riparian vegetation. These areas will not be commercially thinned.

b. Determine width of no-harvest buffers based on site-specific factors such as stream order, presence or absence of conifers, and slope-stability conditions. Buffers will at least include the inner gorge adjacent to streams and the active floodplain. Locate buffers for all perennial streams at least 50 feet slope distance from the edge of the floodplain; for intermittent streams at least 15 feet from the edge. If no floodplain or slope break exists, retain at least two rows of conifer above streams. Buffers will be wider than these minimums where needed to avoid unstable areas (SFP: FW-087, -088, -089, -112).

c. Limit skyline corridors to between 10 and 20 feet wide. Corridor width may appear wider in areas where trees adjacent to the corridor are cut to meet the silviculture prescription. Where skyline corridors pass through riparian buffers, remove no more than 20% of the canopy in a given 1,000-foot reach of stream (SFP: FW-091) Corridors will not be directly over coho habitat.

d. Directionally fell trees away from buffers to protect riparian vegetation from damage. Retain trees accidentally felled into buffers to minimize stream sedimentation or damage to riparian vegetation. Some trees may be removed as determined by a fish biologist or hydrologist (SFP: FW-091).

e. Add aggregate to and/or reshape roads where needed prior to haul to ensure proper drainage. To reduce sedimentation into streams from aggregate-surfaced roads, minimize blading of ditches, monitor roads during periods of heavy rain, and use straw bales to trap sediment where necessary. Suspend log hauling when it is determined that active erosion control measures cannot prevent sediment from entering streams. Where haul is allowed during wet weather, apply mitigating actions such as requiring “constant reduced tire pressure” **(**steering axle tires at 85 psi and all other tires inflated to the tire manufacturer’s recommended minimum pressure) to reduce sedimentation.

f. Where skyline cable yarding is planned, design logging systems to yard away from stream channels to minimize soil disturbance on stream-adjacent slopes. If this

strategy is not feasible, maintain full suspension of logs over streams (SFP: FW-091, -092).

g. To minimize soil disturbance, use standing skyline cable or aerial logging systems for commercial thinning. Ground-based logging systems, such as harvesters, may be used if they operate from roads or on ground less than 30%. A soils scientist or hydrologist will determine case-by-case where ground-based systems may be used.

Soils and Woody Debris

a. Remove the tops (less than 5" in diameter at the large end) from about 20% of the trees in units prior to yarding whole trees. This practice, coupled with the breakage (limbs and tops) that normally occurs during tree felling and yarding, will ensure that residual debris will be of sufficient quantities to address soil nutrient and erosion concerns. Observations of whole-tree yarding also indicate that less soil displacement occurs in units than that associated with log yarding because of the limbs that are attached to tree boles.

b. Retain existing logs in stands to benefit soil nutrient cycling; moss, fungi, and lichen habitat; travel corridors for small mammals; and foraging sites for various animal species.

c. Where applicable to reduce potential for theft of dead and down structural material, close roads as soon as possible after harvest.

d. Outside of areas designated for full log suspension and lateral yarding, use one-end log suspension on all areas designated for cable yarding systems to reduce soil displacement and compaction (SFP: FW-107).

e. Where slopes are greater than 60% immediately below side-cast roads, retain two rows of conifers (where feasible and if conifers appear stable) to maintain slope stability (SFP: FW-112).

f. To minimize soil disturbance, use standing skyline cable or helicopter logging systems as the primary method of log removal for all thinning sales.

g. Ground-based logging systems such as harvesters or wide-tracked skidders may be used if operations are limited to ground less than 30% slope, designated skid roads, and the dry season. A soils scientist or hydrologist will determine case-by-case where ground-based systems may be used. Should rain occur in the summer season, operations may be temporarily suspended to prevent rutting of skid trails. In cooperation with the sale administrator, suspension of operations will be determined by a specialist. About 45 acres may be yarded by ground-based systems, affecting stands 001 (5 acres); 011, 012, and 504280 (9 acres); 037 (8 acres); 041 (7 acres), 065 (3 acres); 159 (8 acres), and 179 and 180 (5 acres). All acres are estimated based on field reconnaissance, maps, and aerial photos.

Domestic Water Sources

a. Protect domestic water-diversion sites and equipment in stands 104, 117, 118, and 120.

Temporary (Non-key) Roads and Landings (NFP: RF-2 & 5, p. C-32, C-33):

a. A team comprising of planners and engineers will review road project sites before preparing road design plans for timber sale contracts. Planners and engineers will review any changes in design plans before incorporating them into contracts.

b. Do not reuse existing temporary roads where road instability is likely a major concern.

c. Limit new temporary spur roads to stable ridges to minimize soil disturbance. No new Forest classified (system) roads will be built. Where feasible, design the logging plan to minimize the need for new temporary roads (SFP: FW-162, 163).

d. If the horizontal alignment of temporarily reopened roads needs adjustment, favor the cut bank side of the road prism to minimize disturbance to side-cast areas and established vegetation.

e. Scatter slash created through road building in the stands.

f. Surface temporary roads used during the wet season with rock aggregate where needed. Surfacing depth should allow for log trucks using constant reduced tire pressures. Consider the length of temporary roads when determining the season of use. For the timber sale contract, identify roads to be used during the dry season; no rock will be used on these roads.

g. Build skyline cable and helicopter service landings in stable areas with stable cut bank slopes. Use existing landings where feasible (SFP: FW-115, 117).

h. Waterbar and close temporary roads between operating seasons or as soon as the need for the road ceases, to minimize sedimentation from roads. To reduce soil erosion, seed exposed soils with native, certified weed-free species (if available) or spread landing slash by machine over landing sites (unless tree planting is planned) and spur roads, especially those with native (non-rock) surfaces. This practice will be more cost effective than machine piling and burning of landing piles and will help stabilize disturbed soils. The district wildlife biologist or botanist will recommend certain native-surface roads for seeding and fertilizing.

i. Consider machine piling and burning of landing piles, especially within 25 feet of key Forest roads. The district hydrologist, fire management officer, and sale administrator

will determine appropriate sites for machine piling and burning. These sites generally include roads and landings that have been rocked (SFP: FW-162).

j. A watershed specialist (such as a hydrologist, soil scientist, or geologist) will evaluate temporary roads used for timber removal (especially those used during the wet season) to determine need for ripping or subsoiling. If ripping is to be done by the timber-sale contractor, roads to be ripped will need to be identified in the timber-sale contract. Avoid subsoiling in areas where residual tree roots may be adversely affected.

k. Do not locate helicopter service landings near streams to minimize potential for petroleum spills affecting water quality.

l. Because the number of large helicopter log-landing sites is insufficient, use existing roads as log drop zones for helicopter logging by small ships such as the K-Max and the Bell 204. Design log drop zones to allow workers to be at least 1.5 times the length of the longest log from drop zones. Place landings no more than 0.5 mile from units. Design landings to allow the loader to swing logs and to accurately monitor loaded truck weight.

m. KV funds will be collected to remove existing fills over culverts from non-key roads in stands 007, 037, 064, and 001/179, upon completion of timber-sale contracts (see notes from unclassified road review).

n. KV funds will be collected to remove potentially unstable sidecast areas from non-key roads in stands 007, 038, 068, and 154, upon completion of timber-sale contracts (see notes from unclassified road review).

o. Follow the operating seasons identified for stands that will be commercially thinned (appendix B-3). Where operating seasons begin 10/1, temporary roads and landings may be built or reopened during September 1 through September 30. During the period from September 1 through September 15, operations shall not begin until two hours after sunrise and shall end two hours before sunset.

p. Generally limit the season of operation for in-stream work—such as replacing or removing culverts in temporary roads and road decommissioning—to July 1 through September 15. Obtain a waiver from the State where needed to conduct the work after September 15. A waiver may be granted after a fish biologist has determined that no fish are spawning in the area or downstream from the area and that water levels are sufficiently low.

Bureau of Land Management (BLM) and USFS Road and Landing in 14-11-10:

a. The USFS has jurisdiction over the entire 1459 road in 14-11-10, except the small portion entering BLM land in the NE1/4 of the NW1/4 of Section 10, which is under BLM jurisdiction. BLM agrees with the USFS proposal to place the road in storage by pulling

the two culverts located on live streams, waterbarring the road surface, and blocking its entrance. The closure would be conditional on BLM's right to temporarily restore vehicle passage when conducting future management activities.

b. Should the USFS use the landing located on BLM land, which will be determined during logging systems analysis, the BLM would prepare its own timber sale for harvesting corridor trees. The BLM sale would be sold to the USFS purchaser as a condition of awarding the USFS sale.

c. The BLM would sell its timber as either a Green Sheet or Negotiated Timber Sale, depending on the cruised volume. Smaller volume sales like this don't require a License Agreement; rather, the BLM purchaser would acquire haul authorization from the USFS. In this case, the BLM sale would be linked to the USFS sale further simplifying the process.

d. The BLM may choose to transfer the responsibilities of yarding corridor and landing rehabilitation (i.e., ripping, grass seeding, tree planting) to the USFS for administration.

Existing System Roads (NFP: RF-2 & 5, p. C-32, C-33):

a. Where water bars are temporarily removed from project-maintained roads to facilitate harvest operations, add rock if needed at these sites to maintain a hardened road surface and reduce the potential for erosion.

b. Replace water bars, remove temporary culverts, and close project-maintained roads when the project is completed. Appropriate closure devices generally include earthen mounds or large boulders. Purchasers will be responsible for replacing closure devices that were removed for harvest operations. These requirements will be included in the timber-sale contract or waived if they do not apply.

c. Locate road drainage (cross drains) in areas that will not discharge over unstable slopes. If unstable roads are to be used, stabilize them prior to their use. Follow the Water Bar Placement Guide for Siuslaw Forest Roads.

d. Limit hauling on road 5491 to the dry season (8/6 to 10/15).

e. Implement deferred maintenance on roads 5300, 5360, 5400, 5500, 5590, and 5800. Deferred maintenance items are limited to those needed to make the haul routes stable and safe for a mix of commercial and public use. Activities are designed to improve the structural strength and stability of roads, improve drainage of road surfaces, and resurface roads where needed. Activities include replacing inadequate or failing ditch relief culverts, surface patching on asphalt roads, structural patches on failing road fills, and resurfacing roads with either gravel or asphalt. Conversion from asphalt to gravel surfacing is considered where it is economically more beneficial than repairing failed asphalt surfacing and sub grade.

Insects, Disease, and Wind (NFP: p. C-12, C-13)

a. For stands considered vulnerable to storm winds, implement untreated "wind buffer" areas.

b. Follow the silviculture prescription guidelines when marking around laminated-root-rot areas.

c. To help document pockets of laminated root rot, include "Treatment of Stumps" (CT6.412) in the timber sale contract.

2. Post-harvest "Essential" KV reforestation activities

Following thinning operations, each unit will be evaluated for planting opportunities. Planting sites will be identified as "essential" and "non-essential" in priority for KV funding. Planting is considered "essential" only in areas where harvesting has opened up holes in the canopy—such as landings and corridors—that were previously stocked with trees. Underplanting—planting under the crowns of overstory conifers—is considered as "non-essential" or an enhancement activity (see item 4, Post-harvest enhancement activities).

Planting prescriptions will be designed to enhance stand structure and species diversity by varying planting densities and species mix. Planting will include shade-tolerant conifer, such as western red cedar, western hemlock, and Sitka spruce, and hardwoods. Planting efforts will focus on the numerous small openings that are expected to be created in each thinned unit and specify spacing tolerances that provide for maximum flexibility in spacing. For example, the planting prescriptions will provide a range of guidelines that will allow for "clump" planting of seedlings as well as leaving other areas unplanted. Refer to the silviculture prescription in the project file for unit-specific information.

Stand and Species Diversity (NFP: p. C-12):

a. Plant about 100% of the stands thinned to 40 TPA, 50% of the stands thinned to 60 TPA, and 5% of the stands thinned to 90 TPA. All of the planting acres in the 40 TPA stands, 10% of the 60 TPA stands, and 5% of the 90 TPA stands are essential KV.

b. Plant a mix of shade-tolerant conifers such as western red cedar, western hemlock, and Sitka spruce (75% of total planting) and other conifers and hardwoods such as Douglas-fir, red alder, Oregon big-leaf maple, and cascara (25% of total planting). If necessary, fell occasional overstory conifer trees required for coarse woody debris to provide more light. *Phellinus* pockets will be planted with western red cedar, red alder, or occasionally left as brush pockets.

c. Implement animal control measures such as tubing or capping to benefit tree survival and growth.

d. Release planted trees in openings as needed for up to 10 years after the commercial thinning sale is closed to benefit tree survival and growth.

3. Post-harvest mitigation activities

These treatments focus on incorporating management elements for fire and fuels, coarse woody debris, snags and wildlife trees, stand and species diversity, and noxious weeds.

Fire and Fuel Management:

a. Follow the Fire Management Plan for LSR RO267 for all wildfire suppression or pre-suppression prevention programs. For all burning, prepare a burn plan that meets all the parameters identified in FSM 5150. Register all material to be burnt through the Forest fuels planner and enter into the FASTRACS program. Allow 5 to 7 days to complete this process that must be done prior to burning. Conduct all burning according to the guidelines of the Oregon Smoke Management Plan.

b. Design fuel treatment activities to meet Aquatic Conservation Strategy objectives and to minimize disturbance to riparian vegetation. Refer to the Northwest Forest Plan (FM-1, 3, 4, 5; pp. C-35, 36) for additional information.

c. Where fuel borders county roads and key Forest roads maintained open for general use, provide fuel breaks to reduce the risk of human-caused fire. Measure fuel breaks from the edge of the road into the thinned units. Classified roads will require a minimum 25-foot fuel break for each side of the road bordered by fuel. About 36 total acres will be treated. See fuels prescription for a list of affected stands and roads.

d. Where fuel borders private land in the wildland-urban interface, reduce fuel loading in stands 104 and 195 by broadcast underburning. Whole tree yarding and burning of slash on landings may preclude the need for underburning.

e. Where fuel borders private land in the wildland-urban interface, reduce fuel loading by burning hand-piled slash within 300 feet of property boundaries in stands 42, 46/47/53, 91, 93 104 (if underburning is not needed), 110, 111, 117, 118, 120, and 195 (if underburning is not needed).

f. Use minimum coarse woody debris prescriptions for some stands in the wildland-urban interface to reduce fuel loading in stands 64, 46/47/53, 58, 68, 75, 104, and 195.

g. Create fuel breaks by (in the order of least to most expensive cost) using untreated buffers adjacent to roads, directional felling of trees away from roads, or hand piling and burning slash adjacent to roads. High cut banks (with no slash) can be considered adequate fuel breaks.

h. If scattering of landing piles will not adequately address the fire hazard, burn landing slash within 25 feet of open-system roads. Follow-up burning with native, certified weed-free seeding if landing is larger than 1/5 acre (about 95' X 95') and has a native (non-rock) surface.

i. Where practical, close project-maintained system roads (roads kept open only for the duration of the commercial thinning project) to vehicle traffic during the dry season where landing piles and other logging slash borders these roads. Determine case-by-case if road closure alone will adequately address the fire hazard. If these roads are to be kept open during the dry season, consider reducing the fuel loading through prescribed burning to address the fire hazard.

j. After harvest operations are completed on any given unit, conduct fuel treatments where necessary and as soon as practical to minimize exposure to fire hazard.

k. To reduce the potential for fire spread and the difficulty in controlling it, place most of the coarse woody debris in small pockets of heavier concentration rather than scattering it more evenly across units. Where large amounts of coarse wood will be created or where thinned units are close to each other, place heavier concentrations of coarse wood on north slopes and lower 1/3 slopes.

l. To reduce the potential for wildfire, do not fell trees for coarse woody debris in designated fuel breaks unless the tops are kept outside of the breaks. Designated fuel breaks need to be identified in the timber-sale contract or on implementation plan maps.

Coarse Woody Debris Mitigation (NFP: 8, 9; p. C-15; C-12 & 13):

Provide coarse woody debris by using the following prescriptions based on the Late-Successional Reserve Assessment, Oregon Coast Province, Southern Portion, version 1.3, p. 66-69:

a. In LSR plantations, maintain 3 to 14 trees-per-acre (tpa) for coarse woody debris. Refer to the silviculture prescription table for site-specific cwd requirements.

b. Defer creating coarse wood in harvested units until four years after the sale contract is closed to allow for canopy recovery. At that time, monitor the canopy cover before the trees are felled to ensure canopy cover remains at or above 30% in all units.

c. Use trees that blow down within 4 years after treatment towards meeting the coarse woody debris allotment for individual stands.

d. Fell trees for woody debris in areas that would enhance density variability within stands. Use *phellinus* pockets as places to concentrate coarse woody debris.

e. To reduce the potential for Douglas-fir bark beetle infestations, avoid felling trees for coarse wood during the period from May 1 through June 15 (adult beetle flight season).

Creating Snags and Wildlife Trees (NFP: p. C-14):

a. To mitigate for past losses of mature snags, top mature trees or inoculate them with native fungi (*Phellinus pini* and *Fomitopsis canjanderi*) in natural stands adjacent to commercially thinned managed stands. Top or inoculate about 300 trees to ensure subwatersheds contain at least 2.0 snags/acre.

b. In thinned portions of plantations, inoculate about 4,000 trees (including 20% mitigation for past harvest practices) with native fungi (*Phellinus pini* and *Fomitopsis cajanderi*) to ensure subwatersheds average about 3.0 snags/acre. Inoculation will allow for continued tree growth and increase snag diameter while providing cavity habitat.

c. Do not create snags and wildlife trees through tree topping between March 1 and September 30, to avoid potential disturbance to spotted owls and murrelets.

d. Do not cut trees that appear to contain red tree vole or raptor nests.

e. In thinned plantations, use trees that die within 4 years after harvest towards meeting the snag allotment for individual stands.

f. Do not create snags where they appear likely to fall over or slide into public-traveled roads, to avoid increasing hazardous conditions in the range of the roadway and theft of snag material for firewood.

