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Environmental Assessment

West Alsea Landscape Management Project

Central Coast Ranger District-ODNRA
Siuslaw National Forest
Lincoln County, Oregon

Lead Agency: **USDA Forest Service**

Responsible Official: **Pam Gardner, District Ranger**
Central Coast Ranger District
Siuslaw National Forest
1130 Forestry Lane
Waldport, OR 97394

For Information Contact: **Jan Robbins, Team Leader**
Central Coast Ranger District
1130 Forestry Lane
Waldport, OR 97394
(541) 563-8423
jrobbins@fs.fed.us

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Chapter 1—Why Is the Project Needed, and What Evidence Established these Needs?

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

Acting District Ranger Carl West proposed the West Alsea Landscape Management Project (the Project) to restore terrestrial and aquatic conditions and processes in the planning area to maintain ecosystem diversity and productivity, as well as provide clean water and economic and recreation opportunities for people.

This project is proposed because of direction from the Forest Service Manual 2602 (USDA 1991) and the Siuslaw Forest Plan (USDA 1990), as amended by the Northwest Forest Plan (USDA, USDI 1994); and the needs identified in the Late-Successional Reserve Assessment (USDA, USDI 1997), the Lower Alsea River Watershed Analysis (USDA 1999a), and best available science. The type and amount of work proposed is based on known historic and existing conditions as well as on past work of a similar nature. Since this proposal was made, Pam Gardner became the District Ranger for the Central Coast Ranger District. She concurs with this proposal.

The Siuslaw Forest Plan, as amended by the Northwest Forest Plan, 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, as well as providing adequate habitat to maintain viable populations of terrestrial and aquatic species. 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 goals of the Project for terrestrial and aquatic conditions and processes include:

- Terrestrial conditions: Speed the development of late-successional forest habitat, especially large trees, and improve habitat diversity and bio-complexity in plantations; maintain existing and create meadow habitat; manage invasive weeds; and retain the opportunity to produce timber and other products from plantations in the matrix land allocation.

- Aquatic conditions: Enhance the health of streams and associated aquatic ecosystems by modifying the transportation system (i.e. repairing, decommissioning, or closing roads), removing barriers to aquatic species, restoring the processes associated with large in-stream wood, and speed the development of conifers and hardwoods in some riparian areas.

The Proposed Project

The West Alsea Landscape Management Project is a package of associated terrestrial and watershed restoration actions. They include commercially thinning and creating dead wood and openings in plantations 20 to 58 years old, non-commercially thinning plantations generally less than 20 years old, creating and maintaining meadows, decommissioning or closing roads, repairing and maintaining key and non-key forest roads, adding large wood to streams, and planting conifers and hardwoods in riparian areas. The Project proposes no changes to roads administered by other public agencies or to roads managed by private landowners.

Repairing and maintaining key forest roads are connected actions because timber purchasers would be required to perform the work as a condition of timber-sale contracts prior to using the roads. Some of these roads extend outside the boundary of the planning area and provide connections to locations where commercial thinning products would be transported. All other actions are connected because they help meet the restoration objectives, or they would be funded by revenue from the sale of timber. Most activities would be completed in 10 years, with commercial timber-sale contracts awarded over a 5 to 6 year period, beginning as early as fiscal year 2009 (10-1-08 to 9-30-09). Road maintenance and decommissioning actions may begin as early as the summer of 2009.

Refer to chapter 2 for a quantified list of actions proposed. Chapter 2 also provides information concerning alternative proposals.

The Planning Area

The planning area—about 40 air miles southwest of Corvallis, Oregon (map 1)—includes nine 6th-field watersheds in the lower (western) portion of the Alsea River watershed and covers about 40,200 acres. The US Forest Service manages about 60 percent of the area (including about 10,415 acres of plantations), 32 percent is privately owned, 1 percent is managed by the Bureau of Land Management, and less than 1 percent is managed by the Oregon Department of Forestry. The Alsea bay and river make up the additional acres in the planning area. The project area is located in Township 13 South, Ranges 10 and 11 West; and Township14 South, Ranges 10, 11, and 12 West; Lincoln County, Oregon.

Three land allocations (late-successional reserve, riparian reserve, and matrix) exist in the planning area. Proposed actions would be consistent with the land allocations in the Plan.

The Problems (Issues) To Be Addressed

The problems to be addressed are 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 Late-Successional Reserve Assessment, Oregon Coast Province—Southern Portion (USDA, USDI 1997); the Lower Alsea River Watershed Analysis (USFS 1999a); and the Siuslaw National Forest Roads Analysis (USFS 2003). Based on these sources of information, District Ranger Pam Gardner identified the following problems and the need to address them:

- The shortage of late-successional and old-growth forest habitat in the Pacific Northwest limits recovery of old-growth-dependent species, such as the northern spotted owl and the marbled murrelet. Thus, she saw a need to speed the development of late-successional and old-growth habitat in late-successional and riparian reserves.
- The shortage of habitat diversity in plantations—forest openings (grass, forbs, and shrubs), hardwood trees, snags, down wood, and tree cavities—and the decline of existing grass, forb, and shrub habitats (e.g., meadows) in the planning area, limits the ability of these areas to support a diversity of plant and animal species, including Region 6 sensitive species and management-indicator species. Thus, she saw a need to improve habitat diversity in plantations and to maintain existing grass, forb, and shrub habitats.
- The shortage of high quality aquatic habitat in the Oregon Coast Range, including the Lower Alsea River watershed, limits recovery of aquatic-dependant species, especially anadromous fish. Thus, she 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, she saw a need to use timber-sale revenue to maintain key forest roads to standards that allow both uses.
- The Northwest Forest Plan called for substantial timber production from the matrix lands, but marbled murrelets are almost always found in surveyed mature forest on the Siuslaw matrix lands, which are then re-designated as late-successional reserves. Thus, she saw the need to produce timber from plantations in matrix lands in a manner that provides important ecological functions.
- Through public scoping, building temporary roads was considered a problem by some people. Thus, she saw a need to develop an alternative to the proposed action that would not build temporary roads.

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 provide 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; page 21). The 1994 record of decision, which amended the Siuslaw Forest Plan, allocated federal lands in the Alsea 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 Assessment Report for Federal Lands in and adjacent to the Oregon Coast Province (USDA, USDI 1995) shows the planning area in the coastal fog zone (block 1) and central interior (block 6) disturbance regimes. The mature conifer stands in both blocks have been extensively clearcut, thus few patches of large, functional late-successional and old-growth forest remain. These blocks once supported the largest unfragmented patches of late-successional forest in the Province. The Report recommends managing to accelerate late-successional forest 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 reestablishing natural riparian areas through actions such as thinning plantations to speed the development of large wood.

The Siuslaw National Forest Roads Analysis (USFS 2003) was developed to provide information to support road management decisions on the Forest. The Roads Analysis recognized that funding for road maintenance is limited and recommends prioritizing limited available maintenance funds to key forest roads. 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 have substantially 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 due to a lack of funds. Thus, some roads have been decommissioned, closed, or been kept at the lowest possible maintenance level.

For needing late-successional and old-growth forest 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 Lower Alsea River watershed, which is located in LSR RO268:

- The dominant patch size has decreased from jumbo patches (larger than 10,000 acres) to smaller patches (100 to 1,000 acres).
- The largest percentage reduction in late-seral vegetation on federal lands in the Province is the coastal fog zone and central interior Alsea disturbance regime blocks.