Noxious Weed Prevention and Mitigation:

a. To prevent the spread of noxious and undesirable weeds, maintain canopy cover to the extent possible when reopening and building roads or stabilizing and closing them. Seed disturbed sites lacking canopy cover (landings, roads, waste areas, culvert removal sites, and road barricades) with available native, certified weed-free grass and forb species.

b. To prevent spread of noxious and undesirable weeds, all heavy equipment (including dump trucks, excluding log trucks) shall be clean and free of soil, vegetative matter, or other debris that may contain or hold weed seeds prior to entering National Forest System lands.

c. To prevent the spread of noxious and undesirable weeds from and between high weed risk stands and worksites, clean all heavy equipment (including dump trucks, excluding log trucks) used in high weed risk units and worksites prior to going to another project site or prior to leaving the work site. Use compressed air, high-

pressure water, or other specified cleaning method to assure equipment is free of soil, vegetative matter, or other material that could contain or hold weed seeds. Prohibit the use of chemicals such as solvents and detergents to clean equipment on National Forest System lands. The Forest Service will specify cleaning areas, either on site or at a facility with a catch basin. Refer to the project file for a list of high-risk areas.

d. Develop noxious weed treatment prescriptions for high weed risk project sites and their adjacent areas. Prescriptions will be based on information obtained from previous monitoring. Limit treatments to manual (handpulling), mechanical, and biological methods (including additional seeding).

Unclassified Roads Not Reopened:

a. Where warranted, place unclassified roads **not** used for commercial thinning (but within ¼-mile of commercial thinning units) in the KV plan to become eligible for KV funds. Use these funds to remove fill from stream crossings, remove unstable sidecast, and install water bars where warranted. If KV funds are not available, another funding source will need to be identified.

b. Generally, apply road-decommissioning design criteria to these roads.

c. Where log culverts were used, consider retaining logs in streams.

d. Remove failing sidecast material where the potential for material entering streams is moderate to high.

4. Post-harvest enhancement activities

Stand and Species Diversity (NFP: p. C-12):

a. Non-essential underplanting will be done under the canopy of stands that are thinned to 60 TPA (40% of stand acres) and 90 TPA (5% of stand acres) to enhance diversity. Plant shade-tolerant conifers, such as western hemlock, western red cedar, and Sitka spruce. Also consider planting hardwoods, such as Oregon big-leaf maple, cascara, and bitter cherry.

b. Use animal control measures such as tubing or capping to benefit survival and growth rates of planted trees.

c. Release is not planned for understory planted trees because initial levels of brush are low and existing overstory trees should retard brush growth long enough for the planted stock to get established. Because of the expected scattered mortality, the planted stock is expected to mimic natural stand understory clumpiness over time.

Wildlife Diversity (NFP: p. C-17):

a. Prior to creation of snags and down wood, underburn stands 011, 012, 065, 087, and 504280 to encourage early-seral growth of herbaceous plants.

Aquatic Resources (NFP: p. C-32 and 37):

a. In the North Fork subwatershed, identify the most slide-prone portions of plantations 506037, 506042, 506074, and the 1990 plantation adjacent to plantation 506042. Thin dense conifer in these areas as heavily as site-specific conditions will allow to speed the growth and development of large wood that could eventually enter streams and benefit aquatic species habitats. Site-specific conditions such as slope stability, stream shade, and slope position will influence thinning prescriptions. Leave (do not remove) felled trees on site.

b. Where dense conifer exist in riparian buffers and headwall leave areas in plantations, thin and leave (do not remove) the dense conifer to speed the growth and development of large wood that could eventually enter streams and benefit aquatic species habitats. Site-specific conditions such as slope stability, stream shade, and slope position will influence thinning prescriptions.

III. Road Decommissioning

1. Road Decommissioning (NFP: RF-3c, 5, & 6; p. C-32, 33):

Road decommissioning definition—Activities that result in the stabilization and restoration of unneeded roads to a more natural state (Federal Register, January 12, 2001).

a. Review, using a team of planners and engineers, the road project sites before preparing design plans for road-decommissioning contracts. Planners and engineers will review any changes in design plans before they are incorporated into contracts.

b. Implement decommissioning activities during the dry season (May 15 to October 15). Follow the directions in the Forest Road Obliteration and Upgrade Guide.

c. Control erosion at fill removal sites. Method of control will vary depending on the amount of sediment that has the potential to enter streams and affect aquatic biota. Consider fill removal, slope stability, cut slopes adjacent to stream channels, road surfaces, and sediment plains in stream channels when determining control methods. Some sites may not require any erosion control while others may require more extensive treatments.

d. Remove all fill material at all culvert removal sites with defined stream channels. Fill removal shall consist of removing all fill that extends from each edge of the natural valley floor width up to the road at about 1.5:1 slope, except where natural slopes are steeper. Where natural slopes are steeper, remove only the fill between the natural slopes.

Partially remove fills where fills are extremely deep, contain too large of material to move (such as large boulders), or will result in adverse effects. For partial fill removal, remove the same wedge of fill as for full-removal areas, except that portion of the fill that is too deep to reach or that which may cause adverse effects. Remove the culvert at full-removal sites; partial-removal sites may leave the culvert functioning in place. Carefully remove all fill material to minimize sediment inputs into streams. (SFP: FW-123).

e. Control erosion on stream-adjacent cut slopes using a native seed mixture and/or vegetation placed contour to the slope where there is a moderate to high risk of erosion affecting aquatic resources. Erosion is most likely when slopes are steeper than 1.5:1 or their length exceeds 20 feet.

f. Place woody debris (locally available alder and brush from the decommissioning site or adjacent to the road prism) in stream channels perpendicular to stream flow where 3 yd^3 of sediment or greater is expected to erode from the channel as the stream adjusts to its gradient during high flows. Stabilize smaller sediment plains where woody debris can be easily obtained near the site.

g. Install water bars on both sides of excavated stream banks at some sites to route surface water away from newly excavated slopes (SFP: FW-123).

h. Use an interdisciplinary process to determine new sites for waste material before contracts are advertised, and to review existing waste sites to determine need for redesign or relocation. Where feasible, avoid placing waste material in areas that would impact access to future projects.

i. Place waste material only in stable areas and at least 50 feet away from stream channels. Contour waste piles to about 1.5:1 slope to minimize potential for surface erosion or mass soil movement. Allow waste piles to become vegetated naturally or use erosion control (alder, brush, native seeding, etc.) where there is a moderate to high potential for surface erosion. Compact waste material where necessary to prevent erosion. (SFP: FW-117, 171).

j. Level and seed long-term (multiyear use) waste areas after each season of use. Short-term (one-time use) waste areas should be shaped or graded to contour, seeded, and—where other resource objectives are not compromised—planted with appropriate tree species.

k. Stabilize unstable or potentiall unstable sites (such as road side-cast material) before a road is decommissioned, to prevent fine sediment from entering stream channels. Excavate side-cast fill material adjacent to stream crossings, where fill material could fail, enter streams, or both. Focus on areas where downhill slopes adjacent to roads are greater than 60%, and road fills are within 200 feet slope-distance of streams (SFP: FW-108, 117).

l. Design water bars to facilitate proper drainage of surface water and to prevent ponding. Place water bars in areas where drainage will not destabilize road fills. To keep streams

within their channels when culverts are obstructed, build water bars immediately above existing culverts to become the overflow point. Use the Siuslaw National Forest Water Bar Construction and Placement Guide to determine water-bar spacing and design (SFP: FW-123).

m. Transport off-site culverts removed from stream crossings and ditches. Recycle, reuse, or dispose culverts at a landfill.

n. Do not apply specified reconstruction to roads that will be decommissioned.

IV. Other Activities

1. Non-commercial Stocking Control of Managed Stands Up To 50 Years Old (NFP: p. C-12):

About 2,284 acres in stands less than 25 years old will be non-commercially thinned. Additional acres of stands 25 to 50 years old will be non-commercially thinned where it is not feasible for commercial thinning.

If KV funds are insufficient, other appropriated funds will be needed to fully fund these treatments.

No treatment will be done for 337 acres of younger stands because these acres have already been treated.

The following criteria will be used to increase variability in stocking, spacing, and species selection:

a. Create variable spacing in upland forest. The average spacing will be about 15 feet. Variable spacing requirements calls for some stands to be thinned to an average spacing of 25 feet (minimum 20 feet, maximum 30 feet). Other stands will be thinned to an average spacing of 18 feet (minimum 16 feet, maximum 22 feet). The objective in variable spacing is to provide some variety across the landscape while still meeting stand-specific growing needs.
b. Create wide conifer spacing in designated riparian zones. Stands that will be thinned to benefit fish habitat will have 25-foot spacing on conifers within 200 feet of the stream to create large trees faster.
c. Retain alder at 50 foot spacing.
d. Retain all other hardwood species such as big-leaf maple, cascara, yew, and chinquapin.
e. Retain all conifer species other than Douglas-fir with the exception of thinning western hemlock in selected stands where there is excess western hemlock stocking.

Stand prescriptions are constantly being reviewed as objectives change. They are a product of joint collaboration between the silviculturist and the fish and wildlife biologists.

Domestic Water Sources

a. Protect domestic water-diversion sites and equipment in stands 111 and 114.

2. Maintaining Existing Meadows and Managing Noxious Weeds:

a. Remove encroaching conifers, woody vegetation, and other unwanted vegetation such as noxious weeds and non-native plants from existing meadows to maintain meadow habitats. A wildlife biologist, silviculturist, botanist, and fish biologist will coordinate these activities.

b. Control non-native or unwanted vegetation in meadows during periods identified to be most effective for the target species. Use biological methods over manual methods, if they are available and more effective in controlling unwanted vegetation.

3. Roadside Hazard Trees:

a. Identify hazardous trees by the principles outlined in "Long Range Planning for Developed Sites in the Pacific Northwest" (USDA 1992), "Oregon guidelines for selecting reserve trees" (USDA, USDI, et al. 1995), and Oregon Administrative Rules 437-006-0001.

b. Evaluate hazard trees by including a road manager, a wildlife biologist, and a silviculturist (or another person trained in hazard-tree identification) along ATM roads and timber-sale haul routes to determine which trees, snags, or both need to be felled or topped to remove roadside hazards. Give priority to leaving felled or topped material in place as coarse woody debris or for using the material as in-stream structure before selecting them as saw logs, wood fiber, or firewood.

4. Roadside Thinning and Salvage Adjacent To Key Forest Roads:

a. Leave harvest equipment on the road. Minimize soil disturbance when downhill yarding. Leave trees on site where removal causes substantial damage to the road or road prism. Require one-end suspension of the leading end of logs where uphill yarding occurs.

b. Cut but do not remove trees within 100 feet of perennial fish bearing streams. Do not cut trees within 50 feet of perennial non-fish bearing streams. Accomplish other potential requirements such as sidecast pullback, culvert replacement, or noxious weed control with sale receipts.

c. Accomplish key forest road maintenance objectives where applicable during roadside thinning to limit treatment entries. Where roadside commercial thinning occurs in stands between 20 and 60 years old that were not commercially thinned under timber sale contracts, these stands may be thinned within ½ site tree (130 feet) from above or below the road and spacing of residual trees will range from 25 to 35 feet.

d. Remove conifers and hardwoods in the original clearing limits of key forest roads 5300, 5360, 5400, 5500, 5590, and 5800 through sales or service contracts. Consider using commercial thinning sales as a means for removal. Use roadside thinning in areas where adjacent plantations have merchantable volume, but will not be thinned under a timber sale contract.

5. Scenery Mitigation and Enhancement:

a. To meet scenic quality objectives, place disturbed material from road decommissioning in such a manner as to follow natural contour lines and vary with surrounding topography in order to appear part of the natural landscape as much as possible.

V. Special-Use Road Permits

Private access and special-use permits: Private landowners, federal agencies, and commercial and community interests have various easements, permits, and access agreements in effect at the time of this project. Proposed actions are designed to facilitate existing agreements. Additional access needs will be reviewed and authorized case-by-case.

Hauling permits: The existing Forest System roads that access private land may be used for private hauling of timber. Road-use permits (FS-7700-41) may be issued to allow hauling after any required consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service for actions proposed by private land owners is completed.

VI. Monitoring Objectives

Monitoring items include those required for implementation and effectiveness monitoring. Implementation monitoring determines if the project design criteria and Siuslaw Forest Plan standards and guides, as amended by the Northwest Forest Plan, were followed. Effectiveness monitoring evaluates whether applying the management activities achieved the desired goals, and if the objectives of the standards and guides were met. Findings resulting from project observations and monitoring are expected to help influence designing future projects and developing future monitoring plans.

1. Implementation Monitoring

Forest Plan Standards and Guides

Before the contract is advertised, review project contracts for consistency with the standards and guides of both the Northwest and Siuslaw Plans and project design criteria.

Contract and Operations

Involve appropriate specialists when developing timber sale, road decommissioning and other project contracts or conducting District operations work to ensure activities are implemented as designed. The appropriate specialists will also participate periodically during

contract work, especially when unusual circumstances arise that may require a contract modification.

Key checkpoints include a plan-in-hand review, and a contract review of specifications before the next phase of work begins (to ensure key problem situations are addressed in the specifications).

2. Effectiveness Monitoring

Monitoring will be tiered to the Siuslaw Forest Plan.

Vegetation Management

a. Monitor treated stands by focusing observations on tree survival and growth and on planted trees.

b. Monitor trees planted in upland understories and riparian areas for survival and growth.

c. Monitor created snags and wildlife trees by observing effects of fungal injection. Observations will focus on the location and rate of decay, and use by cavity nesters.

d. Monitor stands for existing snags and coarse woody debris within 4 years after treatment. These numbers will count towards meeting the snag and coarse wood objectives for individual stands.

e. Observe all thinned stands to determine if residual trees are being damaged by Douglas-fir bark beetles.

f. Evaluate riparian leave areas as to their effectiveness in maintaining stream shading.

g. For a period of three years after project activities are completed, monitor project sites with a high risk of weed infestation. Conduct monitoring annually and focus on detection of new weed infestations. Refer to the project file for a list of high-risk stands.

h. Monitor the effectiveness of silvicultural prescriptions in achieving variable density spacing and the retention of existing species and structural diversity prior to planting and the creation of snags and coarse woody debris (CWD). Adjust prescriptions for planting, and snag and CWD creation in treated stands where necessary to further enhance stand spacing variability and structural and species diversity.

Road Treatments

a. Field-review excavated slopes from road stabilization activities and note areas where eroded materials enter stream channels. Make observations after the first major rainfall and seasonally thereafter until vegetation reoccupies disturbed sites (about 2 to 5 years).

If the surface is eroding and could adversely affect fish habitat, take steps to eliminate or reduce erosion.

b. Observe road surface treatments such as water bars to determine effectiveness and effects on the stability of the outer portion of the road prism.

Fish Habitat Treatments

a. Measure stream temperature to determine potential effects of thinning in some stands, such as stand 506064, where they are in close proximity to coho habitat.

Wildlife Habitat Treatments

a. Use sample plots to monitor vegetation response, including noxious weeds, to areas underburned for wildlife habitat enhancement.

b. Sample post-harvest canopy closures for all harvest densities (40, 60, and 90 TPA) to attain a more accurate picture of short-term and long-term canopy closure response to thinning in the Yachats watershed. Stands should be sampled within one year after harvest, then again every two years for up to 10 years after harvest.

c. Sample all harvest densities (40, 60, and 90 TPA) to quantify cavity nester use of created snags. Stands should be sampled at approximately 5 years and 10 years after harvest for evidence of both cavity nesting and foraging.

Threatened and Endangered Species

a. Implementation and monitoring forms need to be completed and submitted with a cover letter from the Forest Supervisor to formally verify all harassment has been reported. These reports are to be submitted yearly by November 3.

3. Project Tracking

Forest Service direction, regulations, and standards and guides for resource protection may change over time. Should changes occur prior to completion of any actions under this project, an addendum will be done for the EA and contract specifications will be modified, if necessary.

VIII. KV Actions

Tables 1 through 5 identify KV actions for Alternatives 2a, 2b, 3, 4 and 5, including estimated costs. The tables list the actions in order of priority and identify some as essential or mitigation. Those not identified as essential or mitigation are non-essential or enhancement projects.

Table 1. Alternative 2a KV actions summary

Prioritized action	**Mitigation**	**Unit of measure**	**Unit number**	**Cost/ unit**	Total cost
Sidecast pullback	Yes	Cubic yards	1,000	10	10,000
Road culvert and fill removal from temporary roads	Yes	Cubic yards	2,000	10	20,000
Snag creation by mature tree topping	Yes	Trees	249	100	24,900
Plantation tree snag creation[a]	Yes	Trees	780	35	27,300
Plantation tree snag creation	No	Trees	3,118	35	109,130
Down wood creation[b]	Yes	Trees	3,205	10	32,050
Down wood creation	No	Trees	3,205	10	32,050
Stream shade monitoring	Yes	Miles	7	2,000	14,000
Noxious weed control	Yes	Acres	245	135	30,625
Upland "essential" planting and release (2 releases)	No	Acres	380	1000	380,000
Upland understory "non-essential" planting	No	Acres	652	800	521,600
Precommercial thinning and upland noncommercial thinning	No	Acres	2,381	200	476,200
Early-seral maintenance	No	Acres	29	250	7,250
Wildlife habitat enhancement[c]	No	Acres	108	120	12,960
System road decommission	No	Miles	8.5	9,126	77,575
Total					**1,775,640**

[a]20 percent of the snags created will be counted as mitigation; topping or inoculation or will be used.
[b]50 percent of the down wood will be counted as mitigation.
[C]Underburning will occur in five plantations after commercial thinning to encourage growth of herbaceous vegetation.
Note: Fuel treatment costs are accounted for in the timber-sale appraisal as "BD" costs.

Table 2. Alternative 2b KV actions summary

Prioritized action	**Mitigation**	**Unit of measure**	**Unit number**	**Cost per unit**	Total cost
Sidecast pullback	Yes	Cubic yards	1,000	10	10,000
Road culvert and fill removal from temporary roads	Yes	Cubic yards	2,000	10	20,000
Snag creation by mature tree topping	Yes	Trees	249	100	24,900
Plantation tree snag creation[a]	Yes	Trees	780	35	27,300
Plantation tree snag creation	No	Trees	3,118	35	109,130
Down wood creation[b]	Yes	Trees	3,205	10	32,050
Down wood creation	No	Trees	3,205	10	32,050
Stream shade monitoring	Yes	Miles	7	2,000	14,000
Noxious weed control	Yes	Acres	245	135	30,625
Upland "essential" planting and release (2 releases)	No	Acres	380	1000	380,000
Upland understory "non-essential" planting	No	Acres	652	800	521,600
Precommercial thinning and upland noncommercial thinning	No	Acres	2,381	200	476,200
Early-seral maintenance	No	Acres	29	250	7,250
Wildlife habitat enhancement[c]	No	Acres	108	120	12,960
System road decommission	No	Miles	6.1	1,930	11,775
Repair road 5491	No	Miles	2.4	82,708	198,500
Total					**1,908,340**

[a]20 percent of the snags created will be counted as mitigation; topping or inoculation or will be used.
[b]50 percent of the down wood will be counted as mitigation.
[C]Underburning will occur in five plantations after commercial thinning to encourage growth of herbaceous vegetation.