The Lower Alsea River Watershed Analysis (USFS 1999a) reported that:

- Mid-seral stands (9 to 21" DBH) occupy the highest percentage (32 percent) of the landscape and landscape patterns are fragmented across the watershed and the Alsea basin as a whole.
- Historically, over 60 percent of the watershed was comprised of late-seral (>21" DBH). Now it has about 29 percent of this habitat.
- Historically, over 75 percent of late-successional forest was in patches greater than 100,000 acres, but now this habitat is very fragmented, with most patches being less than 1,000 acres.
- Historically, over 40 percent of the watershed was interior late-successional forest, but now less than 12 percent of the watershed provides interior forest habitat.
- Plantations comprise 43 percent of the watershed.
- Structural components of forest stands (snags, down wood, sub-canopy layers, and tree species diversity) currently exist at very low levels in young forest stands (plantations) in the watershed.
- Monitoring of owl nest sites show relatively low reproduction, averaging about one young produced every fourth year.

Over the past few years, much work has been done in the scientific field evaluating the merits of thinning dense, young managed stands (plantations) west of the Cascades in the Pacific Northwest to speed the development of late-successional, old-growth characteristics and improve biological diversity. Examples of scientific findings that support the proposed 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 scattered conifer survival as well as mortality of individual large trees. Based on the Lower Alsea River Watershed Analysis, low numbers of large trees in these forests were the result of intermediate disturbances, such as wind-throw, root-rot, or fire.
- 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, which is the existing condition of plantations proposed for treatment. 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.

- Forsman and Giese (1997) found that over 90 percent of northern spotted owl nests were in cavities, typically in the crown of live trees and in large holes in the side of the trunk or in the broken top of the trunk.
- 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. 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.
- In their notes to the Regional Ecosystem Office as a result of their meeting on January 18, 2001, the Science Findings Evaluation Group 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 plantations on the Siuslaw National Forest that were commercially thinned under previous projects. John Tappeiner (pers. omm..), a professor of silviculture at Oregon State University, who researches stand development in the Oregon Coast Range, was consulted about commercial thinning dense, young Douglas-fir plantations on the Forest. Both scientists reaffirmed the need for thinning these plantations, and supported thinning at different densities so that variable pathways can be established.
- Wimberley (2002) helped show the need to restore certain forest conditions by simulating historical landscape patterns for the Oregon Coast Range. Existing abundance information for the West Alsea planning area is included in table 1 to show a direct comparison between historic-reference range and existing conditions at landscape scales.

Table 1. Historic and existing abundance of forest habitat-seral condition

Forest Seral Stage	Range of Abundance (Historic % of Oregon Coast Province)	Existing Abundance (% of FS in West Alsea and Lower Drift Creek)
Early (<30 years old)	12-29%	10% (<5" dbh in 1990)
Young (30-80 years old)	15-31%	45% (5-20" dbh in 1990)
Mature (80-200 years old)	12-28%	42% (20-48" dbh in 1990)
Old Growth (>200 years old)	29-52%	3% (> 48" dbh in 1990)

- Carey (2003) found that restoring landscape function entails restoring function to managed stands and that bio-complexity is more important than individual habitat elements in maintaining the diversity of forest ecosystems. He also showed that variable densities of forest canopies increases bio-complexity, which supports various biotic communities including soil organisms, vascular

plants, fungi, birds, small mammals, and vertebrate predators. Moreover, promoting deciduous trees, protecting fungal mats, and managing for dead wood are important to bio-complexity.

- Glenn et al. (2004) found that broadleaf forests were important for spotted owls in young forests at two study sites in the Central Oregon Coast. These sites are on land managed by Oregon Department of Forestry near Coos Bay and in the northern part of this province.
- Jackson and Jackson (2004) found that fungal infection is probably necessary for primary excavation of all cavities by woodpeckers, except for possibly two species, Red-cockaded and Acorn woodpeckers.
- On October 14, 2006, Andrew Carey (Emeritus Scientist, Ecosystem Processes Research Program, Pacific Northwest Research Station, US Forest Service), and Tom Spies (Research Ecologist and Team Leader, Landscape and Ecosystems Team, Pacific Northwest Research Station, US Forest Service), reviewed some plantations that were commercially thinned on the Siuslaw National Forest. The objective of this review was to determine if thinning prescriptions were accomplishing the objectives of improving diversity and complexity in plantations. The field trip included members of the Siuslaw Basin and Alsea Stewardship Groups, and Siuslaw Forest staff. Both scientists supported the Forest's approach to managing stands, including variable spacing of residual trees, maintaining or improving species diversity, creating snags and down wood, managing riparian areas, and managing skips/clumps (no-cut areas) and gaps (increasing the early seral habitat component).
- On the Siuslaw National Forest, three 30 to 33 year-old plantations were thinned in the early to mid-1990's to begin a study of thinning effects on overstory and understory development. These plantations were examined for 8 years after treatment. The findings of this study determined that availability of natural light is a major factor in many of the processes that foster the development of stand diversity and complexity. Thinning—especially to low densities—was found to increase understory plant diversity, without losing any shrub species. The study concluded that thinning to low densities and underplanting has the potential to accelerate development of multilayered stands characteristic of old-growth Douglas-fir forests (Chan et al. 2006).

With one known exception, all current scientific evidence points to the need for thinning young, dense managed stands to achieve conditions favorable for developing old growth upland and riparian forest characteristics and increasing habitat diversity. 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, for stands in the Oregon Coast Range province, an early reduction in stand density is the most prudent approach to follow.

For needing to improve habitat diversity in plantations and to maintain and create grass, forb, and shrub habitats

The Lower Alsea River Watershed Analysis (WA) (USFS 1999a), recent observations, and Impara (1997), indicate the following grass, forb, and shrub conditions in the watershed:

- About 40 percent of the watershed is in plantations over 15 years old, which offer little habitat diversity (WA, page 21).
- Recent observations indicate early seral habitat (grass, forbs, and shrubs), including meadows, is continuing to decline on federal lands.
- Historically, the major disturbance agent that created these habitats in the Sitka spruce zone was windthrow (Impara 1997). The spruce zone is roughly within five miles of the ocean. Further inland, fire was the major disturbance agent.
- The natural fire regime in the western hemlock zone, prior to European settlement, had a natural fire return (NFR), ranging between 92 and 271 years, with high intensity, stand-replacing fires occurring about every 300 years (Impara, 1997, p. 272-276). Low to moderate intensity fires occurred between these stand-replacing events. Much of the low intensity burning was implemented by Native peoples, followed by early settlers.
- Low to moderate intensity fires now play a much lesser role than historically, reducing the potential for maintaining and creating grass, forb, and shrub habitats. Low intensity burning by people and uncontrolled wildland fire ended between 1920 and 1950. Most large areas of grass and forb habitats observed on 1940 era aerial photos no longer exist on federal land.

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 Lower Alsea River Watershed Analysis (WA) and the Siuslaw National Forest Roads Analysis (USFS 2003) identified the following adverse conditions in the watershed:

- Anadromous salmonid populations in Oregon coastal streams, including those in the Alsea watershed, are substantially reduced from historic abundance (WA, page 68).
- The Alsea River is listed as water quality limited for temperature because it exceeds the 64-degree temperature standard established by the Oregon Department of Environmental Quality (WA, page 4).
- Pools are moderately abundant, but deep pools are uncommon (WA, page 5).
- Most streams have a low amount of large wood (WA, page 5).

- Forest and county roads have accelerated delivery of sediment, debris torrents, and flow to stream channels (WA, page 91).

- Recent observations indicate that roads also inhibit large wood and coarse sediment transport, disconnect stream channels, and act as barriers to aquatic species migration.

- Currently, and over the past 15 years, funding to maintain forest roads to standard is lacking. Roads not maintained to standard deteriorate more rapidly and culverts are more likely to fail (USFS 2003).

For needing to maintain key forest roads

The Siuslaw National Forest Roads Analysis (USFS 2003) indicates that Forest program funds have not been sufficient to maintain the existing key forest road system for the past several years. Thus, a backlog of key forest road maintenance has accumulated in the Alsea watershed.