Note: Fuel treatment costs are accounted for in the timber-sale appraisal as "BD" costs.

Table 3. Alternative 3 KV actions summary

Prioritized action	**Mitigation**	**Unit of measure**	**Unit number**	**Cost per unit**	**Total cost**
Snag creation by mature tree topping	Yes	Trees	249	100	24,900
Plantation tree snag creation[a]	Yes	Trees	637	35	22,295
Plantation tree snag creation	No	Trees	2,547	35	89,145
Down wood creation[b]	Yes	Trees	2,607	10	26,070
Down wood creation	No	Trees	2,606	10	26,060
Stream shade monitoring	Yes	Miles	7	2,000	14,000
Noxious weed control	Yes	Acres	245	135	30,625
Upland "essential" planting and release (2 releases)	No	Acres	264	1000	264,000
Upland understory "non-essential" planting	No	Acres	605	800	484,000
Precommercial thinning and upland noncommercial thinning	No	Acres	3,001	200	600,200
Early-seral maintenance	No	Acres	29	250	7,250
Wildlife habitat enhancement	No	Acres	10	120	1,200
System road decommission	No	Miles	6.1	1,930	11,775
Repair road 5491	No	Miles	2.4	83,708	198,500
Total					**1,800,020**

[a]20 percent of the snags created will be counted as mitigation; topping or inoculation or will be used.
[b]50 percent of the down wood will be counted as mitigation.
[C]Underburning will occur in five plantations after commercial thinning to encourage growth of herbaceous vegetation.

Note: Fuel treatment costs are accounted for in the timber-sale appraisal as "BD" costs.

Table 4. Alternative 4 KV actions summary

Prioritized action	**Mitigation**	**Unit of measure**	**Unit number**	**Cost per unit**	Total cost
Snag creation by mature tree topping	Yes	Trees	249	100	24,900
Plantation tree snag creation[a]	Yes	Trees	495	35	17,325
Plantation tree snag creation	No	Trees	1,981	35	69,335
Down wood creation[b]	Yes	Trees	2,271	10	22,710
Down wood creation	No	Trees	2,270	10	22,700
Stream shade monitoring	Yes	Miles	7	2,000	14,000
Noxious weed control	Yes	Acres	245	135	30,625
Upland "essential" planting and release (2 releases)	No	Acres	243	1000	243,000
Upland understory "non-essential" planting	No	Acres	475	800	380,000
Precommercial thinning and upland noncommercial thinning	No	Acres	3,593	200	718,600
Early-seral maintenance	No	Acres	29	250	7,250
Wildlife habitat enhancement[c]	No	Acres	6	120	720
System road decommission	No	Miles	6.1	1,930	11,775
Repair road 5491	No	Miles	2.4	82,708	198,500
Total					**1,761,440**

[a]20 percent of the snags created will be counted as mitigation; topping or inoculation or will be used.
[b]50 percent of the down wood will be counted as mitigation.
[C]Underburning will occur in five plantations after commercial thinning to encourage growth of herbaceous vegetation.

Note: Fuel treatment costs are accounted for in the timber-sale appraisal as "BD" costs.

Table 5. Alternative 5 KV actions summary

Prioritized action	**Mitigation**	**Unit of measure**	**Unit number**	**Cost per unit**	Total cost
Sidecast pullback	Yes	Cubic yards	1,000	10	10,000
Road culvert and fill removal from temporary roads	Yes	Cubic yards	2,000	10	20,000
Snag creation by mature tree topping	Yes	Trees	249	100	24,900
Plantation tree snag creation[a]	Yes	Trees	780	35	27,300
Plantation tree snag creation	No	Trees	3,118	35	109,130
Down wood creation[b]	Yes	Trees	3,205	10	32,050
Down wood creation	No	Trees	3,205	10	32,050
Stream shade monitoring	Yes	Miles	7	2,000	14,000
Noxious weed control	Yes	Acres	245	135	30,625
Upland "essential" planting and release (2 releases)	No	Acres	380	1000	380,000
Upland understory "non-essential" planting	No	Acres	652	800	521,600
Precommercial thinning and upland noncommercial thinning	No	Acres	2,381	200	476,200
Early-seral maintenance	No	Acres	29	250	7,250
Wildlife habitat enhancement[c]	No	Acres	108	120	12,960
System road decommission	No	Miles	6.1	1,930	11,775
Repair road 5491	No	Miles	2.4	82,708	198,500
Total					**1,908,340**

[a]20 percent of the snags created will be counted as mitigation; topping or inoculation or will be used.
[b]50 percent of the down wood will be counted as mitigation.
[C]Underburning will occur in five plantations after commercial thinning to encourage growth of herbaceous vegetation.

Note: Fuel treatment costs are accounted for in the timber-sale appraisal as "BD" costs.

Stand-Exam Summary

Lower Yachats

Stand Number	Year of Origin	Stand (Exam) Acres	Compartment /cell	Original Unit Name	Current TPA	Current TPA < 7 DBH	Ave Ht Largest Trees	Current Mean Diameter	% Hemlock	Slope (average)	Slope (range)	Aspect	Current Basal Area sq ft per acre	Total Cubic feet (M) per acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Rx	Exam Date
506064	1969	83	6906		303	23	96	11	1	55	0-75	E	200	5.51	25.8	75	60	CT	6/02
506086	1959	14	5912	Beamer Creek	249	12	100	12.6	3.6	35	0-50	SW	216	6.72	32.1	73	61	CT	12/01
506126	1956	17	5623	Cape Ridge Salvage	296	33	102	12.3	96	59	40-70	E	245	7.7	36.1	70	70	CT	2/02
506127	1965	15	6529		417	156	100	10.2	92	20	15-70	NE	238	6.93	32.2	75	74	CT	4/02
506709	1957	40			300		100	12	95	30	20-60	W	250	8	35	70	70	NT	
Subtotal		168																	

Stand-Exam Summary

North Yachats

Stand Number	Year of Origin	Stand (Exam) Acres	Compartment /cell	Original Unit Name	Current TPA	Current TPA <7 DBH	Ave Ht Largest Trees	Current Mean Diameter	% Hemlock	Slope (average)	Slope (range)	Aspect	Current Basal Area sq ft per acre	Total Cubic feet (M) per acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Rx	Exam Date
506001	1961	65	6102	Burnt Timber #1	271	11	117	13.4	23	26	0-70	SW	265	8.3	39.8	75	73	CT	1/02
506002	1962	64	6205	Burnt Timber #2	223	32	115	12.7	13	36	0-60	W	197	6.34	30.7	76	55	CT	2/02
506003	1965	217	502007	Land Exchange														NT/NCT	9/02
506007	1966	53	6620	Howell Ridge 1-64	214	19	105	13.9	0	28	0-48	S	226	7.34	35.3	77	61	CT	2/02
506009	1972	30	7218		426	63	92	10.8	89	20	0-32	SW	274	7.8	36.5	70	83	CT	1/02
506010	1954	77	502039	TSE w/ 504280	185		100	12		30	0-50	SW	250	8	35	75	60	CT	1/02
506011	1966	14	6526	Yachats Mtn. Salvage 1-63	187	3	103	13.3		30	0-50	SW	275	8.64	40.8	70	60	CT	1/02
506012	1966	4	6624	Yachats Mtn. Salvage 1-63	187	3	103	13.3		30	0-50	SW	275	8.64	40.8	70	60	CT	1/02
506014	1969	50	6902		405	136	92	9.5	27	30	0-50	N,S	199	5.34	24.9	78	65	CT	2/02
506016	1966	12	6903	Howell Ridge 1-64	274	16	100	12.1	1	53	32-75	SE	218	6.34	30.1	76	63	CT	2/02
506017	1966	37	6623	Howell Ridge 1-64	274	16	100	12.1	1	53	32-75	SE	218	6.34	30.1	76	63	CT	2/02
506020	1979	49	6901		357	58	97	10.2	34	40	13-70	NE	204	5.4	25.1	76	64	CT	1/02
506025	1948	12	4801	Yachats C&O Sale	300		115	13	75	30	15-50		230	8	3.5	75	70	CT	
506026	1976	20	7609		253	22	91	11.2	50	53	30-70	SW	174	4.73	22.3	81	52	CT	3/02
506029	1970	60	7010		234	20	93	11.8	0	50	0-70	SE	177	4.93	23.1	79	52	CT	3/02
506030	1981	21	8114																
506030	1975	40																NT	
506033	1973	43	7327		227	22	94	12	0	62	35-75	SW	178	5.1	24.1	78	51	CT	3/02
506038	1963	71	6815	Axel Creek 1-66	281	25	100	12.3	10	66	0-90	E	231	7	33.4	77	66	CT	3/02
506039	1961	24	6113	Howell Ridge/Yachats 1-A	187	27	109	13.7	0	50	30-65	N	192	6.3	30.4	76	52	CT	2/02
506040	1959	22	5910	Axel Creek Sale	220	12	110	12.9	8	40	0-65	N	199	6.4	30.8	75	55	CT	2/02
506041	1974	101	9025	Beamer 120	310	22	102	12.1	NA	63	0-80	N	247	7.5	35.1	75	71	CT	2/02
506042	1976	73	7610		238	5	89	11.7	0	40	0-90	SE	178	5	23.2	80	52	CT	3/02
506046	1971	6	7110		195	4	96	12.9	0	60	0-80	SE	177	5.3	25.1	74	49	CT	3/02
506047	1971	29	7110		195	4	96	12.9	0	60	0-80	SE	177	5.3	25.1	74	49	CT	3/02
506048	1963	20	6815	Axel Creek 1-66	395	40	91	10.6	10	60	0-80	E	243	6.43	30.5	77	74	CT	3/02
506053	1971	27	7110		210	-	102	11.9	0	43	16-70	NE	161	4.7	22	80	47	CT	3/02
506074	1954	26																NT	
506076	1976	13	7606		223	23	103	13.2	0	25	0-30	NW	211	6.5	31	76	58	CT	3/02
506082	1976	5			223	23	103	13.2	0	25	0-30	NW	211	6.5	31	76	58	NT	2/02
506093	1956	50	5605/5706	Howell Ridge	154	-	117	15.7	19	60	25-70	N	207	7.1	34.5	75	52	CT	10/98
506094	1956	8	5706	Howell Ridge	154		117	15.7	19	60	25-70	N	207	7.1	34.5	75	52	CT	10/98
506099	1956	5	5617	Howell Ridge Road Chance	197		114	14.4	2	35	0-55	N	223.5	7.23	34.6	74	59	CT	2/02
506178	1976	121	7607		273	33	99	10.9	17	60	50-90	SW	176	4.9	23	75	53	CT	3/02
506179	1968	45	6806	Head Darky Creek 1-65	415	114	100	10	31	24	0-50	S	224	6.24	29.2	77	71	CT	3/02
506180	1965	11	6524	Burnt Salvage 2-63	570	80	101	10.1	63	29	0-40	S	320	8.5	39.3	8.3	100	CT	3/02
506185	1966	8																NT	
506187	1949	213			457	43	102	10.4	84	45	20-80	N	270	7.5	34.9	74	84	CT	2/02
506188	1949	4																NT	
506189	1950	229																NT	
506194	1949	27			450	50	102	10.5	75				270	8	35	75	85	CT	2/02
Subtotal		2006																	

Stand-Exam Summary

School

Stand Number	Year of Origin	Stand (Exam) Acres	Compartment /cell	Original Unit Name	Current TPA	Current TPA <7 DBH	Ave Ht Largest Trees	Current Mean Diameter	% Hemlock	Slope (average)	Slope (range)	Aspect	Current Basal Area sq ft per acre	Total Cubic feet (M) per acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Rx	Exam Date
506043	1964	19	6421	Yachats Thin 1-B	134	-	115	16	0	48	40-80	SE	189	6.6	32.2	75	47	CT	2/02
506055	1971	9	7111		176	6	103	13.8	0	50	40-80	SE	183	5.63	26.7	77	49	CT	2/02
506056	1961	19	6114	Howell Ridge	147	2	110	15.2	0	60	50-80	NE	187	6.2	30.2	78	48	CT	2/02
506061	1971	6	7111		150	-	117	14.2	0	40	0-70	SW	166	5.22	24.8	76	44	CT	2/02
506065	1966	60	6618	Sietz Ridge Sale #3	260	8	102	12.4	0	33	20-60	SW	219	6.43	30.7	72	62	CT	3/02
506073	1964	13	6420	Yachats Thin #2	183		102	14.2	0	60	50-70	E	203	6.4	30.2	79	54	CT	2/02
506077	1959	22	5906	Yachats Thin #2	160	13	117	15	0	50	30-75	N	196	6.7	32.7	76	51	CT	2/02
506081	1956	10	5614	Howell Ridge	220	-	115	14	5	45	30-60	NE	220	6.8	33	75	60	CT	8/98
506091	1956	28	5613	Howell Ridge	177	-	109	14.6	0	60	35-90	SE	208	6.8	33	75	54	CT	9/99
506092	1964	31	6417	Cannibal Mountain	158	-	119	15.1	0	65	0-70	W	197	6.64	32.4	77	51	CT	2/02
506109	1956	8	5603		219	3	118	13.4	3	46	30-60	N	215	6.84	33	75	59	NT	2/02
Subtotal		224																	

Stump

Stand Number	Year of Origin	Stand (Exam) Acres	Compartment /cell	Original Unit Name	Current TPA	Current TPA <7 DBH	Ave Ht Largest Trees	Current Mean Diameter	% Hemlock	Slope (average)	Slope (range)	Aspect	Current Basal Area sq ft per acre	Total Cubic feet (M) per Acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Rx	Exam Date
506117	1960	28	6009		175	-	106	14.6					204	6.6	31.8	82	53		
506124	1970	5	7008		245	-	111	11.3		24	20-30	SW	171	4.71	22.4	78	51	CT	3/02
506125	1970	3			245		111	11.3		24	20-30	SW	171	4.71	22.4	78	51	NT	3/02
506131	1971	34			277		95	10.9	2	40	30-60	NE	181	4.7	22.5	70	55	CT	2/02
506135	1971	7	7122		276	-	100	10.9	0	40	15-60	NE	180	4.72	22.5	74	55	CT	2/02
506144	1968	27	6807	Neiglick Creek Alder-Fir	194	-	105	12.8	5	20	0-50	N	173	5.1	24.5	75	49	CT	8/99
506146	1965	7	6531	Keller Creek Salvage	232	8	105	13	6	50		E	220	6.8	32	84	60	CT	1/02
506155	1970	17	7006		236	25	112	12.4	4	60	55-75	E	198	6.04	28.6	81	56	CT	2/02
506156	1970	8	7006		230	25	110	12.4	5	55		N	200	6	29	80	56	CT	2/02
506158	1965	8		Keller Creek #2	232	8	104	13.1	7	55	40-80	E	218	6.7	32	84	60	NCT	1/02
506160	1965	48	6533	Keller Creek #2	156	-	102	13.7	4.8	70	30	100	E	4.9	23.3	78	43	CT	9/98
506165	1971	44	7123		284	-	93	10.5	25	30	0-50	SW	172	4.51	22.1	81	53	CT	9/98
Subtotal		236																	

Stand-Exam Summary

Upper Yachats

Stand Number	Year of Origin	Stand (Exam) Acres	Compartment /cell	Original Unit Name	Current TPA	Current TPA <7 TPA	Ave Ht Largest Trees	Current Mean Diameter	% Hemlock	Slope (average)	Slope (range)	Aspect	Current Basal Area Sq ft per acre	Total Cubic feet (M) per Acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Rx	Exam Date
506107	1958	12	5608	Yachats Mtn. Chance	266	-	103	13.3	7	40	20-60	NW	257	8.11	40	82	70	CT	9/99
506123	1973	39	7329		215	7	98	11.9	4	35	15-50	NE	165	4.7	21.9	77	48	CT	2/02
506129	1965	19	6530	Keller Creek Salvage 1-63	195	-	108	15.2	0	60	15-65	NE	247	8.1	39.1	82	63	CT	9/98
506133	1960	34	6012	Keller Creek	117	-	117	15	2	60	15-70	NE	143	4.9	23.7	75	37	CT	10/98
506145	1970	30	7014		306	34	89	10.7	3	60	25-80	N	191	5.11	23.9	77	58	CT	1/02
506147	1966	18	6627	W.W. Salvage Sale 3-63	263	38	115	11.2	4	60	15-75	NW	179	5.34	25.8	75	54	CT	1/02
506148	1963	52	6313	W.W. Sale	215	3	101	12.7	6	60	45-90	NW	188	5.62	27	76	53	CT	1/02
506149	1964	47	6418	Keller Creek #2	232	8	104	13.1	7	55	25-80	E	218	6.74	32.2	84	60	CT	1/02
506154	1970	90	7015		173	9	105	12.6	5	55	25-90	E	150	4.43	20.9	75	42	CT	1/02
506159	1963	70	6312	W.W. Salvage	194	18	115	13.7	4	40	15-70	N	200	6.4	30.6	72	54	CT	1/02
506161	1964	30	6419	Keller Creek 32	280	15	109	12.1	3	50	40-60	S	224	6.61	31.7	75	64	CT	1/02
506166	1971	36	7112		165	5	97	13.5	17	50	20-80	E	164	4.94	23.3	74	54	CT	2/02
506170	1971	26	7124		313	58	98	10.8	9	65	50-90	N	201	5.5	25.5	80	61	CT	2/02
506174	1960	15	6023	Klickitat Mtn.Salvage	184	24	97	15.3	3	20	15-35	NW	235	8.41	41	71	60	CT	12/01
506175	1956	50	5605	Klickitat Mtn. Windfall	140	1	112	17.5	98	50	15-65	NW	233	8.6	41.6	71	56	CT	1/02
506176	1968	26	6813	W.W. #2	176	-	96	14.2	54	50	40-55	NW	198	6.1	28.8	75	53	CT	12/01
506177	1961	16	6123	Klickitat Ridge	245	-	99	14	47	55	35-70	NE	262	8.4	40	75	70	CT	12/01
Subtotal		610																	

Stand-Exam Summary

Yachats

Stand Number	Year of Origin	Stand (Exam) Acres	Compartment /cell	Original Unit Name	Current TPA	Current TPA <7 DBH	Ave Hi Largest Tree	Current Mean Diameter	% Hemlock	Slope (average)	Slope (range)	Aspect	Current Basal Area sq ft per acre	Total Cubic feet (M) per acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Rx	Exam Date
506037	1960	131	6014		281	28	107	12.6	9	25	0-55	SW	244	7.42	35.4	75	69	CT	1/02
506058	1965	26	6531		205	22	95	11.3	2	50	15-80	S	144	4.1	19.3	77	43	CT	3/02
506062	1976	10	7611		249	-	91	11.6	0	45	40-60	E	184	5.1	24.1	75	54	CT	2/02
506066	1967	18	6713	Beamer Creek 1-64	236	22	109	12.9	16	55	15-80	SE	214	6.8	32	75	60	CT	3/02
506068	1960	66	6013	Carson Creek	161	8	110	14.2	1	50	25-70	SW	177	5.8	28	76	47	CT	3/02
506071	1959	36	5911	Beamer Creek	222	44	113	13.3	4	50	35-70	E	215	7.21	34.4	72	59	CT	1/02
506072	1953	17	5309	Axel Creek	273	13	117	13.6	5	25	15-45	W	275	8.84	42.7	75	75	CT	2/02
506075	1975	31	7407		197	2	82	11.9	24	20	15-30	SW	152	4.33	20.7	74	44	CT	3/02
506084	1964	37	6425	Beamer Creek Salvage 1-63	190	10	116	14.2	0	60	30-95	E	209	6.8	32.2	75	55	CT	1/02
506087	1960	9	6004	Carson Creek	316	18	99	11.5	13	35	20-70	SW	228	6.5	30.8	74	67	CT	2/02
506097	1972	45	7207															NCT	7/02
506098	1972	9																NT	7/02
506104	1970	69	7007		296	23	89	11	1	45	15-80	NE	197	5.3	24.5	75	59	CT	1/02
506110	1971	19			232			12	0	50	30-80	S	175	5.5	25	75	49	CT	5/02
506111																			
506117																			
506111	1971	9																NCT	
506112	1960	54		Yachats Study														NT	
506117	1960	28	6009	Keller Creek	175	-	106	14.6	0	20	15-40	NW	204	6.6	31.8	82	53	CT	10/99
506118	1960	10	6009	Keller Creek	226	-	105	15	0	20	15-40	N	271	7	43	78	71	CT	10/99
506120	1962	52	6205	Neiglick Creek	195	-	94	14	3	50	20-90	E	210	7.2	31.1	74	56	CT	9/99
506122	1960	22	6010	Keller Creek	235	7	101	13.4	0	30	15-40	NW	231	6	34.1	74	63	CT	1/02
506136	1964	64	6424	Neiglick Creek	183	1	107	13.8	0	50	30-70	N	190	6.42	28.6	75	51	CT	8/99
506137	1962	81	6202	Neiglick Creek	196	-	103	13.8	9	50	30-70	NE	205	7.73	30.7	75	55	CT	2/02
506140	1964	32	6423	Neiglick Creek	222	-	109	14	4	20	15-40	N	239	8.9	37.3	76	64	CT	8/99
506195	1955	8			213	26	115	13	2	20	0-30	N	195	6	28.7	77	54	CT	
Subtotal		883																	

Total 4,127

Stand Prescription Summary - Alternatives 2a, 2b, and 5

Lower Yachats

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506064	83	58	60	16	15	85	22	116	15	812	14	812	25			
506086	14	10	60	9	17.5	100	24	20	10	70	14.6	146	4		hpb key rd	
506126	17	12	90	5	16.2	130	32	24		36	13.31	159.72	5		hpb key rd	
506127	15	9	90	2	13	145	30	18		0	12.6	113.4	6		hpb key rd	
506709	40	0						0		0			40			
Subtotal	168	89						178	25	918		1231.12	79	0		

North Fork Yachats

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
504280	28	20	60	2	17.8	107	25	40		0	22.8	456	8			underburn
506001	65	41	60	2	18	110	26	82		0	20.6	844.6	24			
506002	64	45	90	2	16.6	140	34	90		0	7	315	19		hpb key rd	
506003	217												217			
506007	53	37	60	2	18	109	26	74		0	16.2	599.4	16		hpb key rd	
506009	30	6	90	2	15.3	117	30	12	15	0	17.8	106.8	24			
506010	49	32	60	2	17.8	107	25	64		0	22.8	729.6	17			
506011	14	10	60	2	17.8	107	25	20		0	22.8	228	4			underburn
506012	4	4	60	2	17.8	107	25	8		0	22.8	91.2	0			underburn
506014	50	20	60	2	15.8	77	20	40		0	13	260	30			
506016	12	8	60		16.1	88	22		10		16.2	129.6	4			
506017	37	26	60	2	16.1	88	22	52		0	16.2	421.2	11			
506020	49	25	60	2	14.2	68	18	50	10	0	15.3	382.5	24			
506025	12	8	60	2	17.6	101	24	16		0	14.3	114.4	4			
506026	20	14	60	2	14	166	14	28	12	0	12.6	176.4	6			
506029	60	34	60	2	14.7	73	19	68		0	12.6	428.4	26			
506030	21												21			
506033	43	25	60	9	15.3	77	20	50		175	11.1	277.5	18			
506038	81	56	60	2	16	105	25	112		0	15	840	25			
506039	24	24	60	2	18.3	113	26	48		0	10.1	242.4	0		hpb key rd	
506040	22	15	60	9	18	106	25	30	12	105	10.1	151.5	7			
506041	101	28	60	9	17	95	23	56		196	18.1	506.8	73			
506042	73	51	60	9	13.8	62	17	102		357	13.3	678.3	22		hpb bdry	
506046	5	5	60	9	16.2	86	21	10		35	10.1	50.5	0		hpb bdry	
506047	29	20	60	9	16.2	86	21	40		140	10.1	202	9		hpb bdry	
506048	10	8	60	2	14.1	69	18	16		0	20.8	166.4	2			
506053	27	15	60	9	15.1	75	19	30		105	9.5	142.5	12		hpb bdry	
506074	26												26			
506076	13	10	60	9	16.3	87	22	20		70	15.5	155	3			
506082	5												5			
506093	50	11	60	2	18.8	120	28	22		0	12.4	136.4	39		hpb bdry	
506094	20	3	60	9	18.6	131	30	6		21	10.7	32.1	17		hpb key rd	
506099	5	4	60	2	17.9	110	26	8		0	15.6	62.4	1		hpb key rd	
506178	121	85	60	9	14.3	67	18	170	10	595	11.9	1011.5	36		hpb key rd	
506179	45	32	90	2	15	110	28	64		0	12.1	387.2	13			
506180	11	8	90	2	14.5	103	27	16		0	23.8	190.4	3			
506187	213	10	60	2	15.8	81	20	20		0	21.5	215	203			
506189	229												229			
506194	27	19	60	9	15.8	81	20	38		133	20	380	8			
Subtotal	1965	759						1502	69	1932		11111	1206	0		

506188 included with 506187 506185 included with 506003
506082 included with 506076

School

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506043	19	13	60	5	18.6	113	26	26		39	10.1	131.3	6		hpb key rd	
506055	9	6	60	9	15.5	78	20	12		42	12.6	75.6	3		hpb key rd	
506056	19	13	60	9	18.1	107	25	26		91	9.6	124.8	6		hpb key rd	
506061	6	4	60	9	17.4	99	24	8		28	7.5	30	2		hpb key rd	
506065	60	42	40	15	16	65	17	84		546	16	672	18			underburn
506073	13	9	60	9	17.2	96	23	18		63	13	117	4			
506077	22	15	60	2	18.6	113	26	30		0	11.8	177	7			
506081	10	7	60	9	18.6	113	26	14		49	9.8	68.6	3			
506091	28	4	60	9	18.2	110	26	8		28	12.7	50.8	24		hpb key rd	
506092	31	22	60	2	18	106	25	44	8	0	13.4	294.8	9		hpb key rd	
506109	8												8			
Subtotal	224	135						270	8	886		1741.9	89	0		

Stump

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506124	5	4	60	2	15.4	78	20	8		0	10.6	42.4	1			
506125	3	0											3			
506131	34	20	60	2	14.5	69	18	40		0	13.1	262	14			
506135	7	3	60	9	11.1	40	12	6		21	7.4	22.2	0	4		
506144	27	19	90	2	15.6	120	30	38		0	6.6	125.4	8		hpb key rd	
506146	7	5	60	2	16.2	86	21	10		0	14.1	70.5	2			
506155	17	11	60	9	17.1	96	23	22		77	11	121	6			
506156	8	4	60	9	17.1	96	23	8		28	11	44	4			
506158	8	0						0	10				0	8		
506160	48	21	60	2	16.6	90	22	42		0	9	189	27			
506165	44	22	60	2	13.1	57	16	44		0	14.3	314.6	0	22		
Subtotal	208	109						218	10	126		1191.1	65	34		

Upper Yachats

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506107	12	5	90	2	16.7	137	34	10		0	16.1	80.5	7		hpb key rd	
506123	39	20	60	9	14.9	73	19	40	24	140	19.9	398	19			
506129	19	13	60	2	18.3	110	26	26		0	20.4	265.2	6			
506133	34	24	60	9	17.6	101	24	48		168	4.5	108	10			
506145	30	20	60	2	14	65	17	40		0	14.5	290	10			
506147	18	12	40	15	15.5	65	18	24		156	15	180	6			
506148	52	37	40	15	15.5	65	18	74		481	14	518	15			
506149	47	32	60	2	17.3	98	24	64	15	0	16.2	518.4	15			
506154	90	63	60	2	16.6	105	27	126		0	9.5	598.5	27			
506159	70	49	60	2	17.9	105	25	98	10	0	12.5	612.5	21		hpb key rd	
506161	30	21	60	2	16.2	85	21	42	15	0	17.9	375.9	9			
506166	36	25	60	16	13.5	90	22	50	15	350	10	250	11			
506170	26	16	60	2	15.1	75	19	32		0	14.4	230.4	10			
506174	15	11	60	9	20.4	135	30	22		77	14.1	155.1	4		hpb key rd	
506175	50	35	60	2	20.1	133	29	70		0	16.3	570.5	15		hpb key rd	
506176	26	18	90	9	15.9	125	31	36		126	8.5	153	8		hpb key rd	
506177	16	11	60	9	18	106	25	22	14	77	19.6	215.6	5		hpb key rd	
Subtotal	610	412						824	93	1575		5519.6	198	0		

Yachats

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506037	131	92	60	2	17.2	100	24	184		0	18.7	1720.4	39			
506058	26	18	60	9	15	73	19	36		126	7.1	127.8	8			
506062	10	7	90	2	13.5	92	25	14		0	11.1	77.7	3			
506066	18	13	90	9	16.3	131	32	26		91	9.1	118.3	5		hpb key rd	
506068	66	46	60	2	17.7	106	25	92	18	0	9.7	446.2	20			
506071	36	25	60	9	18.8	115	27	50		175	11.6	290	11		hpb key rd	
506072	17	12	60	9	18.2	109	26	24		84	20.7	248.4	5			
506075	31	22	60	2	14.6	70	18	44		0	9.8	215.6	9			
506084	37	26	60	9	17.8	103	25	52	14	182	12.6	327.6	11			
506087	9	6	60	2	16.1	85	21	12		0	17.4	104.4	3			underburn
506097	45												0	45		
506098	9												0	9		
506104	69	45	60	0	14.5	69	18	0		0	13.8	621	24		bb,hpb bdry	
506110	19	13	60	9	16	85	21	26		91	10	130	6		hpb key rd	
506111	9												0	9	hpb key rd	
506112	54												54			
506117	28	20	60	2	17.2	96	23	40		0	15.9	318	8		hpb key rd	
506118	10	7	60	2	18.3	109	26	14		0	24.1	168.7	3		hpb key rd	
506120	52	36	60	2	17.4	99	24	14		0	15.6	561.6	16		hpb key rd	
506122	22	15	60	9	17.3	99	24	30	12	105	15.9	238.5	7			
506136	64	45	90	9	15.9	124	31	90		315	7.7	346.5	19			
506137	81	57	90	9	16.3	130	32	114		399	8.5	484.5	24		hpb key rd	
506140	32	22	90	2	17	142	34	44		0	13.2	290.4	10			
506195	8	8	60	0	17.9	103	25	0		0	9.9	79.2	0		bb,hpb key rd	
Subtotal	883	535						906	44	1568		6914.8	285	63		

506112 is the Yachats density research site. Some treatment areas now require additional thinning.

TOTALS	4058	2039						3898	249	7005		27709.52	1922	97		

hpb key rd = handpile and burn adjacent to key road
hpb bdry = handpile and burn adjacent to private land
bb = broadcast underburn

Stand Prescription Summary - Alternative 3

Lower Yachats

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506064	83	58	60	16	15	85	22	116	15	812	14	812	25	0		
506086	14	10	60	9	17.5	100	24	20	10	70	14.6	146	4	0	hpb key rd	
506126	17	12	90	5	16.2	130	32	24		36	13.31	159.72	5	0	hpb key rd	
506127	15	3	90	2	13	145	30	6		0	12.6	37.8	0	12	hpb key rd	
506709	40	0						0			0	0	40	0		
Subtotal	168	83						166	25	918		1155.52	73	12		

North Fork Yachats

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
504280	28	0									0	0	0	29		
506001	65	5	60	2	18	110	26	10		0	20.6	103	0	60		
506002	64	45	60	2	17.9	107	26	90		0	11.3	508.5	19	0	hpb key rd	
506003	217	0									0	0	217			
506007	53	37	60	2	18	109	26	74		0	16.2	599.4	16	0	hpb key rd	
506009	30	6	90	2	15.3	117	30	12	15	0	17.8	106.8	24	0		
506010	49	6	60	2	17.8	107	25	12		0	22.8	136.8	43	0		
506011	14	0									0	0	0	14		
506012	4	0									0	0	0	4		
506014	50	0							10		0	0	0	50		
506016	12	8	60	2	16.1	88	22	16		0	16.2	129.6	4	0		
506017	37	26	60	2	16.1	88	22	52	10	0	16.2	421.2	11	0		
506020	49	25	60	2	14.2	68	18	50		0	15.3	382.5	24	0		
506025	12	8	60	2	17.6	101	24	16	12	0	14.3	114.4	4	0		
506026	20	14	60	2	14	166	14	28		0	12.6	176.4	6	0		
506029	60	34	60	2	14.7	73	19	68		0	12.6	428.4	26	0		
506030	21	0									0	0	21	0		
506033	43	25	60	9	15.3	77	20	50		175	11.1	277.5	18	0		
506038	81	56	60	2	16	105	25	112		0	15	840	25	0		
506039	24	24	60	2	18.3	113	26	48		0	10.1	242.4	0	0	hpb key rd	
506040	22	15	60	9	18	106	25	30	12	105	10.1	151.5	7	0		
506041	101	28	60	9	17	95	23	56		196	18.1	506.8	73	0		
506042	73	5	60	9	13.8	62	17	10		35	13.3	66.5	0	68		
506046	5	5	60	9	16.2	86	21	10		35	10.1	50.5	0	0	hpb bdry	
506047	29	10	60	9	16.2	86	21	20		70	10.1	101	19	0	hpb bdry	
506048	10	8	60	2	14.1	69	18	16		0	20.8	166.4	2	0		
506053	27	9	60	9	15.1	75	19	30		105	9.5	85.5	0	18	hpb bdry	
506074	26	0									0	0	26	0		
506076	13	7	60	9	16.3	87	22	14		49	15.5	108.5	0	6		
506082	5	0									0	0	5	0		
506093	50	11	60	2	18.8	120	28	22		0	12.4	136.4	39	0	hpb bdry	
506094	20	3	60	9	18.6	131	30	6		21	10.7	32.1	17	0	hpb key rd	
506099	5	4	60	2	17.9	110	26	8		0	15.6	62.4	1	0	hpb key rd	
506178	121	85	60	9	14.3	67	18	170	10	595	11.9	1011.5	36	0	hpb key rd	
506179	45	11	90	2	15	110	28	22		0	12.1	133.1	34	0		
506180	11	0									0	0	0	11		
506187	213	10	60	2	15.8	81	20	20		0	21.5	215	203	0		
506189	229	0									0	0	229	0		
506194	27	19	60	9	15.8	81	20	38		133	20	380	8	0		
Subtotal	1965	549						1110	69	1519		7674.1	1157	259.6		

506188 included with 506187

506185 included with 506003

School

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506043	19	13	60	5	18.6	113	26	26		39	10.1	131.3	6	0	hpb key rd	
506055	9	6	60	9	15.5	78	20	12		42	12.6	75.6	3	0	hpb key rd	
506056	19	3	60	9	18.1	107	25	6		21	9.6	28.8	0	16	hpb key rd	
506061	6	4	60	9	17.4	99	24	8		28	7.5	30	2	0	hpb key rd	
506065	60	0									0	0	0	60		
506073	13	0									0	0	0	13		
506077	22	0									0	0	0	22		
506081	10	0									0	0	0	10		
506091	28	2	60	9	18.2	110	26	4		28	12.7	25.4	0	26	hpb key rd	
506092	31	11	60	2	18	106	25	22	8	0	13.4	147.4	0	20	hpb key rd	
506109	8	0										0	8	0		
Subtotal	225	39						78	8	158		438.5	19	166.9		

Stump

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506124	5	0	60	2	15.4	78	20	0		0	10.6	0	0	5		
506125	3	0									0	0	3	0		
506131	34	20	60	2	14.5	69	18	40		0	13.1	262	14	0		
506135	7	3	60	9	11.1	40	12	6		21	7.4	22.2	0	4		
506144	27	19	60	2	16.4	91	22	38		0	10.6	201.4	8	0	hpb key rd	
506146	7	5	60	2	16.2	86	21	10		0	14.1	70.5	2	0		
506155	17	11	60	9	17.1	96	23	22		77	11	121	6	0		
506156	8	2	60	9	17.1	96	23	4		14	11	22	0	6		
506158	8	0							10		0	0	0	8		
506160	48	3	60	2	16.6	90	22	6		0	9	27	45	0		
506165	44	22	60	2	13.1	57	16	44		0	14.3	314.6	0	22		
Subtotal	208	85						170	10	112		1040.7	78	45		