The Lower Alsea River Watershed Analysis (USFS 1999a) indicates that roads constructed before the mid-1970's have a much higher number of road-related landslides compared to newer roads. The older mid-slope roads were constructed, using a side-cast method, and are a greater risk to natural resources. Continued use of these roads will require some stabilization and realignment to reduce the risk of landslides.

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 inventorying maintenance needs (annual and deferred) of the key forest road system and prioritizing road maintenance work to ensure user safety and resource protection within current and anticipated Forest budgets. It also recommends considering alternative funding sources for road maintenance and repair.

Road condition surveys indicate that key forest roads are not suitable for commercial and non-commercial use. Due to a lack of adequate road maintenance over the past 15 years, the capitol investment associated with building and maintaining key forest roads is at risk of being lost.

For needing commodities

Based on societal needs outlined in the Forest Ecosystem Management Assessment Team's (FEMAT) report (USDA, USDI, et al. 1993), the Plan designates producing timber and other products to be important objectives for matrix lands. The standards and guides for these lands are designed to provide important ecological functions and to maintain structural components like logs, snags, and large trees.

Help From Other Agencies and the Public

After identifying the actions that the proposed project would implement to address the problems on page 2, the District Ranger sought public comment on them. Letters describing the actions considered in the proposed project were mailed to about 200 parties, plus local landowners, on March 9, 2007. Public comment was also solicited through news releases in the Newport News-Times in Newport, Oregon; the Corvallis Gazette-Times in Corvallis, Oregon; and the Siuslaw News in Florence, Oregon. The Siuslaw National Forest's quarterly "Project Update" publications were also used for public outreach. Comments on the proposed project were requested by April 9, 2007. Through these scoping efforts, seven persons responded.

Public comments contained a 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, the issue of no new temporary road building was added by the District Ranger to the problems identified on pages 2 and 3. Thus, Alternative 3 was developed to address this problem. Based largely on public comment, some alternatives were considered but eliminated from detailed study. The alternatives are described in chapter 2. Comments relevant to clarifying how the Project would be implemented or relevant to the effects of implementing the Project are addressed in chapters 2 and 3, the Project design criteria (appendix A), or the Project file.

Decision Framework

The Responsible Official for the Project is the District Ranger for the Central Coast Ranger District-ODNRA (formerly the South Zone District) of the Siuslaw National Forest. The environmental assessment (EA) for the Project—to be completed after public comment on the preliminary analysis—will disclose the predicted environmental effects of implementing the different alternatives the District Ranger directed the Team to analyze. Based on this EA, a decision will be made by the District Ranger. The District Ranger will determine through a Decision Notice:

> To what extent, if any, will actions 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 actions?

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 actions 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.

Chapter 2—What Alternatives were Developed to Meet the Identified Needs?

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 the problems identified in chapter 1; concerns raised during public scoping for this project; public involvement with recent, similar Forest projects, such as the Lobster Landscape Management Project (USFS 2006a); and concerns raised during monitoring of similar District projects that were implemented in the past.

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

To accomplish this, managed stands across the landscape would be thinned to about 30 to 50 trees per acre and include associated activities, such as planting trees in the understory. Following treatment, these stands would 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 tree-spacing variability among stands across the 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-entry 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 Lower Alsea 5th-field watershed.

Based on the information above, the District Ranger decided to take a more conservative approach to stand management and development at this time by implementing single-entry prescriptions for about 40 percent of the stands proposed for commercial thinning, especially those that would be affected by road decommissioning, and where restoration of grass, forb, or shrub habitats has greater emphasis. As information is obtained about single-entry treatments through studies, such as the Five Rivers Landscape Management Project Final EIS (USFS 2002c) and the Siuslaw Thinning and Underplanting Diversity Study (Phase II) **(**USFS 2007e**)**, it may become a more widespread tool for stand treatments in the future.

Alternatives Considered in Detail

Alternatives 1, 2, and 3—Three alternatives, including Alternative 1 (No Action), Alternative 2 (Proposed Project), and Alternative 3 (No New Temporary Roads) were fully developed and are described in this section. The analyses of their effects are disclosed in chapter 3. Actions included for alternatives 2 and 3 are designed to address the problems identified by the District Ranger and incorporate the standards and guides established by the Siuslaw Forest Plan, as amended by the Northwest Forest Plan (USDA, USDI 1994b; ROD, page B-11). All quantities illustrated for the alternatives in the Project EA and appendices are estimates.

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 2 and 3 are implemented. Measures to avoid or minimize impacts associated with implementing these alternatives have been included in the design criteria. Therefore, we believe that management requirements and mitigation measures for all proposed actions are covered by the design criteria. For the proposed actions, appendix A identifies implementation monitoring (determines if actions are implemented as designed) and effectiveness monitoring (determines the effectiveness of the design criteria). Monitoring and observations of past, similar actions indicate that the design criteria are effective in protecting natural resources.

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 such as inter-tree competition, wind, diseases, insects, and fire to develop late-successional and old-growth forests, improve bio-complexity, and restore watersheds.
- Relying on natural processes:
  - Development of late-successional forest habitat, especially large trees and large dead wood, would take decades in developing;
  - Bio-complexity would not substantially improve until a major disturbance occurs;
  - Understory development of grasses, forbs, shrubs, and small trees would be slow in developing;
  - Meadows would decline in size through the encroachment of trees, shrubs, and invasive plants;

  - Streams, such as Canal Creek and Drift Creek, would remain deficient of large wood; and
  - Barriers to fish passage would remain in roads, unless they are removed by massive debris torrents.
- No plantations would be commercially or non-commercially thinned under this alternative, and no temporary roads would be reopened or built;
- Current forest roads would be retained, with no changes in management objectives;
- Forest roads would continue to 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;
- Current aquatic and riparian habitat conditions would improve gradually over a long period of time; and
- No additional projects are anticipated for the next 10 years, unless a catastrophic event such as a flood or 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 changes in vegetation and animal populations, these lands would move toward old-growth conditions.

Alternative 2: Proposed Project

To meet the Project needs, this alternative would implement the management actions listed below (map 2).

Plantation treatments and associated actions

To speed the development of late-successional and old-growth forest habitat, to increase forest bio-complexity, and to provide timber from matrix lands, the following actions are proposed (table 2 illustrates the quantities of proposed actions):

- To speed the development of large trees and increase bio-complexity, commercially thin plantations, using skyline, helicopter and ground-based logging systems;
- To diversify the structure and composition of plantations, create 1/8- to 1-acre gaps in 10 to 30 percent of affected commercially thinned plantations, with most plantations being in the 10 percent range;
- To improve diversity in stands, plant gaps and moderate to heavily thinned stands with shade-tolerant conifers and hardwoods;
- To promote development of nesting cavities in large (greater than 30” DBH) trees, some mature trees in adjacent natural stands would be inoculated or topped;
- To promote development of nesting cavities for over 35 endemic species that use cavities in trees, such as the northern spotted owl and American marten, some trees in plantations would be inoculated or topped;

- To provide habitat for over 40 endemic species that use snags, such as woodpeckers and the northern flying squirrel, some snags would be created in plantations;
- To create habitat for over 20 endemic species that use down wood, such as the ruffed grouse, red-backed vole, and chantrelle mushroom some plantation trees would be felled;
- To improve the quality and diversity of habitat that would benefit over 100 wildlife species, such as the Coopers hawk and Roosevelt elk, portions of some commercially thinned plantations would be under-burned and seeded with native grasses and forbs;
- To reduce the risk of wildfire, residual logging slash would be hand-piled and burned adjacent to key forest roads;
- To maintain stand health and growth of younger plantations, some of these plantations would be non-commercially thinned, using service contracts; and
- To provide habitat for over 100 wildlife species, such as the brush rabbit and western pond turtle, some meadows would be created in 1-acre openings in plantations, and existing meadows would be maintained.