Upper Yachats

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506107	12	5	90	2	16.7	137	34	10		0	16.1	80.5	7	0	hpb key rd	
506123	39	20	60	9	14.9	73	19	40	24	140	19.9	398	19	0		
506129	19	13	60	2	18.3	110	26	26		0	20.4	265.2	6	0		
506133	34	24	60	9	17.6	101	24	48		168	4.5	108	10	0		
506145	30	20	60	2	14	65	17	40		0	14.5	290	10	0		
506147	18	12	40	15	15.5	65	18	24		156	15	180	6	0		
506148	52	37	40	15	15.5	65	18	74		481	14	518	15	0		
506149	47	32	60	2	17.3	98	24	64	15	0	16.2	518.4	15	0		
506154	90	6	60	2	16.6	105	27	12		0	9.5	57	0	84		
506159	70	49	60	2	17.9	105	25	98	10	0	12.5	612.5	21	0	hpb key rd	
506161	30	21	60	2	16.2	85	21	42	15	0	17.9	375.9	9	0		
506166	36	25	60	16	13.5	90	22	50	15	350	10	250	11	0		
506170	26	9	60	2	15.1	75	19	18		0	14.4	129.6	0	17		
506174	15	11	60	9	20.4	135	30	22		77	14.1	155.1	4	0	hpb key rd	
506175	50	35	60	2	20.1	133	29	70		0	16.3	570.5	15	0	hpb key rd	
506176	26	18	90	9	15.9	125	31	36		126	8.5	153	8	0	hpb key rd	
506177	16	11	60	9	18	106	25	22	14	77	19.6	215.6	5	0	hpb key rd	
Subtotal	610	348						696	93	1575		4877.3	161	101		

Stand Prescription Summary - Alternative 3

Yachats

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506037	131	92	60	2	17.2	100	24	184		0	18.7	1720.4	39	0		
506058	26	18	60	9	15	73	19	36		126	7.1	127.8	8	0		
506062	10	7	60	2	13.8	65	17	14		0	14.8	103.6	3	0		
506066	18	13	60	9	17	95	23	26		91	14.6	189.8	5	0	hpb key rd	
506068	66	46	60	2	17.7	106	25	92	18	0	9.7	446.2	20	0		
506071	36	25	60	9	18.8	115	27	50		175	11.6	290	11	0	hpb key rd	
506072	17	12	60	9	18.2	109	26	24		84	20.7	248.4	5	0		
506075	31	22	60	2	14.6	70	18	44		0	9.8	215.6	9	0		
506084	37	26	60	9	17.8	103	25	52	14	182	12.6	327.6	11	0		
506087	9	6	60	2	16.1	85	21	12		0	17.4	104.4	3	0		underburn
506097	45	0									0	0	0	45		
506098	9	0									0	0	0	9		
506104	69	0									0	0	0	69	hpb bdry	
506110	19	13	60	9	16	85	21	26		91	10	130	6	0	hpb key rd	
506111	9	0									0	0	0	9	hpb key rd	
506112	54	0									0	0	54	0		
506117	28	20	60	2	17.2	96	23	40		0	15.9	318	8	0	hpb key rd	
506118	10	7	60	2	18.3	109	26	14		0	24.1	168.7	3	0	hpb key rd	
506120	52	36	60	2	17.4	99	24	72		0	15.6	561.6	16	0	hpb key rd	
506122	22	15	60	9	17.3	99	24	30	12	105	15.9	238.5	7	0		
506136	64	45	60	9	16.5	90	22	90		315	12.1	544.5	19	0		
506137	81	57	60	9	17.1	109	23	114		399	13.3	758.1	24	0	hpb key rd	
506140	32	22	60	2	18.1	106	25	44		0	18.6	409.2	10	0		
506195	8	8	60	0	17.9	103	25	0		0	9.9	79.2	0	0	bb,hpb key rd	
Subtotal	883	490						964	44	1568		6981.6	261	132		

506112 is the Yachats density management research site. Some treatment areas now require additional thinning.

TOTALS	4058	1594						3184	249	5850		22168	1749	717		

hpb key rd = handpile and burn adjacent to key road
hbp bdry = handpile and burn adjacent to private land
bb = broadcast underburn

Stand Prescription Summary - Alternative 4

Lower Yachats

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506064	83	58	60	16	15	85	22	116	15	812	14	812	25			
506086	14	10	60	9	17.5	100	24	20	10	70	14.6	146	4		hpb key rd	
506126	17	12	90	5	16.2	130	32	24		36	13.31	159.72	5		hpb key rd	
506127	15	3	90	2	13	145	30	6		0	12.6	37.8	0	12	hpb key rd	
506709	40	0											40			
Subtotal	168	83						166	25	918		1155.52	73	12		

North Fork Yachats

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
504280	28	0									0	0	0	28		
506001	65	0									0	0	0	65		
506002	64	45	60	2	17.9	107	26	90		0	11.3	508.5	19	0	hpb key rd	
506003	217	0									0	0	217	0		
506007	53	37	60	2	18	109	26	74		0	16.2	599.4	16	0	hpb key rd	
506009	30	0							15		0	0	0	30		
506010	49	0									0	0	0	49		
506011	14	0									0	0	0	14		
506012	4	0									0	0	0	4		
506014	50	0							10		0	0	0	50		
506016	12	8	60	2	16.1	88	22	16		0	16.2	129.6	4	0		
506017	37	26	60	2	16.1	88	22	52	10	0	16.2	421.2	11	0		
506020	49	0									0	0	0	49		
506025	12	0							12		0	0	0	12		
506026	20	0									0	0	0	20		
506029	60	34	60	2	14.7	73	19	68		0	12.6	428.4	26	0		
506030	21	0									0	0	21	0		
506033	43	0									0	0	0	43		
506038	81	56	60	2	16	105	25	112		0	15	840	25	0		
506039	24	24	60	2	18.3	113	26	48		0	10.1	242.4	0	0	hpb key rd	
506040	22	15	60	9	18	106	25	30	12	105	10.1	151.5	7	0		
506041	101	28	60	9	17	95	23	56		196	18.1	506.8	73	0		
506042	73	0									0	0	0	73		
506046	5	1	60	9	16.2	86	21	2		14	0	0	4	0		
506047	29	24	60	9	16.2	86	21	48		168	10.1	242.4	5	0	hpb bdry	
506048	10	8	60	2	14.1	69	18	16		0	20.8	166.4	2	0		
506053	27	0									9.5	133	0	27	hpb bdry	
506074	26	0									0	0	26	0		
506076	13	0									0	0	0	13		
506082	5	0									0	0	5	0		
506093	50	11	60	2	18.8	120	28	22		0	12.4	136.4	39	0	hpb bdry	
506094	20	3	60	9	18.6	131	30	6		21	10.7	32.1	17	0	hpb key rd	
506099	5	4	60	2	17.9	110	26	8		0	15.6	62.4	1	0	hpb key rd	
506178	121	85	60	9	14.3	67	18	170		595	11.9	1011.5	36	0	hpb key rd	
506179	45	0							10		0	0	0	45		
506180	11	0									0	0	0	11		
506187	213	0									0	0	203	10		
506189	229	0									0	0	229	0		
506194	27	19	60	9	15.8	81	20	38		133	20	380	8	0		
Subtotal	1965	428						856	69	1232		5992	994	543		

506188 included with 506187
506185 included with 506003

Stand Prescription Summary - Alternative 4

School

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506043	19	13	60	5	18.6	113	26	26		39	10.1	131.3	6	0	hpb key rd	
506055	9	6	60	9	15.5	78	20	12		42	12.6	75.6	3	0	hpb key rd	
506056	19	3	60	9	18.1	107	25	6		21	9.6	28.8	0	16	hpb key rd	
506061	6	4	60	9	17.4	99	24	8		28	7.5	30	2	0	hpb key rd	
506065	60	0									0	0	0	60		
506073	13	0									0	0	0	13		
506077	22	0									0	0	0	22		
506081	10	0									0	0	0	10		
506091	28	2	60	9	18.2	110	26	4		28	12.7	25.4	0	26	hpb key rd	
506092	31	11	60	2	18	106	25	22	8	0	13.4	147.4	0	20	hpb key rd	
506109	8	0									0	0	8	0		
Subtotal	225	39						78	8	158		438.5	19	166.9		

Stump

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506124	5	0	60	2	15.4	78	20	0		0	10.6	0	0	5		
506125	3	0									0	0	3	0		
506131	34	0									0	0	0	34		
506135	7	0									0	0	0	7		
506144	27	19	60	2	16.4	91	22	38		0	10.6	201.4	8	0	hpb key rd	
506146	7	0									0	0	0	7		
506155	17	0									0	0	0	17		
506156	8	0									0	0	0	8		
506158	8	0							10		0	0	0	8		
506160	48	0									0	0	0	48		
506165	44	22	60	2	13.1	57	16	44		0	14.3	314.6	0	22		
Subtotal	208	41						82	10	0		516	11	156		

Upper Yachats

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	Within urban interface Y/N	Wildlife habitat enhancement
506107	12	5	90	2	16.7	137	34	10		0	16.1	80.5	7	0	hpb key rd	
506123	39	20	60	9	14.9	73	19	40	24	140	19.9	398	19	0		
506129	19	0									0	0	0	19		
506133	34	0									0	0	0	34		
506145	30	0									0	0	0	30		
506147	18	12	40	15	15.5	65	18	24		156	15	180	6	0		
506148	52	37	40	15	15.5	65	18	74		481	14	518	15	0		
506149	47	0							15		0	0	0	47		
506154	90	0									0	0	0	90		
506159	70	49	60	2	17.9	105	25	98	10	0	12.5	612.5	21	0	hpb key rd	
506161	30	0							15		0	0	0	30		
506166	36	25	60	16	13.5	90	22	50	15	350	10	250	11	0		
506170	26	0									0	0	0	26		
506174	15	11	60	9	20.4	135	30	22		77	14.1	155.1	4	0	hpb key rd	
506175	50	35	60	2	20.1	133	29	70		0	16.3	570.5	15	0	hpb key rd	
506176	26	18	90	9	15.9	125	31	36		126	8.5	153	8	0	hpb key rd	
506177	16	11	60	9	18	106	25	22	14	77	19.6	215.6	5	0	hpb key rd	
Subtotal	610	223						446	93	1407		3133.2	111	276		

Yachats

Stand number	Total plantation acres	Total commercial thinning acres	Residual trees per acre post cwd/snag	Adjusted cwd/snag per acre created	Residual diameter inches	Residual basal area sq ft	Residual relative density	Number of snags to be created within plantation	Number of snags to be created within adjacent mature stand	Number of trees to be felled for coarse wood within plantation	Estimated per acre volume to be removed (mbf)	Stand volume (total MBF)	No-treatment acres	Noncommercial thinning acres	WUI Treatment	Wildlife habitat enhancement
506037	131	92	60	2	17.2	100	24	184		0	18.7	1720.4	39	0		
506058	26	18	60	9	15	73	19	36		126	7.1	127.8	8	0		
506062	10	7	60	2	13.8	65	17	14		0	14.8	103.6	3	0		
506066	18	13	60	9	17	95	23	26		91	14.6	189.8	5	0	hpb key rd	
506068	66	46	60	2	17.7	106	25	92	18	0	9.7	446.2	20	0		
506071	36	25	60	9	18.8	115	27	50		175	11.6	290	11	0	hpb key rd	
506072	17	12	60	9	18.2	109	26	24		84	20.7	248.4	5	0		
506075	31	22	60	2	14.6	70	18	44		0	9.8	215.6	9	0		
506084	37	26	60	9	17.8	103	25	52	14	182	12.6	327.6	11	0		
506087	9	6	60	2	16.1	85	21	12		0	17.4	104.4	3	0		underburn
506097	45	0									0	0	0	45		
506098	9	0									0	0	0	9		
506104	69	0									0	0	0	69	hpb bdry	
506110	19	13	60	9	16	85	21	26		91	10	130	6	0	hpb key rd	
506111	9	0									0	0	0	9	hpb key rd	
506112	54	0								0	0	0	54	0		
506117	28	20	60	2	17.2	96	23	40		0	15.9	318	8	0	hpb key rd	
506118	10	0									0	0	0	10	hpb key rd	
506120	52	36	60	2	17.4	99	24	0		0	15.6	561.6	16	0	hpb key rd	
506122	22	0							12		0	0	0	22		
506136	64	45	60	9	16.5	90	22	90		315	12.1	544.5	19	0		
506137	81	57	60	9	17.1	109	23	114		399	13.3	758.1	24	0	hpb key rd	
506140	32	22	60	2	18.1	106	25	44		0	18.6	409.2	10	0		
506195	8	8	60	0	17.9	103	25	0		0	9.9	79.2	0	0	bb,hpb key rd	
Subtotal	883	468						848	44	1463		6574.4	251	63		
	4058	1282						2476	249	5178		17809.62	1459	1216.9		

hpb key rd = handpile and burn adjacent to key road
hpb bdry = handpile and burn adjacent to private land
bb = broadcast underburn

Harvest Plan Summary - Alternatives 2a, 2b, and 5

Lower Yachats

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Potential ground-based acres	Helicopter Acres	Operating Season
64	1969	58	968.6	0.47	0.02	58	7	1	0	0	8/6 to 2/28
86	1959	10	146	0	0	0	0	0	0	10	10/1 to 2/28
126	1956	12	159.7	0.1	0.05	12	2	2	0	0	10/1 to 2/28
127	1965	9	113.4	0.05	0	9	2	0	0	0	10/1 to 2/28
Subtotal		89	1387.7	0.62	0.07	79	11	3	0	10	

Total		2,039	29,086.00	8.82	1.78	1,885	232	51	36	118	

Harvest Plan Summary - Alternatives 2a, 2b, and 5

North Yachats

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Potential ground-based acres	Helicopter Acres	Operating Season
1	1961	41	844.6	0.61	0.09	37	5	3	4	0	8/6 to 2/28
2	1962	45	315	0.06	0	45	4	0	0	0	10/1 to 2/28
7	1956	37	599.4	0.29	0.02	37	6	1	0	0	8/6 to 2/28
9	1972	6	106.8	0	0	6	2	0	0	0	10/1 to 2/28
10,11,12, 504280	1965,66	66	1504.8	0.2	0.25	58	2	8	8	0	8/6 to 2/28
14	1969	20	260	0	0.07	20	5	1	0	0	8/6 to 2/28
16	1969	8	129.6	0	0	8	0	1	0	0	7/8 to 10/15
17	1966	26	421.2	0.3	0	26	2	1	0	0	7/8 to 10/15
20	1969	25	382.5	0	0	20	3	0	0	5	10/1 to 2/28
25	1948	8	114.4	0	0	8	1	0	0	0	10/1 to 2/28
26	1976	14	176.4	0	0	14	2	0	0	0	10/1 to 2/28
29	1970	34	428.4	0.25	0.04	34	4	1	0	0	7/8 to 10/15
33	1973	25	277.5	0.19	0	25	3	0	0	0	8/6 to 10/15
38, 48	1963	64	1476.8	0.48	0.04	64	7	1	0	0	7/8 to 2/28
39	1961	24	242.4	0	0	24	2	0	0	0	10/1 to 2/28
40	1959	15	151.5	0	0	15	0	0	0	0	7/8 to 2/28
41		28	506.8	0.15	0	23	3	0	5	0	7/8 to 2/28
42	1976	51	678.3	0.11	0	51	8	0	0	0	8/6 to 2/28
46, 47, 53	1973, 71, 71	40	395	0.11	0.07	40	4	2	0	0	10/1 to 2/28, 7/8 to 10/15
76	1972	10	155	0	0.02	10	1	1	0	0	8/6 to 10/15
93	1957	11	136.4	0	0	11	2	0	0	0	10/1 to 2/28
94	1956	3	32.1	0	0	3	1	0	0	0	10/1 to 2/28
99	1956	4	62.4	0	0	4	2	0	0	0	10/1 to 2/28
178	1972	85	1011.5	0	0	85	9	0	0	0	10/1 to 2/28
179	1968	32	387.2	0.13	0.23	30	2	1	2	0	7/8 to 10/15
180	1965	8	190.4	0	0.03	8	0	1	0	0	7/8 to 10/15
187	1949	10	215	0	0	0	0	0	0	10	10/1 to 2/28
194	1949	19	380	0	0	0	0	0	0	19	10/1 to 2/28
Subtotal		759	11581.4	2.88	0.86	706	80	22	19	34	

Harvest Plan Summary - Alternatives 2a, 2b, and 5

School

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Potential ground-based acres	Helicopter Acres	Operating Season
43	1964	13	131.3	0	0	13	2	0	0	0	10/1 to 2/28
55	1971	6	75.6	0	0	6	2	0	0	0	10/1 to 2/28
56	1961	13	124.8	0.06	0	13	2	0	0	0	10/1 to 2/28
61	1971	4	30	0	0	4	2	0	0	0	10/1 to 2/28
65	1966	42	840	0.45	0.05	39	4	3	3	0	7/8 to 10/15
73	1964	9	117	0.23	0	9	2	0	0	0	10/1 to 2/28
77	1959	15	177	0.2	0	15	2	0	0	0	10/1 to 2/28
81	1956	7	68.6	0	0	7	0	0	0	0	10/1 to 2/28
91	1956	4	50.8	0.01	0	4	2	0	0	0	10/1 to 2/28
92	1964	22	294.8	0.09	0	22	4	0	0	0	7/8 to 2/28
Subtotal		135	1909.9	1.04	0.05	132	22	3	3	0	

Stump

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Potential ground-based acres	Helicopter Acres	Operating Season
124*	1970	4	42.4	0	0	4	0	0	0	0	8/6 to 2/28
131	1971	20	262	0	0	0	0	0	0	20	8/6 to 10/15
135	1971	3	22.2	0	0	3	1	0	0	0	10/1 to 2/28
144	1968	19	125.4	0	0.04	19	0	1	0	0	10/1 to 2/28
146	1965	5	70.5	0	0	5	2	0	0	0	8/6 to 2/28
155	1970	11	121	0	0	0	0	0	0	11	8/6 to 10/15
156	1970	4	44	0.04	0	4	1	0	0	0	10/1 to 2/28
160	1965	21	189	0	0	3	1	0	0	18	8/6 to 10/15
165	1971	22	314.6	0	0	4	1	0	0	18	10/1 to 2/28
Subtotal		109	1191.1	0.04	0.04	42	6	1	0	67	