To accomplish the commercial thinning:

- Repair and maintain key and non-key forest roads affected by the Project, including:
  - Replacing deteriorated ditch-relief culverts and adding new ones;
  - Replacing deteriorated culverts in streams;
  - Patching paved road surfaces where pavement has slumped or cracked; and
  - Adding rock to some sections to maintain structure integrity.
- Temporarily reopen existing non-key roads and non-system roads; and
- Build new temporary roads.

  These roads would be waterbarred and re-closed or decommissioned after thinning operations are completed. This work would be accomplished as part of the timber-sale contracts.

Proposed actions that restore aquatic conditions:

To restore the health of watersheds and the aquatic ecosystems they contain, the following actions are proposed:

- To improve stream function and reduce stream temperature, large wood would be placed in Canal Creek and its tributaries (Bear, West, Skinner, and East Fork Canal), using helicopter or ground-based equipment;
- To provide cover, create pools, and nurse logs for riparian vegetation that would benefit species such as salmonids and pond turtles, large wood would be placed in the lower Drift Creek sloughs and adjacent floodplains, using helicopter or ground-based equipment;
- To reduce the potential for mass-soil movement, chronic sedimentation, and to remove fish passage barriers associated with roads, some mid-slope and valley-bottom roads would be

decommissioned by removing fill and culverts from stream crossings, building waterbars across roadbeds, and closing road entrances;
- To maintain road investments within available funding levels, some system roads (generally ridge-top roads that do not cross streams) would be waterbarred and closed; and
- To improve the long-term stability of stream shade and speed the development of large wood that could fall into streams, some riparian conifer would be released from competition and some riparian areas would be planted with conifer and hardwoods. This work is in addition to the commercial and noncommercial thinning in nearby plantations that is expected to accelerate the development of large trees adjacent to streams.

Other proposed activities in the Project planning area:

- The US Forest Service acquired land in the lower Drift Creek area in 2003. To access a portion of this land, USFS road 3446-316 would be extended and limited to administrative access. The road extension would involve reconstructing about 1.5 miles of existing road. The road would also access two power-line-support towers managed by the Bonneville Power Administration. Present access to this area requires the use of a County-maintained bridge. This bridge currently has a load restriction of 5 tons.
- To maintain recreation opportunities, access to existing trailheads and the Canal Creek campground will be maintained.

Alternative 3: No New Temporary Roads

To meet the Project needs, this alternative would implement the management actions listed below (map 3).

Plantation treatments and associated actions

To speed the development of late-successional and old-growth forest habitat, to increase forest bio-complexity, and to provide timber from matrix lands, the following actions are proposed (table 2 illustrates the quantities of proposed actions):

- To speed the development of large trees and increase bio-complexity, commercially thin plantations, using skyline, helicopter, and ground-based logging systems;
- To diversify the structure and composition of plantations, create 1/8- to 1-acre gaps in 10 to 30 percent of affected commercially thinned plantations, with most plantations being in the 10 percent range;
- To improve diversity in stands, plant gaps and moderate to heavily thinned stands with shade-tolerant conifers and hardwoods;
- To promote development of nesting cavities in large (greater than 30” DBH) trees, some mature trees in adjacent natural stands would be inoculated or topped;

- To promote development of nesting cavities for over 35 endemic species that use cavities in trees, such as the northern spotted owl and American marten, some trees in plantations would be inoculated or topped;
- To provide habitat for over 40 endemic species that use snags, such as woodpeckers and the northern flying squirrel, some snags would be created in plantations;
- To create habitat for over 20 endemic species that use down wood, such as the ruffed grouse, red-backed vole, and chantrelle mushroom some plantation trees would be felled;
- To improve the quality and diversity of habitat that would benefit over 100 wildlife species, such as the Coopers hawk and Roosevelt elk, portions of some commercially thinned plantations would be under-burned and seeded with native grasses and forbs;
- To reduce the risk of wildfire, residual logging slash would be hand-piled and burned adjacent to key forest roads;
- To maintain stand health and growth of younger plantations, some of these plantations would be non-commercially thinned, using service contracts; and
- To provide habitat for over 100 wildlife species, such as the brush rabbit and western pond turtle, some meadows would be created in 1-acre openings in plantations, and existing meadows would be maintained.

To accomplish the commercial thinning:

- Repair and maintain key and non-key forest roads affected by the Project, including:
  - Replacing deteriorated ditch-relief culverts and adding new ones;
  - Replacing deteriorated culverts in streams;
  - Patching paved road surfaces where pavement has slumped or cracked; and
  - Adding rock to some sections to maintain structure integrity.
- Temporarily reopen existing non-key roads and non-system roads; and
- No new temporary roads would be built.

  These roads would be waterbarred and re-closed or decommissioned after thinning operations are completed. This work would be accomplished as part of the timber-sale contracts.

Proposed actions that restore aquatic conditions:

To restore the health of watersheds and the aquatic ecosystems they contain, the following actions are proposed:

- To improve stream function and reduce stream temperature, large wood would be placed in Canal Creek and its tributaries (Bear, West, Skinner, and East Fork Canal), using helicopter or ground-based equipment;
- To provide cover, create pools, and nurse logs for riparian vegetation that would benefit species such as salmonids and pond turtles, large wood would be placed in the lower Drift Creek sloughs and adjacent floodplains, using helicopter or ground-based equipment;

- To reduce the potential for mass-soil movement, chronic sedimentation, and to remove fish passage barriers associated with roads, some mid-slope and valley-bottom roads would be decommissioned by removing fill and culverts from stream crossings, building waterbars across roadbeds, and closing road entrances;
- To maintain road investments within available funding levels, some system roads (generally ridge-top roads that do not cross streams) would be closed in the watershed by building waterbars and barricading road entrances;
- To improve the long-term stability of stream shade and speed the development of large wood that could fall into streams, some riparian conifer would be released from competition and some riparian areas would be planted with conifer and hardwoods. This work is in addition to the commercial and noncommercial thinning in nearby plantations that is expected to accelerate the development of large trees adjacent to streams.

Other proposed activities in the Project planning area:

- The US Forest Service acquired land in the lower Drift Creek area in 2003. To access a portion of this land, USFS road 3446-316 would be extended and limited to administrative access. The road extension would involve reconstructing about 1.5 miles of existing road. The road would also access two power-line-support towers managed by the Bonneville Power Administration. Present access to this area requires the use of a County-maintained bridge. This bridge currently has a load restriction of 5 tons.
- To maintain recreation opportunities, access to existing trailheads and the Canal Creek campground will be maintained.

Comparison of Alternatives

Key quantitative differences—based on our estimates—of Alternatives 1, 2, and 3 are compared in table 2.