*road and landing data addressed in stands 117 and 118

Harvest Plan Summary - Alternatives 2a, 2b, and 5

Upper Yachats

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Potential ground-based acres	Helicopter Acres	Operating Season
107	1958	5	80.5	0	0	5	2	0	0	0	10/1 to 2/28
123	1973	20	398	0.1	0	20	4	1	0	0	8/6 to 10/15
129	1965	13	265.2	0.05	0	13	1	0	0	0	10/1 to 2/28
133	1960	24	108	0.05	0	24	4	1	0	0	8/6 to 10/15
145	1970	20	290	0.08	0	20	3	0	0	0	10/1 to 2/28
147-148	66-63	49	892.1	0.3	0	49	6	0	0	0	8/6 to 2/28
149	1964	32	518.4	0.05	0.04	32	3	1	0	0	8/6 to 10/15
154	1970	63	850.5	0.5	0	63	5	0	0	0	8/6 to 2/28
159	1963	49	612.5	0.26	0.07	41	5	2	8	0	8/6 to 2/28
161	1964	21	375.9	0.1	0.03	21	4	1	0	0	8/6 to 10/15
166	1971	25	385	0.1	0	25	3	0	0	0	8/6 to 10/15
170	1971	16	230.4	0	0	9	2	0	0	7	8/6 to 10/15
174	1960	11	155.1	0.04	0	11	3	0	0	0	10/1 to 2/28
175	1956	35	570.5	0.35	0	35	4	0	0	0	10/1 to 2/28N, 8/6 to 10/15S
176	1968	18	153	0	0	18	2	0	0	0	10/1 to 2/28
177	1961	11	215.6	0.06	0	11	1	0	0	0	8/6 to 10/15
Subtotal		412	6100.7	2.04	0.14	397	52	6	8	7	

Harvest Plan Summary - Alternatives 2a, 2b, and 5

Yachats

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Potential ground-based acres	Helicopter Acres	Operating Season
37	1960	92	1720.4	0.29	0	86	9	0	6	0	8/6 to 2/28
58	1973	18	127.8	0.07	0	18	2	0	0	0	8/6 to 2/28
62	1976	7	77.7	0	0.03	7	0	1	0	0	8/6 to 2/28
66	1967	13	118.3	0.05	0	13	1	0	0	0	8/6 to 2/28
68	1960	46	446.2	0.48	0.03	46	4	2	0	0	7/8 to 10/15
71	1959	25	290	0.13	0.04	25	4	1	0	0	8/6 to 2/28
72	1953	12	248.4	0	0	12	2	0	0	0	8/6 to 2/28
75	1974	22	215.6	0	0	22	6	0	0	0	8/6 to 2/28
84	1964	26	327.6	0.04	0	26	2	1	0	0	8/6 to 2/28
87	1960	6	104.4	0	0	6	1	0	0	0	8/6 to 2/28
104	1970	45	621	0.32	0.06	45	8	1	0	0	8/6 to 2/28
110	1971	13	130	0	0.08	13	0	1	0	0	7/8 to 10/15
117	1960	20	318	0.1	0	20	3	0	0	0	8/6 to 2/28
118	1960	7	168.7	0.04	0.06	7	0	1	0	0	8/6 to 2/28
120	1962	36	561.6	0.36	0	36	5	1	0	0	7/8 to 10/15
122	1960	15	238.5	0.05	0.15	15	2	2	0	0	8/6 to 10/15
136	1964	45	346.5	0.18	0	45	5	0	0	0	10/1 to 2/28N, 8/6 to 10/15S
137	1962	57	484.5	0.09	0.1	57	4	2	0	0	8/6 to 2/28
140	1964	22	290.4	0	0.05	22	2	1	0	0	10/1 to 2/28
195	1955	8	79.2	0	0.02	8	0	1	0	0	10/1 to 2/28
Subtotal		535	6914.8	2.2	0.62	529	60	15	6	0	

Lower Yachats

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Operating Season
64	1969	58	968.6	0	0	20	3	0	38	8/6 to 2/28
86	1959	10	146	0	0	0	0	0	10	10/1 to 2/28
126	1956	12	159.7	0	0	12	2	0	0	10/1 to 2/28
127	1965	3	37.8	0	0	3	1	0	0	10/1 to 2/28
Subtotal		83	1312.1	0	0	35	6	0	48	

Total		1,594	23,148	0	0	750	122	0	844	

North Yachats

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Operating Season
1	1961	5	103	0	0	5	2	0	0	8/6 to 2/28
2	1962	45	508.5	0	0	36	2	0	9	10/1 to 2/28
7	1956	37	599.4	0	0	8	3	0	29	8/6 to 2/28
9	1972	6	106.8	0	0	6	2	0	0	10/1 to 2/28
10,11,12, 504280	1965,66	6	136.8	0	0	6	2	0	0	8/6 to 2/28
14	1969	0	0							8/6 to 2/28
16	1969	8	129.6	0	0	0	0	0	8	7/8 to 10/15
17	1966	26	421.2	0	0	0	0	0	26	7/8 to 10/15
20	1969	25	382.5	0	0	20	3	0	5	10/1 to 2/28
25	1948	8	114.4	0	0	8	1	0	0	10/1 to 2/28
26	1976	14	176.4	0	0	14	2	0	0	10/1 to 2/28
29	1970	34	428.4	0	0	0	0	0	34	7/8 to 10/15
33	1973	25	277.5	0	0	0	0	0	25	8/6 to 10/15
38, 48	1963	64	1476.8	0	0	19	2	0	45	7/8 to 2/28
39	1961	24	242.4	0	0	24	2	0	0	10/1 to 2/28
40	1959	15	151.5	0	0	0	0	0	15	7/8 to 2/28
41		28	506.8	0	0	17	1	0	11	7/8 to 2/28
42	1976	5	66.5	0	0	5	1	0	0	8/6 to 2/28
46, 47, 53	1973, 71, 71	24	237	0	0	16	3	0	8	10/1 to 2/28, 7/8 to 10/15
76	1972	7	108.5	0		7	1	0	0	8/6 to 10/15
93	1957	11	136.4	0	0	11	2	0	0	10/1 to 2/28
94	1956	3	32.1	0	0	3	1	0	0	10/1 to 2/28
99	1956	4	62.4	0	0	4	2	0	0	10/1 to 2/28
178	1972	85	1011.5	0	0	68	9	0	17	10/1 to 2/28
179	1968	11	133.1	0		11	2	0	0	7/8 to 10/15
180	1965	0	0							7/8 to 10/15
187	1949	10	215	0	0	0	0	0	10	10/1 to 2/28
194	1949	19	380	0	0	0	0	0	19	10/1 to 2/28
Subtotal		549	8144.5	0	0	288	43	0	261	

School

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Operating Season
43	1964	13	131.3	0	0	13	2	0	0	10/1 to 2/28
55	1971	6	75.6	0	0	6	2	0	0	10/1 to 2/28
56	1961	3	28.8	0	0	3	1	0	0	10/1 to 2/28
61	1971	4	30	0	0	4	2	0	0	10/1 to 2/28
65	1966	0	0							7/8 to 10/15
73	1964	0	0							10/1 to 2/28
77	1959	0	0							10/1 to 2/28
81	1956	0	0							10/1 to 2/28
91	1956	2	25.4	0	0	2	1	0	0	10/1 to 2/28
92	1964	11	147.4	0	0	11	2	0	0	7/8 to 2/28
Subtotal		39	438.5	0	0	39	10	0	0	

Stump

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Operating Season
124*	1970	0	0							8/6 to 2/28
131	1971	20	262	0	0	0	0	0	20	10/1 to 2/28
135	1971	3	22.2	0	0	3	1	0	0	10/1 to 2/28
144	1968	19	201.4	0	0	0	0	0	19	10/1 to 2/28
146	1965	5	70.5	0	0	5	2	0	0	8/6 to 2/28
155	1970	11	121	0	0	0	0	0	11	10/1 to 2/28
156	1970	2	22	0	0	2	1	0	0	10/1 to 2/28
160	1965	3	27	0	0	3	1	0	0	10/1 to 2/28
165	1971	22	314.6	0	0	4	1	0	18	10/1 to 2/28
Subtotal		85	1040.7	0	0	17	6	0	68	

*road and landing data addressed in stands 117 and 118

Upper Yachats

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Operating Season
107	1958	5	80.5	0	0	5	2	0	0	10/1 to 2/28
123	1973	20	398	0	0	4	1	0	16	10/1 to 2/28
129	1965	13	265.2	0	0	0	0	0	13	10/1 to 2/28
133	1960	24	108	0	0	10	2	0	14	10/1 to 2/28
145	1970	20	290	0	0	5	1	0	15	10/1 to 2/28
147-148	66-63	49	892.1	0	0	22	2	0	27	8/6 to 2/28
149	1964	32	518.4	0	0	16	2	0	16	8/6 to 2/28
154	1970	6	81	0	0	6	1	0	0	8/6 to 2/28
159	1963	49	612.5	0	0	10	2	0	39	8/6 to 2/28
161	1964	21	375.9	0	0	10	2	0	11	8/6 to 2/28
166	1971	25	385	0	0	15	1	0	10	8/6 to 10/15
170	1971	9	129.6	0	0	9	2	0	0	10/1 to 2/28
174	1960	11	155.1	0	0	5	2	0	6	10/1 to 2/28
175	1956	35	570.5	0	0	14	3	0	21	10/1 to 2/28N, 8/6 to 10/15S
176	1968	18	153	0	0	18	2	0	0	10/1 to 2/28
177	1961	11	215.6	0	0	0	0	0	11	8/6 to 10/15
Subtotal		348	5230.4	0	0	149	25	0	199	

Yachats

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Operating Season
37	1960	92	1720.4	0	0	69	6	0	23	8/6 to 2/28
58	1973	18	127.8	0	0	5	1	0	13	8/6 to 2/28
62	1976	7	103.6	0	0	0	0	0	7	8/6 to 2/28
66	1967	13	189.8	0	0	0	0	0	13	8/6 to 2/28
68	1960	46	446.2	0	0	0	0	0	46	7/8 to 10/15
71	1959	25	290	0	0	15	2	0	10	8/6 to 2/28
72	1953	12	248.4	0	0	12	2	0	0	8/6 to 2/28
75	1974	22	215.6	0	0	22	6	0	0	8/6 to 2/28
84	1964	26	327.6	0	0	0	0	0	26	8/6 to 2/28
87	1960	6	104.4	0	0	6	1	0	0	8/6 to 2/28
104	1970	0	0							8/6 to 2/28
110	1971	13	130	0	0	0	0	0	13	7/8 to 10/15
117	1960	20	318	0	0	0	0	0	20	8/6 to 2/28
118	1960	7	168.7	0	0	0	0	0	7	8/6 to 2/28
120	1962	36	561.6	0	0	22	4	0	14	7/8 to 10/15
122	1960	15	238.5	0	0	6	2	0	9	8/6 to 2/28
136	1964	45	544.5	0	0	29	4	0	16	10/1 to 2/28N, 8/6 to 10/15S
137	1962	57	758.1	0	0	23	2	0	34	8/6 to 2/28
140	1964	22	409.2	0	0	13	2	0	9	10/1 to 2/28
195	1955	8	79.2	0	0	0	0	0	8	10/1 to 2/28
Subtotal		490	6981.6	0	0	222	32	0	268	

Lower Yachats

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Operating Season
64	1969	58	968.6	0	0	0	0	0	58	8/6 to 2/28
86	1959	10	146	0	0	0	0	0	10	10/1 to 2/28
126	1956	12	159.7	0	0	12	2	0	0	10/1 to 2/28
127	1965	3	37.8	0	0	3	1	0	0	10/1 to 2/28
Subtotal		83	1312.1	0	0	15	3	0	68	

Total		1,281	18,766	0	0	289	50	0	992	

North Yachats

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Operating Season
1	1961	0	0							8/6 to 2/28
2	1962	45	508.5	0	0	36	3	0	9	10/1 to 2/28
7	1956	37	599.4	0	0	7	2	0	30	8/6 to 2/28
9	1972	0	0							10/1 to 2/28
10,11,12, 504280	1965,66	0	0							8/6 to 2/28
14	1969	0	0							8/6 to 2/28
16	1969	8	129.6	0	0	0	0	0	8	7/8 to 10/15
17	1966	26	421.2	0	0	0	0	0	26	7/8 to 10/15
20	1969	0	0							10/1 to 2/28
25	1948	0	0							10/1 to 2/28
26	1976	0	0							10/1 to 2/28
29	1970	34	428.4	0	0	0	0	0	34	7/8 to 10/15
33	1973	0	0							8/6 to 10/15
38, 48	1963	64	1476.8	0	0	0	0	0	64	7/8 to 2/28
39	1961	24	242.4	0	0	0	0	0	24	10/1 to 2/28
40	1959	15	151.5	0	0	0	0	0	15	7/8 to 2/28
41	1974	28	506.8	0	0	0	0	0	28	7/8 to 2/28
42	1976	0	0							8/6 to 2/28
46, 47, 53	1973, 71, 71	24	375.4	0	0	0	0	0	24	10/1 to 2/28, 7/8 to 10/15
76	1972	0	0							8/6 to 10/15
93	1957	11	136.4	0	0	11	2	0	0	10/1 to 2/28
94	1956	3	32.1	0	0	3	1	0	0	10/1 to 2/28
99	1956	4	62.4	0	0	4	2	0	0	10/1 to 2/28
178	1972	85	1011.5	0	0	40	6	0	45	10/1 to 2/28
179	1968	0	0							7/8 to 10/15
180	1965	0	0							7/8 to 10/15
187	1949	0	0							10/1 to 2/28
194	1949	19	380	0	0	0	0	0	19	10/1 to 2/28
Subtotal		427	6462.4	0	0	101	16	0	326	

School

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Operating Season
43	1964	13	131.3	0	0	13	2	0	0	10/1 to 2/28
55	1971	6	75.6	0	0	6	2	0	0	10/1 to 2/28
56	1961	3	28.8	0	0	3	1	0	0	10/1 to 2/28
61	1971	4	30	0	0	4	2	0	0	10/1 to 2/28
65	1966	0	0							7/8 to 10/15
73	1964	0	0							10/1 to 2/28
77	1959	0	0							10/1 to 2/28
81	1956	0	0							10/1 to 2/28
91	1956	2	25.4	0	0	2	1	0	0	10/1 to 2/28
92	1964	11	147.4	0	0	11	2	0	0	7/8 to 2/28
Subtotal		39	438.5	0	0	39	10	0	0	

Stump

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Operating Season
124	1970	0	0							8/6 to 2/28
131	1971	0	0							10/1 to 2/28
135	1971	0	0							10/1 to 2/28
144	1968	19	201.4	0	0	0	0	0	19	10/1 to 2/28
146	1965	0	0							8/6 to 2/28
155	1970	0	0							10/1 to 2/28
156	1970	0	0							10/1 to 2/28
160	1965	0	0							10/1 to 2/28
165	1971	22	314.6	0	0	0	0	0	22	10/1 to 2/28
Subtotal		41	516	0	0	0	0	0	41	

Upper Yachats

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Operating Season
107	1958	5	80.5	0	0	5	2	0	0	10/1 to 2/28
123	1973	20	398	0	0	0	0	0	20	10/1 to 2/28
129	1965	0	0							10/1 to 2/28
133	1960	0	0							10/1 to 2/28
145	1970	0	0							10/1 to 2/28
147-148	66-63	49	892.1	0	0	0	0	0	49	8/6 to 2/28
149	1964	0	0							8/6 to 2/28
154	1970	0	0							8/6 to 2/28
159	1963	49	612.5	0	0	7	1	0	42	8/6 to 2/28
161	1964	0	0							8/6 to 2/28
166	1971	25	385	0	0	0	0	0	25	8/6 to 10/15
170	1971	0	0							10/1 to 2/28
174	1960	11	155.1	0	0	4	1	0	7	10/1 to 2/28
175	1956	35	570.5	0	0	14	3	0	21	10/1 to 2/28N, 8/6 to 10/15S
176	1968	18	153	0	0	18	2	0	0	10/1 to 2/28
177	1961	11	215.6	0	0	0	0	0	11	8/6 to 10/15
Subtotal		223	3462.3	0	0	48	9	0	175	

Yachats

Stand Number	Year of Origin	Harvest Acres	Total harvest volume (MBF)	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Operating Season
37	1960	92	1720.4	0	0	0	0	0	92	8/6 to 2/28
58	1973	18	127.8	0	0	0	0	0	18	8/6 to 2/28
62	1976	7	103.6	0	0	0	0	0	7	8/6 to 2/28
66	1967	13	189.8	0	0	0	0	0	13	8/6 to 2/28
68	1960	46	446.2	0	0	0	0	0	46	7/8 to 10/15
71	1959	25	290	0	0	10	2	0	15	8/6 to 2/28
72	1953	12	248.4	0	0	0	0	0	12	8/6 to 2/28
75	1974	22	215.6	0	0	0	0	0	22	8/6 to 2/28
84	1964	26	327.6	0	0	0	0	0	26	8/6 to 2/28
87	1960	6	104.4	0	0	0	0	0	6	8/6 to 2/28
104	1970	0	0							8/6 to 2/28
110	1971	13	130	0	0	0	0	0	13	7/8 to 10/15
117	1960	20	318	0	0	0	0	0	20	8/6 to 2/28
118	1960	0	0							8/6 to 2/28
120	1962	36	561.6	0	0	22	4	0	14	7/8 to 10/15
122	1960	0	0							8/6 to 2/28
136	1964	45	544.5	0	0	29	4	0	16	10/1 to 2/28N, 8/6 to 10/15S
137	1962	57	758.1	0	0	23	2	0	34	8/6 to 2/28
140	1964	22	409.2	0	0	2	1	0	20	10/1 to 2/28
195	1955	8	79.2	0	0	0	0	0	8	10/1 to 2/28
Subtotal		468	6574.4	0	0	86	13	0	382	

Yachats Terrestrial Restoration Project EA

List of Preparers

The Team

Name	Position Title	Primary Responsibilities
Bruce Buckley	Resource Planner	EA writer, project coordinator, appendix B-3,economic analysis
Jessica Dole	Forest Landscape Architect	Scenery effects
Barbara Ellis	GIS Technician	GIS mapping
Edward Garza	Forest Fuels/Fire Planner	Fire hazard effects, fuels prescription
Daniel Karnes	Operations Manager	Silviculture effects and prescription, and appendix B-1 and B-2
Ken McCall	Forest Transportation Planner	Forest transportation system effects, roads analysis
Doug Middlebrook	District Wildlife Biologist	Wildlife effects; wildlife specialist report, including the biological evaluation, and appendix B-2
Karla Reeves	District Fish Biologist	Fisheries effects, fisheries biological assessment
Jan Robbins	District Hydrologist	Hydrologic and soils effects, temporary and system roads stability assessment, water quality restoration plan
Dan Segotta	Forest Botanist	Listed, sensitive, and survey-and-manage plant effects, effects on noxious and undesirable weeds
Phyllis Steeves	Forest Archaeologist	Heritage resource effects
Paul Thomas	Planning Manager	Team leader
Clarence Wadkins	Interpretive Specialist	Recreation effects

Contributors

Name	Position Title	Primary Responsibilities
Karen Bennett	Forest Soils Scientist	Soils effects support
Al Brown	Forest Environmental Coordinator (past)	NEPA guide
Frank Davis	Forest Environmental Coordinator (present)	NEPA guide
Bill Helphinstine	District Ranger	Process guide, public-involvement coordinator
Stu Johnston	Forest Silviculturist	Stand effects analysis for fisheries biological assessment
Mark Leverton	Forest Geologist	Slope stability support
Eric Stolsig	Silviculture Technician	Stand exams

Appendix D

Contributions From Others

1. List of Agencies and Organizations Consulted

Agencies

Lincoln County Road Department
Lincoln Soil and Water Conservation District
NOAA Fisheries, Portland, OR
Oregon Department of Fish and Wildlife, Newport, OR
US Fish and Wildlife Service, Portland, OR

Organizations

Confederated Tribes of Siletz
Confederated Tribes of Coos, Lower Umpqua, and Siuslaw
Local Steelheaders Group
Mid-Coast Anglers
Mid-Coast Watershed Council
Oregon Watershed Enhancement Board

2. List of Persons Who Commented on the Proposed Project

Gayle Anderson (Boise Building Solutions), Dick Beers, Charles Dobson (CITIFOR, Inc.), Helen Field, Larry Field, Lance Gatchell (Lincoln County Soil and Water Conservation District), Wayne Hoffman (Mid-Coast Watershed Council), Daniel Krueger, Steven McKinley, Michael Posner, Bill Richardson (Rocky Mountain Elk Foundation), Steve Rose, and David Schlesinger.

In addition, several other persons commented on the management proposal to reduce the size of the parking area adjacent to the Keller Creek dispersed recreation site. Most responded because of the mistaken belief that the proposal was to eliminate the dispersed site.

3. List of Persons Who Commented on the Initial EA

Table 1. Keller Creek Picnic Area

Person or Organization	Comment Summary	Response
Carl Miller P.O. Box Eighteen Yachats, OR 97498	Don't remove the Keller Creek Picnic Grounds.	Preliminary Analysis (PA), pages 7, 12, 19, 23, 27, and 74 (same for all responses below).
Karl Christianson Mountain Shores, Inc. P.O. Box Eighteen Yachats, OR 97498	Do not shutdown Keller Creek Park. I and other members of the community will be happy to replace old, unsafe tables at no charge to the Forest Service.	
Sally Carr P.O. Box 453 Yachats, OR 97498	Preserve the Keller Creek park and its parking lot.	
Billie Jo Smith 1239 SE Pine St. Toledo, OR 97391	Retain Keller Creek Park. Do not reduce its remaining access and picnic features.	
Andrea Scharf 9777 Yachats River Road Yachats, OR 97498	Remove plans to degrade the Keller Creek park from the Yachats Terrestrial Restoration Project. Use local paper also for EA notice of availability.	
Hugh Rackleff 8819 Yachats River Road Yachats, OR 97498	Petitioner (108 signatures). Leave Keller Creek picnic grounds alone.	
Larry Field 9010 River Road Yachats, OR 97498	Do not close Keller Creek picnic grounds.	

Helen Field 9010 River Road Yachats, OR 97498	Leave the Keller Creek park the way it is.	
Rick Briggs 1004 Yachats River Road Yachats, OR 97498	Don't close the Keller Creek Park.	
Paul Niblock 95161 Hwy 101 South Yachats, OR 97498	Preserve Keller Creek Park not just for us but also for those who are yet to come.	
Ted and Vicki Johnson 893 Howell Pt. Rd. Salem, OR 97301	The proposed options for the Keller Creek site are unacceptable; it is used and loved by many.	

Table 2. Commercial thinning

Person or Organization	**Comment Summary**	**Response**
David Schlesinger P.O. Box 727 Yachats, OR 97498	Alternative 3 is the best choice. It avoids building or reopening temporary roads. Temporary roads have a way of becoming permanent roads.	PA, chapters 2 and 3.
Steven McKinley P.O. Box 516 Siletz, OR 97380	Favors commercial thinning. Roads are needed for economical harvest and multiple use. No snag or down wood creation—too costly and will occur naturally.	PA, page 4; appendix A, pages 23 to 27.
Larry Field 9010 River Road Yachats, OR 97498	Snags and down wood will create a fire hazard. Supports commercial thinning.	PA, pages 72 and 73.
Helen Field 9010 River Road Yachats, OR 97498	Snags are a fire hazard. The alternative that has the least logging costs is best. Protect our domestic water systems during commercial and noncommercial thinning operations.	PA, pages 72 and 73; appendix A, pages 9 and 19.

Table 3. Road decommissioning

Person or Organization	Comment Summary	Response
Steven McKinley P.O. Box 516 Siletz, OR 97380	Roads are needed for economical harvest, including special forest products. All all-weather roads need to be kept open for emergency access. Maintain road 5491.	PA, pages 75 to 81.
Larry Field 9010 River Road Yachats, OR 97498	Do not decommission or close roads; they are needed for commercial firewood, fire control, and timber harvest.	PA, pages 72, 73, 75 to 81, and 82.
Helen Field 9010 River Road Yachats, OR 97498	Do not decommission the 5491 road. Favors Alternative 1 when it comes to road decommissioning.	PA, pages 75 to 81.

Table 4. Meadow maintenance/elk forage

Person or Organization	Comment Summary	Response
Steven McKinley P.O. Box 516 Siletz, OR 97380	Maintain meadows for elk forage.	PA, pages 31, 56, and 57.
Helen Field 9010 River Road Yachats, OR 97498	Maintain roads for elk by providing grass forage adjacent to roads—this helps to reduce elk impacts on farms and fences.	PA, pages 31, 56, and 57.

4. List of Persons Who Commented on the Preliminary Analysis

Larry Field, Yachats watershed resident
Jeremy Hall, Oregon Natural Resources Council

5. Comments on the Preliminary Analysis and Forest Service Responses

Table C1 summarizes the substantive comments received on the preliminary analysis during the 30-day comment period, which began on September 18, 2004 and ended close-of-business on October 18, 2004. Each comment was read and considered, as the environmental assessment for this project was prepared. Comments, not covered by existing regulations or not outside the scope of the project, were separated into topics. Where applicable, pages of the environmental assessment (EA) or project design criteria (appendix A) are referenced where the comment topics are discussed.

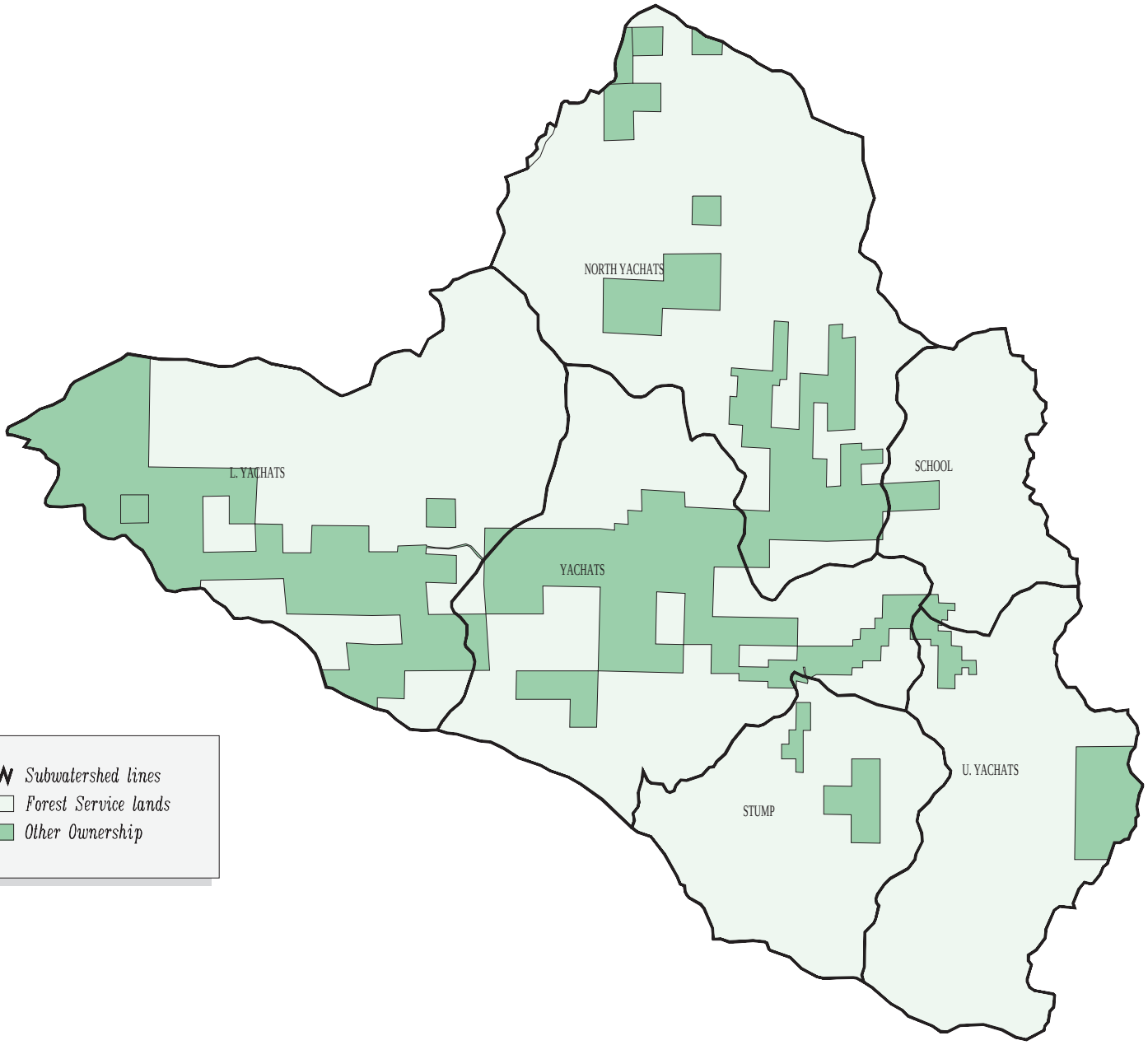
Table C1. Preliminary analysis comment and response summary

Discussion Topic	Comment Summary	Response
	From Larry Field:	
Alternatives	Favors Alternative 5	
Access	Maintain and repair a portion of road 5491.	Refer to the EA, pages 13, 19, 75, 76, 82 and 83.
Keller Creek dispersed site	Keep the Keller Creek dispersed site open for public use.	Refer to the EA, pages 12, 15, 17, 19, and 79.
	From Jeremy Hall:	
New temporary roads	Identify lengths of new temporary roads by stand and show the acres accessed by these roads	Refer to appendix B-3. “Acres Accessed” was added to the “New Temporary Road Miles” column.
Waste material	Any cross drains, new ditching, cut banks, and excavation required?	None of these will be required because new roads are limited to stable ridges. Refer to appendix A, pages 10 and 11.

	Where will the fill material be placed, how will it be stabilized, and how will invasive weeds and erosion be dealt with? Can some of the fill be used to re-contour roadbeds?	Typically, removed fill material is placed adjacent to the road cut bank at least 50 feet away from streams. Refer to appendix A, pages 18, 19, and 20.
Understory tree planting	Planting should be done using variable densities and species proportion.	Silvicultural prescriptions will allow for the maximum flexibility in varying spacing. Following thinning, the stands will be evaluated for underplanting opportunities and site-specific guidelines will be prepared (EA, chapter 3, forest stand conditions; appendix A, page 13, Stand and Species Diversity.
	It is inappropriate to underplant all the units that will be thinned to 30 residual TPA.	Stands that were designated for 30 residual TPA are now designated for 40 or 60 residual TPA (EA, appendix B-2). The EA states that about 100% of the 40 TPA units will be underplanted to ensure that adequate provisions are made to accomplish "essential" reforestation work. Reforestation is considered essential where landings and corridors have opened holes in the canopy that were previously stocked with trees. However, in the three 40 residual TPA units, there is considerable flexibility on how this is accomplished. Post-thinning underplanting treatments will incorporate considerable flexibility as stated in appendix A, page 13, Post-harvest essential KV reforestation activities, Stand and Species Diversity.
Snag creation	Allow trees to grow larger by waiting at least 10 years following thinning before creating snags.	KV funds are normally used to pay for snag creation work. KV funds must be used within five years of the sale closure. Where snags creation has been proposed, the Wildlife Biologist feels that their size will provide some benefits. In stands where tree

		diameters are small, snag recruitment is deferred. In these cases, sufficient stocking is retained to ensure future snag recruits. Snags will then be created with the next thinning operation paid for by KV collections or alternative funds, if available.
Commercial Thinning	Commercial thinning lacks adequate provisions to create variably spaced trees. From the prescriptions it appears that entire units will be thinned to even spacing with no small islands of unthinned areas, wolf trees, gaps, or recommendations for highly variable spacing.	Refer to the additional information that was added to the EA, chapter 3, pages 36 and 37 and to appendix A, pages 7, 13, 14, and 23 for clarification.
Non-commercial thinning	70% of these stands will be thinned to 21 feet spacing; additional variability is needed for these stands.	Refer to appendix A, page 20.
Stand density	Report existing and target relative densities of each stand.	Refer to appendix B-1 for existing stand densities, and Appendix B-2 for residual (target) stand densities for each proposed thinning unit.
Post-thinning spacing variability	Very little variability is planned between or among stands.	Refer to the EA, chapter 3, pages 36 and 37; appendix A, pages 7, 13, and 20; and appendix B-2.
Unthinned Patches	Small unthinned patches (.25 acre) should be left every few acres within each thinning unit.	This level of diversity creation is currently not economically or operationally feasible given the Agency's funding and workforce. However, through current layout practices that take

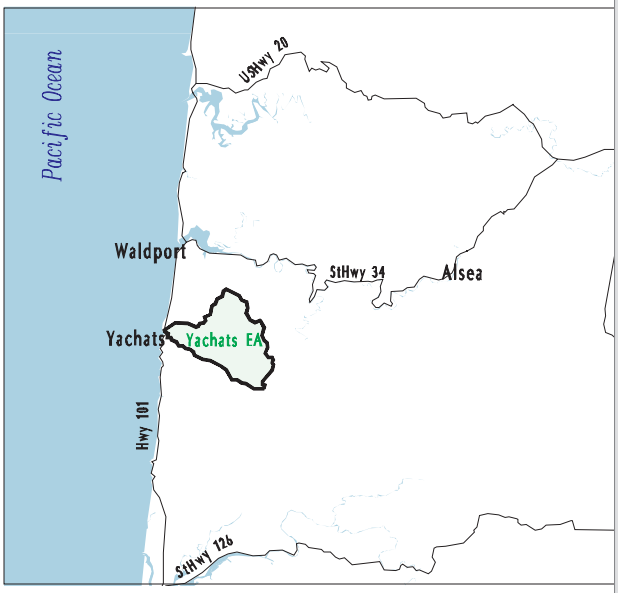
		advantage of the current diversity of vegetation, we have been able to approximate this condition at a level slightly larger than at the .25-acre stand level (EA, chapter 3, pages 36 and 37).
Creation of Gaps	Gaps should not be clearcuts, but retain a few scattered trees, both standing and on the ground.	There are no plans to identify specific locations for the creation of gaps with this project. However, small gaps will be created through the variable density prescriptions, especially in the stands where 40 TPA is the target average residual stocking.
Managing for wood production	We should be trying to create conditions for stands to go off on different trajectories… We will not accomplish this by thinning young stands with prescriptions extrapolated from growth and yield models.	The prescriptions are not based on growth and yield models, but on studies by Franklin, Carey, and others in an effort to move homogeneous plantations toward more heterogeneous, natural conditions. Thinning 25 to 45 year old stands to 40 and 60 trees per acre will not maximize timber production on any tables of which we are aware. Private industry on similar sites is regenerating 25 to 45 year old plantations that are carrying 200 plus trees per acre. The three primary prescriptions (40, 60, and 90 TPA) will allow many units to go off on different trajectories. The different prescriptions will also allow us to monitor the success of these trajectories in achieving diverse late-seral attributes and leave us with options for future silvicultural management, if necessary, to continue to speed the development of late-successional habitat.