Table 2. Comparing the key quantitative differences of Alternatives 1, 2, and 3

Issue, objective, and outcome	Alternative 1	Alternative 2	Alternative 3
Speed the development of late-successional and old-growth forest habitat, and increase forest bio-complexity:			
Speed development of late-successional and old-growth forest habitat (acres)	0	4,568	4,438
Commercial thinning, skyline logging (acres)	0	4,084	3,745
Commercial thinning, ground-based logging (acres)	0	135	126
Commercial thinning, helicopter logging (acres)	0	349	567
Create gaps in plantations (acres)	0	333	323
Plant trees in created gaps in plantations (acres)	0	129	118

Issue, objective, and outcome	Alternative 1	Alternative 2	Alternative 3
Plant trees in plantations outside of gaps (acres)	0	868	848
Create nesting cavities in mature stands (trees)	0	497	497
Create nesting cavities in plantations (trees)	0	11,265	10,885
Create snags in plantations (trees)	0	11,265	10,885
Create down wood in plantations (trees)	0	26,690	25,633
Under-burn and seed in plantations (acres)	0	733	703
Hand-pile and burn logging slash adjacent to key forest roads	0	97	97
Non-commercially thin younger plantations (acres)	0	238	238
Create meadows in plantations (acres)	0	127	121
Maintain existing meadows (acres)	0	71	66
Non-commercial thinning (acres)	0	34	34
Invasive plant control and monitoring (acres)	0	634	634
Repair and maintain key forest roads (miles)	0	50	50
Repair and maintain non-key forest roads (miles)	0	44	44
Manage roadside vegetation (acres)	0	225	225
Reopen, then close, temporary roads (miles)	0	18.8	17.7
Build, then close, temporary roads (miles)	0	2.3	0
Restore aquatic conditions			
Add large wood to streams in Canal Creek (pieces)	0	500	500
Add large wood to sloughs in Drift Creek (pieces)	0	200	200
Decommission roads (miles)	0	11.1	11.1
Close roads (miles)	0	20.6	20.6
Release riparian conifer from competition in riparian areas (acres)	0	50	50
Plant riparian areas with conifer and hardwoods (acres)	0	100	100
Remove culvert fill and unstable sidecast material from temporary roads (number of sites/cubic yards)	0	5/1,700	5/1,700
Other proposed activities			
Extend road 3446-316 (miles)	0	1.5	1.5
Stand treatments in matrix			
Commercially thin plantations (acres treated/thousand board feet)	0	502/6,275	489/6,112
Timber-sale economics (rounded**)**			
Total timber-sale value (dollars)	0	2,575,490	2,485,570
Costs for mitigation projects (dollars)	0	1,619,570	1,593,340

Issue, objective, and outcome	Alternative 1	Alternative 2	Alternative 3
Costs for enhancement projects (dollars)		2,061,960	2,052,870

Land Allocation Summary

The following land allocation estimates include stands proposed for commercial thinning, roads proposed for repair and maintenance, temporary roads, and roads proposed for decommissioning and closure. Most other actions, such as adding large wood to streams and planting trees in riparian areas are located in riparian reserves.

Alternative 2

- 4,066 acres of stands proposed for commercial thinning are in late-successional (LSR) and riparian reserves (RR), and 502 acres in matrix.
- 17.1 miles of temporarily reopened roads would be located in LSR and RR, 7.7 miles in RR only, and 2.1 miles in matrix.
- 2.2 miles of new temporary roads would be located in LSR and RR, 1.2 miles in RR only, and 0.08 miles in matrix.
- 11.1 miles of roads proposed for decommissioning would be located in LSR and RR; 9 miles in RR only.
- 19.6 miles of roads proposed for closure would be located in LSR and RR; 8 miles in RR only, and about 1 mile in matrix.

Alternative 3

- 3,949 acres of stands proposed for commercial thinning are in late-successional (LSR) and riparian reserves (RR), and 489 acres in matrix.
- 17.1 miles of temporarily reopened roads would be located LSR and RR, 7.6 miles in RR only, and 2 miles in matrix.
- 11.1 miles of roads proposed for decommissioning would be located in LSR and RR; 9 miles in RR only.
- 19.6 miles of roads proposed for closure would be located in LSR and RR; 8 miles in RR only, and about 1 mile in matrix.

What alternatives were developed?

Map 2

Map 2

Map 3

What alternatives were developed?

Chapter 3—What Environmental Effects are Predicted for Each Alternative?

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

Wildlife Habitat and Species, and Forest Stand Conditions
(District Wildlife Biologist and District Silviculturist)

Introduction
The effects of proposed actions on US Forest Service desired conditions or goals for wildlife (USDA 1991, Forest Service Manual 2602; USDA 1990, Siuslaw Forest Plan; and USDA, USDI 1994, Northwest Forest Plan) are described in this section. These goals emphasize maintaining ecosystem diversity (bio-complexity) and productivity by supporting recovery of threatened or endangered species, maintaining species viability, and providing diverse opportunities for esthetic, consumptive, and scientific uses of wildlife.

The effects to these goals from proposed activities are primarily measured by analyzing changes to habitats, because attainment of these species-focused goals is ultimately dependant upon the diversity of habitats needed by animals for their survival. Secondary effects include potential disturbance to individuals during their respective breeding seasons.

The desired future condition in the Project area includes a mix of habitat types at the watershed and stand scales. At the watershed scale, more late-successional forest, dead wood, grass, forb, and shrub habitats are needed (chapter 1). At the stand (plantation) scale, the desired condition is increased bio-complexity, including a mix of conifer and hardwood tree species and sizes, generally healthy and vigorous trees that are variably spaced, dead wood, grasses, forbs, and shrubs.

Currently, wildlife habitat quality is limited in stands, because they include dense, single-story, and small Douglas-fir trees that range from 14 to 58 years old. These trees are declining in growth and health due to competition between trees. Silvicultural treatments would be implemented to increase bio-complexity within stands. The effects of these treatments are based on the project design criteria (appendix A) that have been developed over time from monitoring of past, similar thinning actions and research studies.

The Wildlife Assessment (USFS 2007h) and the Silvicultural Prescription **(**USFS 2007d) for the Project provide the context for this analysis and include additional information about habitat types and species, and forest stand conditions. Species in the project area use several habitats types, including grass, forbs, and shrubs; sapling or pole forest; small forest; mature forest; old growth forest; cave or burrow; cliff or rim; talus; down wood; snag; and riparian.

Alternative 1 (no action)

This alternative is consistent with agency wildlife goals; however, it would retard attainment of these goals, because habitat bio-complexity would remain low for many years. For example, nesting structures for species, such as the northern spotted owl, marbled murrelet, and pileated woodpecker would take much longer to develop, because growth and development of trees in dense plantations would continue to be suppressed. In addition, habitat for species, such as northern spotted owl, woodpeckers, ruffed grouse, brush rabbit, bats, elk, and American marten would remain low and not be improved.

Habitat in plantations would continue to develop, mostly as dense single-storied Douglas-fir monocultures. Trees would continue to grow over time, but attributes of old-growth forest habitat—such as large trees and canopy gaps—would develop at rates slower than natural stands historically achieved old-growth characteristics (Tappeiner et al. 1997).

Individual trees would continue to compete for limited resources, especially light. Trees would grow taller as they strive to obtain sufficient sunlight, but diameter growth would continue to slow in response to loss of crown, resulting in reduced photosynthesis. The trees would remain susceptible to insects, disease, and windthrow, because inter-tree competition would continue to weaken trees.

Inter-tree competition would result in the mortality of the most severely suppressed conifers, and provide snags and eventually down wood. The majority of this dead wood would be small—less than 10 inches in diameter, 60 to 70 feet tall, and 25 to 45 years old.

Because the plantations are predominantly uniform monocultures, opportunities for establishing bio-complexity through natural processes would remain low for many years, minus a major disturbance. Eventually, through mortality and natural disturbances, openings would be created, allowing other conifers and brush species to become established in the understory.

The effects of the no-action alternative are likely to be similar to those 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 Lower Alsea watershed, it does provide a basis for comparing the development of overstocked stands over 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 due to limited light conditions. Although individual tree diameter growth has remained small, height growth has continued, producing tall, spindly trees prone to windthrow. Crown widths and lengths have receded making the trees less vigorous and more prone to effects of insects and disease.

The monitoring results from Siuslaw Thinning and Under-planting Diversity Study (USFS 2007e) indicates the following conditions in un-thinned stands: live crown to bole length and crown ratios are continually dropping, diameters are still increasing but at progressively much slower rates (less than 2.0 inches of DBH growth per decade) than adjacent thinned plots, available understory light remains less

than 5 percent, and understory brush and shrub stocking remain very low (Chen 2006; Stu Johnston, Forest Silviculture Specialist, pers. comm.).

In summary, Alternative 1 (No Action) provides no opportunities to improve attainment of agency wildlife goals at the landscape scale by accelerating the development of complex, old-growth forest conditions, and increasing bio-complexity in young, overstocked monoculture stands. Restoration objectives for habitats of concern would likely be delayed for many decades and may never be reached before a natural disturbance resets the vegetation succession cycle.

Alternatives 2 and 3

Actions that affect wildlife habitat include commercial and non-commercial thinning in plantations, building new temporary roads (Alternative 2 only), temporarily reopening existing roads, repairing and maintaining roads, maintaining meadows, increasing the amount of early seral habitat (grass, forb, and shrub), tree planting and associated brush control (cutting competing brush near planted trees), and dead wood creation.

Alternatives 2 and 3 are expected to have the following effects on wildlife habitats:

- Maximize long-term benefit and minimize short-term detrimental effects to wildlife goals, primarily through application of the project design criteria in appendix A.

- Increase the restoration rate or maintain and restore habitats that are below their natural range of variability in the project area. These habitats (in terrestrial and aquatic areas) are late-successional and old growth forest, grass/forb or shrub, and large dead wood (Alternative 2 would have slightly more acres of benefit to these habitats).

- Hasten recovery of late-successional forest to support recovery of the threatenend northern spotted owl and marbled murrelet, and maintain viability of other associated species.

- Habitat characteristics expected to develop faster, due to these treatments, include larger patches of contiguous late-successional forest on the landscape, large and giant trees (conifers and hardwoods), large dead wood, large limbs, and large cavities in trees.

- Maintain and restore grass, forb, shrub, and dead wood habitats to benefit viability of species associated with these habitats, including the California quail, Rufus hummingbird, wrentit, and woodpeckers; and improve recreation opportunities (e.g., hunting of deer and elk) for people.

- Alternative 2 would generate slightly more revenue from the sale of timber than Alternative 3 (table 3). Therefore, more funds would be available under Alternative 2 for habitat treatments that benefit wildlife, such as creating dead wood, under-burning forests, and improving existing meadows.

Alternatives 2 and 3 are expected to have the following effects on wildlife species:

- Species that depend upon late-successional forest habitat for nesting, such as the northern spotted owl or marbled murrelet, are not expected to have suitable nesting conditions in treated plantations for decades after treatments. However, hastening development of giant trees, large limbs, and large cavities should improve the potential for these rare animals to find suitable nesting structures earlier in treated stands.

- Species associated with grass, forb, shrub, or dead wood habitats should begin benefiting within two to five years after treatments. These species include a number of bird and bat species, brush rabbits, chipmunks, mice, and voles. Animals, such as the northern spotted owl, which prey on some of these species, should benefit from the increase of available prey.

- Species associated with aquatic habitats should benefit from the nearly immediate improvements caused by placing large wood in streams, and from road work that improves water quality and stream connectivity, such as replacing small culverts in streams with larger ones. Benefiting species include fish, Pacific giant salamander, and tailed frog.

- Maintaining open roads provide access for people to use wildlife resources. Although closing some roads could limit these benefits, they can still provide access by foot. Closed roads would be opened periodically to implement projects; during that time, these roads could be used by the public. Key forest roads and some non-key forest roads would continue to provide access to the project area.

- Road actions that improve water quality, thus the quality of aquatic habitat, would improve viability of aquatic wildlife species.

- Both action alternatives would have similar amounts of short-term, adverse effects to habitats and species, because they have similar amounts of treatments. Adverse effects are minor, especially compared to the long-term beneficial effects to species and ecosystem sustainability.

    - Short-term adverse effects are minor for threatened wildlife species, because the amount and type of potential adverse effects determinations from this project are consistent with the current Biological Opinion (BO) and Letter of Concurrence (LOC) from the US Fish and Wildlife Service (Habitat BO and LOC 2007-2008). Consistency is based on implementing the design criteria in appendix A, which ensures that no suitable habitat would be removed and potential adverse effects to these species from project-related disturbance or habitat degradation would be within the limits consulted for the Central Coast Ranger District–ODNRA of the Siuslaw National Forest (Habitat Biological Assessment for 2007-2008).

- Short-term adverse effects are minor for sensitive, survey and manage, management indicator species, and land birds, because the habitat needed by these species that could be impacted is or would be:

    - A common or over-abundant habitat, such as small forest (10 to 20” DBH);
    - A very small amount of habitat that would be affected (less than 1 percent of needed habitat type in the watershed);
    - Slightly degraded, such as felling a few—less than 60—large trees (hazard trees and trees used for guyline anchors) to facilitate safe restoration actions; or
    - Improved through maintenance or restoration actions.

Harvest Plan (Resource Planner)

Skyline, Ground-based, and Helicopter Operations

To facilitate skyline yarding of stands proposed for commercial thinning, Alternative 2 would build about 2.3 miles of temporary road on stable ridge systems and temporarily reopen about 22 miles of system and non-system roads. Building new temporary roads would access about 339 acres and temporarily reopening non-system roads would access about 1,709 acres. Using these roads to access skyline landing sites would also minimize the need for sidehill and downhill yarding, which tend to result in greater damage to residual trees and greater soil disturbance. Additionally, use of these roads would permit landing sites to be located in areas where logs would be yarded away from riparian vegetation buffers, not through them.

Alternatives 2 and 3 would implement ground-based yarding to harvest about 135 and 126 acres, respectively. This logging system would be limited to the dry season, 30 percent or less slopes, areas where streams would not be affected, and use of existing skid roads, where feasible, to minimize effects to soils (appendix A). Most ground-based yarding would occur in stand 504280, where the duff area is relatively deep.

By not building temporary roads, Alternative 3 would require about 218 more acres to be yarded by helicopter, compared to Alternative 2. Based on past experiences by timber sale administrators on the Central Coast Ranger District, helicopter yarding would result in slightly less ground disturbance in stands, a little less damage to residual tree boles, and slightly greater damage to tree canopies, compared to skyline yarding. Due to the lack of helicopter service landings in the northeastern portion of the planning area, about 130 acres would not be accessible to logging under Alternative 3. These acres would be non-commercially thinned, with cut trees left on site.

Without use of new temporary roads, about 225 more acres of sidehill and downhill skyline yarding, and yarding through riparian vegetation may be likely under Alternative 3, compared to Alternative 2.

For safety reasons, loaded helicopter flight paths are prohibited over heavily traveled roads, power lines, and private property (unless permission is granted by the property owner). Under Alternatives 2 and 3, most helicopter service landings and yarding areas would be located at least one mile from residences. There are a few of residences located about ¼-mile from a helicopter service or log landing (involving about 40 acres); most landings would be located at least one mile from residences. Overall, because of distance and topography, operations are expected to have a low potential for noise disturbance to landowners. Because Alternative 3 would require more helicopter yarding than Alternative 2, the potential for disturbance to local landowners would be slightly greater under Alternative 3.

Timber-sale Economics

Under Alternative 2, about 57,233 thousand board feet (MBF) or 130,141 hundred cubic feet (CCF) would be produced. Alternative 3 would produce about 56,813 MBF or 129,140 CCF. A MBF to CCF conversion factor of 2.27 was used for this analysis.

Based on a recent average market rate for small-wood timber sales in Oregon and Washington, which has declined substantially in recent months, the advertised rates for the sale of timber is expected to be about $45 per MBF for Alternative 2 and about $43.75 per MBF for Alternative 3. The advertised rate is the current market rate and includes the minimum amount needed to cover Forest Service expenses associated with planning, sale preparation, and sale administration; logging and associated costs; and the required minimum collection for the National Forest Fund (NFF). The lower advertised rate associated with Alternative 3 reflects the greater dependence on helicopter logging because of limited road access—logging with helicopters costs more than skyline logging. Moreover, under Alternative 3, limited road access and the lack of suitable helicopter service landings would shift some stands (about 130 acres) to the noncommercial-thinning category, reducing timber volume and timber-sale value.