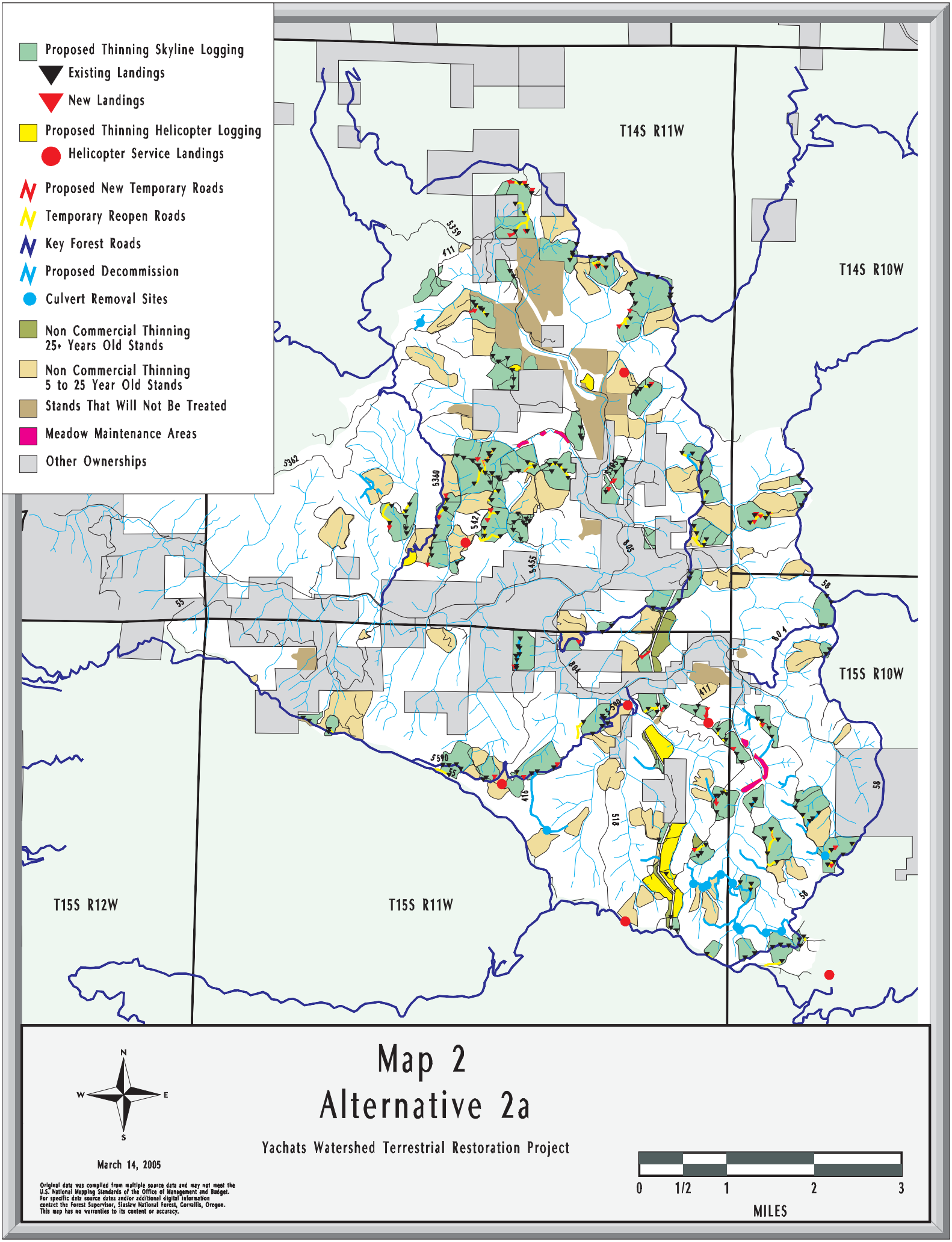
Map 1

Yachats Terrestrial Restoration Project

Vicinity Map



March 14, 2005



Map 2
Alternative 2a

Yachats Watershed Terrestrial Restoration Project

March 14, 2005

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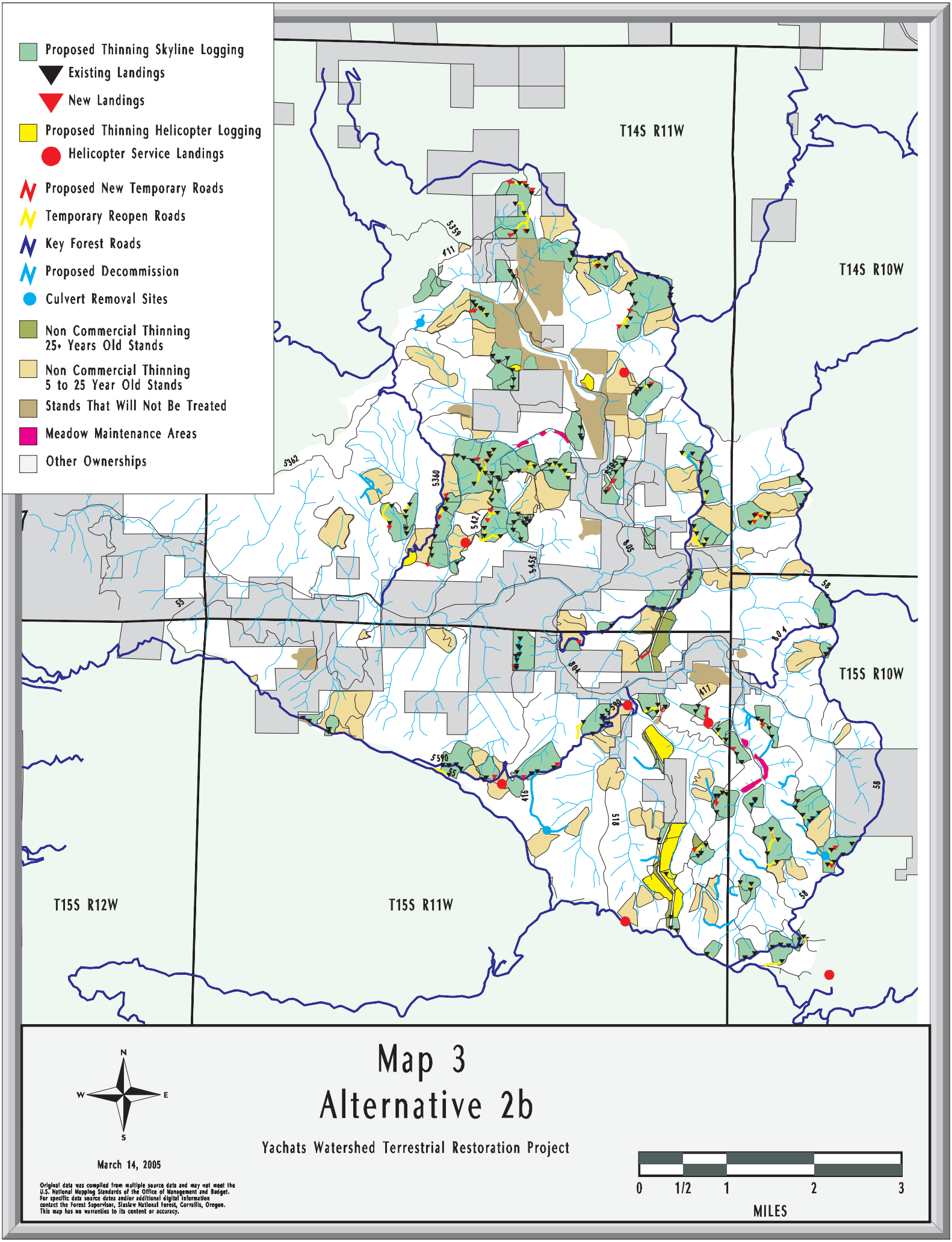

Map 3
Alternative 2b

Yachats Watershed Terrestrial Restoration Project

March 14, 2005

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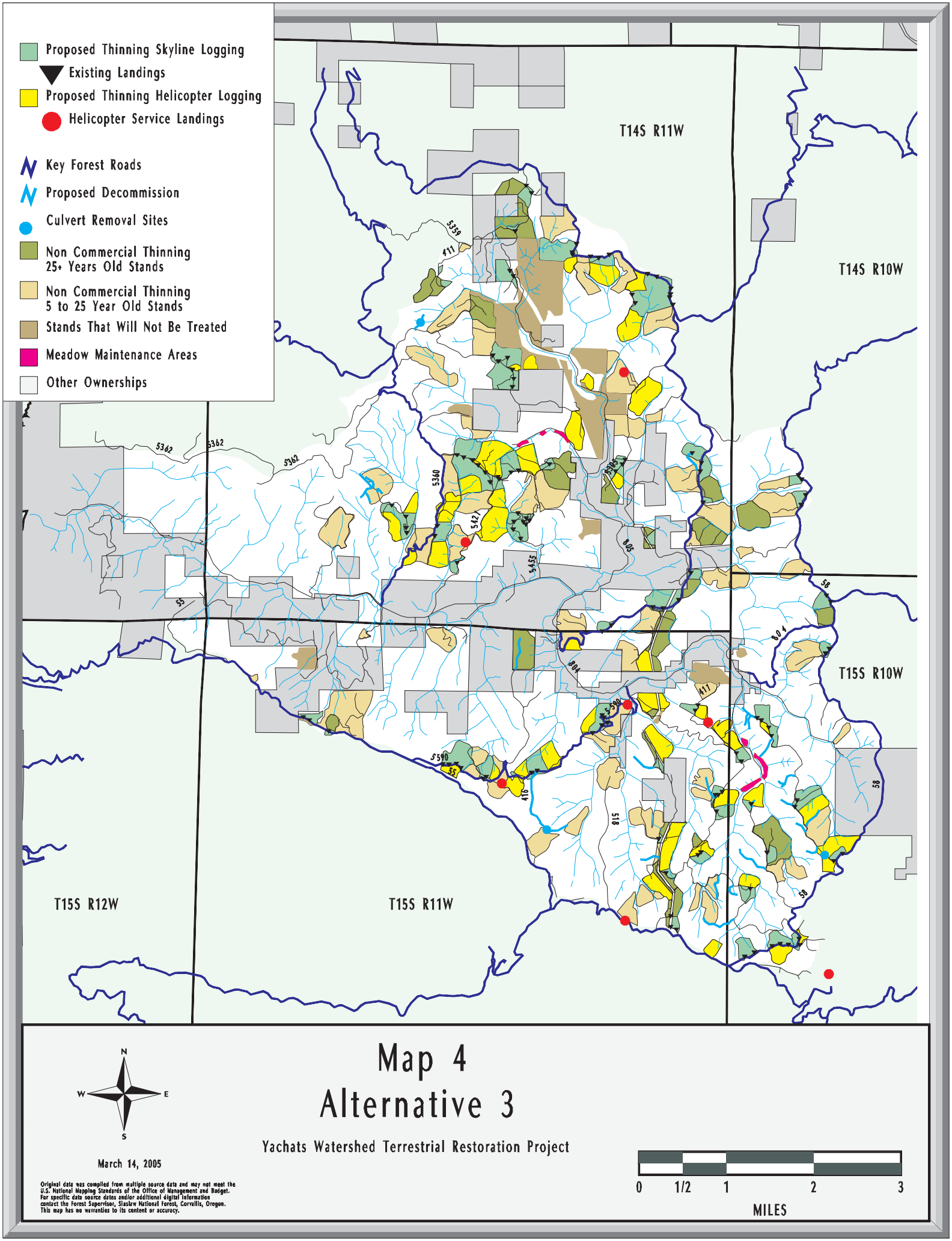

Map 4
Alternative 3

Yachats Watershed Terrestrial Restoration Project

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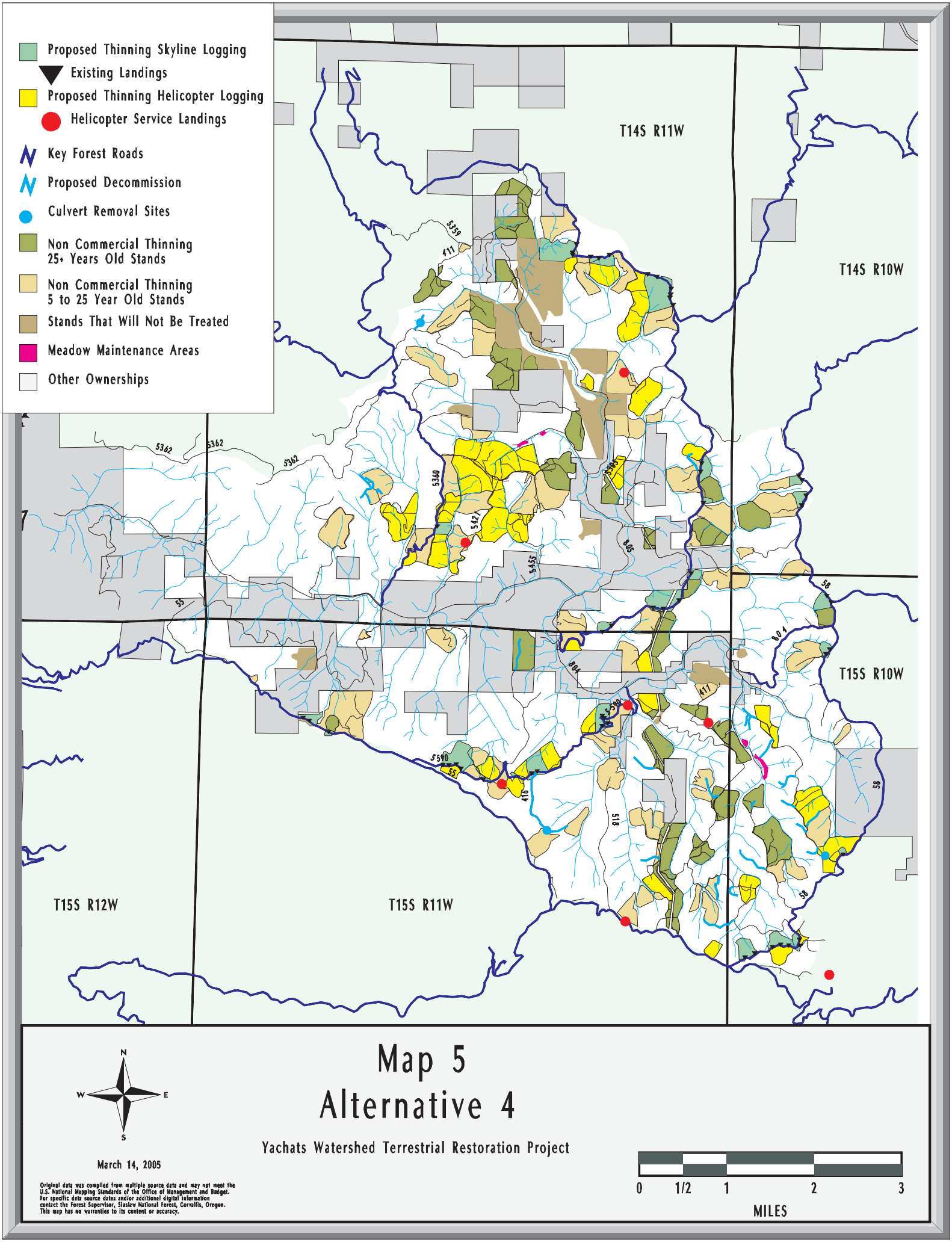

Map 5
Alternative 4

Yachats Watershed Terrestrial Restoration Project

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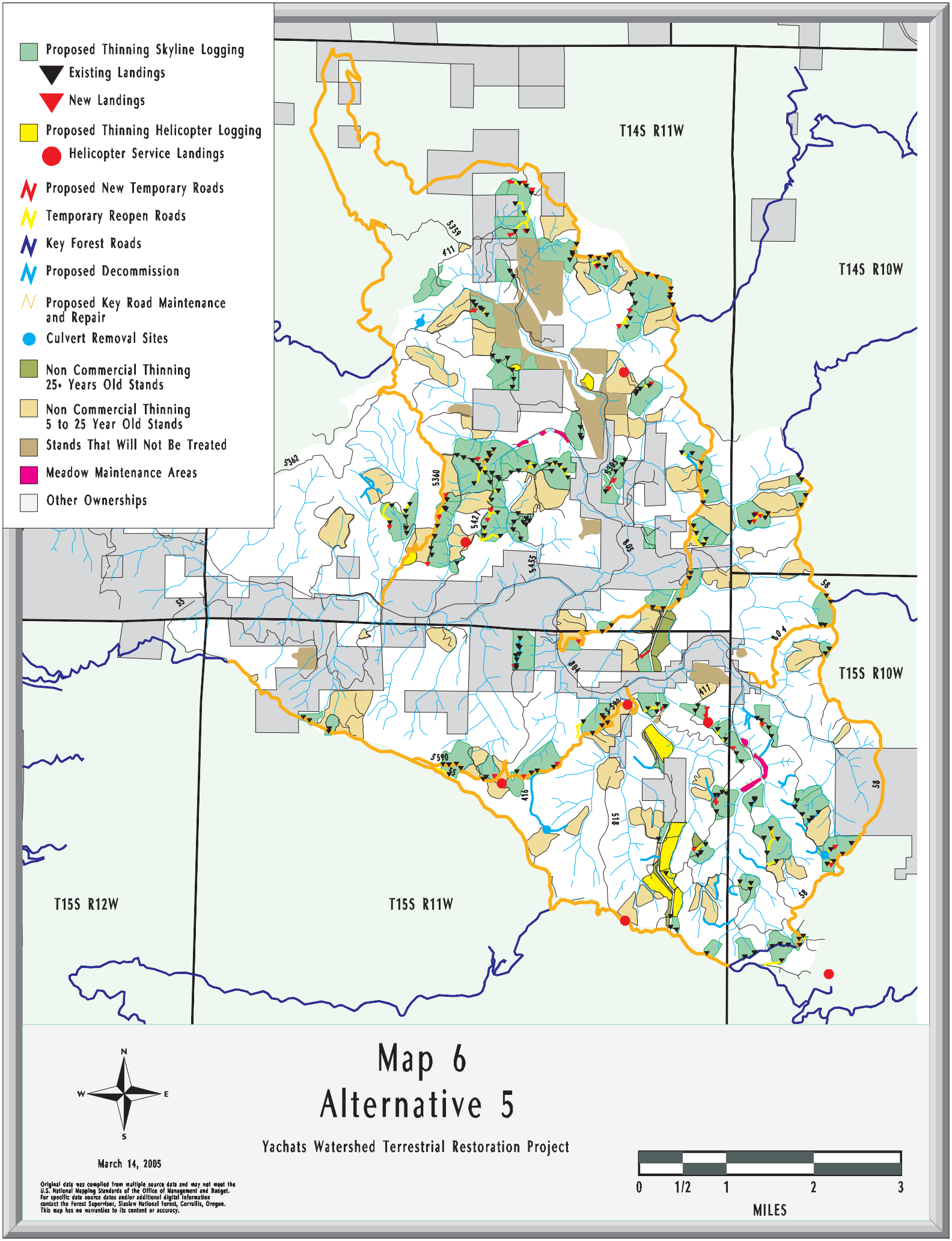

Map 6
Alternative 5

Yachats Watershed Terrestrial Restoration Project

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