Table 3 summarizes the timber-sale values and collections, based on MBF dollars. The total sale value reflects the estimated advertised rates shown above. Collections; total cost for mitigation actions (such as invasive plant control and road decommissioning) and enhancement actions (such as tree planting, and underburning and seeding), are deducted from the total sale value to obtain the remaining sale value. If there is a positive amount for the remaining sale value, it is sent to the National Treasury.

Table 3: Summary of total sale value and costs for Alternatives 1, 2, and 3

Alternative	Total sale value (MBF)	Minimum NFF collection	Regional, and roads and trails collections	Cost of mitigation actions	Salvage-Sale Fund collection	Cost of enhancement actions	Remaining sale value
Alt. 1	0	0	0	0	0	0	0
Alt. 2	$2,575,485	$14,308	$901,420	$1,619,570	$683,090	$2,061,960	$-2,704,863
Alt. 3	$2,485,569	$14,204	$869,949	$1,593,340	$678,060	$2,052,870	$-2,722,854

Based on the current market conditions, Alternatives 2 and 3 would provide sale values sufficient to cover the National Forest Fund collection, Regional and roads and trails collections, and costs associated with

mitigation actions. However, current sale values would not cover the salvage sale fund collection or the costs associated with enhancement actions**.** The lesser sale value associated with Alternative 3 is due to the fewer acres that would be commercially thinned and the greater dependence on helicopter yarding.

About 35 to 40 percent of the sales on the Central Coast Ranger District are sold at the advertised rate. However, there are many variables that influence the value of timber at the time of sale, including market conditions (which are currently very low), competition during bids for timber sales, the type of timber-sale contract used (e.g., stewardship contract), and flexibility in the seasons of operations—any of these could cause bids for timber-sale contracts to rise above advertised rates.

Market values of timber are expected to increase in the future, when timber sales under this project are sold within the next 5 years. At that time, sale values generated by both alternatives may provide positive remaining sale values.

Proposed, Endangered, Threatened and Sensitive Plants (Forest Botanist)

The project area, and proposed activities and their potential effects were evaluated by the Forest Botanist, following Forest Service policy for proposed, endangered, threatened and sensitive (PETS) plants (Forest Service Manual 2671; 2007b). Alternative 1 (no action) would have no effect on these species.

At project initiation, two PETS plants were documented in the project area: the lichen *Pannaria rubiginosa*, and *Phaeocollybia pseudofestiva*, a fungi. A pre-field review of the project area determined that, in addition to the two known species, there is potential PETS species habitat for one (1) vascular plant, two (2) bryophyte, seven (7) lichen and 12 fungi species.

A field survey, designed to detect the presence of these species, located two sites of Methuselah's beard (*Usnea longissima*), and one site of jelly skin (*Leptogium brebissonii*), both PETS lichen species. No attempt was made to relocate the lichen and fungi sites previously documented from the project area, because they are in an area that would not be affected by the project. The survey was not able to determine the presence or absence of the twelve fungi species that have potential habitat, because they do not reliably fruit every year; therefore, it is assumed that these species are present in the project area.

Alternatives 2 and 3 would have the following effects on lichens:

- Proposed activities under the action alternatives would impact individuals and habitat of Methuselah's beard, but would not lead to a trend toward federal listing as threatened or endangered, because it is estimated that greater than 90 percent of the individuals in the project area occur within mature stands, where no project activities are proposed.

- The jelly skin lichen was located on a recently windthrown tree, where its chances of long-term survival were unknown. A return visit to the site two months after it was located did not find any trace of the lichen and it is assumed to no longer be there. Therefore, the proposed project would not impact this species under any of the alternatives.

Several fungi species have potential habitat in the project area and are associated with conifers, either occurring on the roots as symbiotic mycorrhizae, or growing in soil under conifer trees. Alternatives 2 and 3 would have the following effects:

- Threats to these species include the removal of host trees, and soil disturbance and compaction. Design criteria for the project that prescribes retaining an average of 40 to 80 trees per acre in commercially thinned stands would leave sufficient host trees for their persistence.

- The conversion of forest to meadow habitat would result in the removal of all host trees and the mycorrhizal fungi that depend on them, but affected areas would be a small percentage of the acres proposed for commercial thinning; therefore, effects would be minor and would not lead to a trend toward federal listing.

- Most detrimental soil disturbance would occur on temporary roads under both action alternatives. Because these areas are very small, compared to the plantations they access, effects on fungi would not lead to a trend toward federal listing.

Northwest Forest Plan Survey and Manage Botanical Species (Forest Botanist)

On July 24, 2007, the Under Secretary of the Department of Agriculture signed a new Survey and Manage Record of Decision that removed the survey and manage requirements from all of the National Forests' land and resource management plans (LRMPs) within the range of the northern spotted owl. However, the court—in *Northwest Ecosystem Alliance et al v. Mark Rey et al, Civ. No. 04-844, Western District of Washington*—has not yet granted the government's motion to lift the modified October 11, 2006 injunction. Therefore, the West Alsea Landscape Management Project has been designed to be consistent with the 2001 Survey and Manage ROD, as modified by subsequent annual species reviews; and as allowed by the modified October 11, 2006 injunction (USFS 2007a).

A pre-field review of the project area did not find any known sites for survey and manage botanical species. Five lichen and two bryophyte species do have potential habitat in the project area that proposed activities could impact. A survey conducted in 2007 detected two sites of the Cape Perpetua specklebelly (*Pseudocyphellaria perpetua*), a survey and manage lichen species, in a stand proposed for commercial thinning. A no-cut buffer would be implemented around each site sufficient to allow the species to persist (appendix A).

Invasive Plants (Forest Botanist)

Based on information gathered from a summer 2007 invasive plant survey, 50 non-native plant species are established in the project area, 44 of which are considered to be invasive including nine classified as Noxious Weeds by the Oregon Department of Agriculture. The West Alsea Invasive Plant Risk Assessment (USFS 2007c) contains a complete list of non-native species in the project area.

Invasive species established in the project area that are classified as noxious and require remedial action to prevent further spread include: English ivy (*Hedera helix*), bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), giant knotweed (*Polygonum sachalinense*), Himalaya blackberry (*Rubus armeniacus*), Scotch broom (*Cytisus scoparius*), St. John's-wort (*Hypericum perforatum*) and tansy ragwort (*Senecio jacobaea*).

Nine other species that are not classified as noxious, but considered to be highly invasive, would be managed in the same way as noxious weeds. They include cherry laurel (*Prunus laurocerasus*), English holly (*Ilex aquifolium*), Australian burnweed (*Erechtites minima*), cut-leaf geranium (*Geranium columbinum*), common tansy (*Tanacetum vulgare*), hedgemustard (*Sisymbrium officinale*), herb Robert (*Geranium robertianum*), honeysuckle (*Lonicera* sp.) and may-weed (*Tripleurospermum maritima*).

Alternative 1 is expected to maintain current weed infestation levels in the foreseeable future.

Alternatives 2 and 3 would have the following effects:

- Ground-disturbing activities that result in exposed mineral soil on sites with moderate to full sunlight exposure greatly increase the potential for colonization and establishment by invasive plants, including noxious weeds.

- Some invasive plants in the project area are considered to be naturalized in western Oregon and are commonly found along roads, in areas of soil disturbance, and in other waste areas. These species would continue to persist and are expected to colonize at least some of the disturbed sites under the action alternatives.

- The action alternatives would pose a high risk for introducing and spreading invasive plants, because proposed thinning and ground disturbing activities are in close proximity to known infested sites, seed sources, and vectors.

- Stands accessed by road systems that support populations of invasive plants are at a greater risk of colonization and establishment.

- Decommissioning roads generally reduces the potential for 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.

Preventive measures identified in appendix A are expected to provide adequate resistance to the introduction of noxious weeds not currently established in the project area. These measures would also reduce the risk of established weed species spreading beyond their current boundaries.

For stands that have infestations within or in close proximity to the stand, remedial treatment, in addition to preventive measures, would be prescribed.

An "early treatment" vegetation management strategy would be implemented near high-risk stands, using manual and mechanical treatment methods. The objective of these treatments is to try and deplete the amount of seed in the soil seed bank and reduce the area occupied by invasive plants prior to project implementation.

In summary, by following preventive measures in appendix A and completing remedial treatments, the risk of noxious weed infestation on disturbed areas under the action alternatives 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 in thinned stands.

Soils and Water Quality (District Hydrologist)

Plantation Treatments and Associated Actions

Sediment Production

Sediment is fine and coarse geologic material as well as large wood added to streams through processes such as windthrow, mass wasting, surface soil erosion, and stream bank erosion. The Northwest Forest Plan Aquatic Conservation Strategy objectives include “5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include timing, volume, rate, character of the sediment, storage and transport.”

The desired future condition for sediment in the project area includes large trees in sediment source areas, such as unstable slopes and riparian areas; minimal chronic sources of fine sediments that increase turbidity of streams, such as stream-adjacent roads, road-stream crossings, and bare soil next to streams; few barriers to sediment movement at road-stream crossings due to culverts; and low risk of mass wasting from roads, from unstable sidecast fills, and fills over culverts (USFS 1999a).

The Lower Alsea River Watershed Analysis (USFS 1999a), stream surveys, and field reviews indicate that sand and silt in streams may be slightly elevated from historic conditions in Lower Alsea River watershed. No quantitative data exist on turbidity for streams in the project area. Large trees on unstable slopes and riparian areas provide large wood that can enter streams. Some source areas in the West Alsea planning area were previously logged, reducing the size and effectiveness of wood delivered to streams.

The watershed analysis identified the existing road system as the primary risk for sedimentation of streams. Unpaved stream-adjacent roads, such as FS road 5359 near Eckman Creek, are chronic sources

of fine sediment. Mid-slope roads, such as FS road 3484 above Risley Creek, often contain plugged or partially plugged culverts, culverts that are too small to pass sediment and wood, and failing sidecast material—all of which are potential sources of fine sediment.

The following effects on sediment production are based on the implementation of the design criteria for this project (appendix A). Field observations conducted for this project—and observations of completed similar actions from other past, similar projects—indicate that the design criteria, such as using organic material on excavated slopes where culverts and fill material area removed, would limit the creation of additional sediment that can enter streams to acceptable levels. Past observations also indicate that vegetation becomes established on disturbed sites within two years after implementation of actions, resulting in reductions in chronic sedimentation in the long term. Therefore, actions proposed by Alternatives 2 and 3 are expected to result in similar outcomes.

Alternative 1 (no action)

- No road maintenance and repair would be implemented outside of periodic roadside brushing and surface grading. Consequently, the potential for sediment to enter streams from roads near streams would increase over time.

- Undersized culverts would continue to function as barriers to organic material (trees) and coarse sediment (rock and gravels) that could enter streams. This material benefits hydrology by restoring natural sediment processes.

- Chronic sedimentation of streams from erosion or potential mass wasting of soils from mid-slope or valley-bottom roads would continue.

- Bare soil areas beneath older plantations with dense tree canopies would continue to undergo minor, localized columnar and rill erosion, resulting in potential minor sedimentation of streams until canopies open and allow vegetation to become established on the ground.

- Existing conditions that affect municipal and domestic-use water systems would remain unchanged.

Alternatives 2 and 3

- Skyline yarding can cause minor soil displacement and compaction, especially near landings, in yarding corridors, and in areas of sidehill and downhill yarding. However, field observations indicate that fine sediment generated by skyline yarding (less so for helicopter yarding) is not likely to enter streams or is not measurable.

- Ground-based yarding restrictions—such as limiting yarding to the dry season, designating turnroads, and limiting operations to slopes 30 percent or less—would not result in sedimentation of streams.

- Building new temporary roads would not introduce sediment to streams because the locations of these roads would be limited to stable ridge systems.
- Temporarily reopening roads may cause immeasurable amounts of sediment at locations where roads cross streams until vegetation becomes reestablished in road prisms in about three years.
- Unstable sidecast material, comprised primarily of fine sediment, would be removed from non-system roads and deposited in stable areas. This would eliminate the potential for this material to enter streams.
- Road repair and maintenance would minimize sediment produced from roads by improving road surface drainage and preventing potential mass wasting from roads due to culvert failure.
- Managing vegetation adjacent to forest roads can displace soil during yarding, but areas of disturbance are generally limited to the road corridor. Design criteria, such as trapping sediment before it enters streams, would result in minor adverse effects to water quality. Vegetation would occupy the disturbed sites in two years, resulting in short-term effects.
- Removing or replacing culverts would increase sources of sedimentation in the short term, but would decrease these effects to below that of existing conditions in the long term.
- Use of system roads during the wet season, especially from log hauling, can introduce fine sediment to streams at road-stream crossings. Monitoring the roads would be done during the wet season to determine if measures are needed to reduce sedimentation of streams.
- Waterbarring and closing roads after use would reduce the potential for roads becoming a chronic source of fine sediment.
- Creating snags and down wood, non-commercial thinning, planting trees, maintaining meadows, and creating early seral habitat in plantations by burning is not expected to create measurable amounts of sediment that could enter streams because soil disturbance would be minor, localized, short term, and at least 50’ from streams.
- Non-commercial thinning would speed the development of residual trees into large wood that could enter streams in the future. Large wood benefits stream hydrology by dispersing energy during high flows and connecting streams to their floodplains.
- Based on project design criteria and distance between action sites and water diversion sites, Alternatives 2 and 3 are not expected to increase turbidity for municipal and domestic-use water systems.

Soil Productivity

The desired future condition for the planning area is to improve soil productivity (FSM 2550.3) or prevent future loss of soil productivity through erosion (USFS 1990). Actions that prevent erosion, such as decommissioning roads, allow natural processes to improve soil productivity in the long term.

Soil productivity in the planning area has been affected by a number of human actions, including compaction and soil displacement from road construction, timber harvesting, and homesteading; loss of organic material due to soil displacement, or loss of down wood sources; and erosion due to road or landing drainage problems. No indications of heavily burned soils were observed in the planning area.

Detrimental soil conditions currently observed in each plantation are generally much less than 15 percent. However, three stands in the Lower Drift Creek Restoration area (503162, 503166, 503172) were all thoroughly compacted by past agricultural activities, and are all considered to be compacted over 100 percent of the area (about 28 acres). Siuslaw Forest Plan standards and guidelines state: "Do not allow the total acreage of all detrimental soil conditions to exceed 15% of the total National Forest Land within each harvest unit, excluding roads and landings" (USFS 1990; D-11).

Effects to soil productivity were analyzed using Pacific Northwest Regional advice contained in "Preparing Soil Resource Analyses for Inclusion in NEPA Documents" (USFS 2002d), and are based on the implementation of the design criteria for this project (appendix A). Field observations conducted for this project—and observations of the results from other past, similar projects—indicate that the design criteria are sufficient to protect soil productivity. Detrimental soil conditions of past, similar projects were kept well under the 15 percent threshold, and adverse effects to soil productivity were limited to being minor and short-term. Past observations also indicate that long-term beneficial effects to soil productivity resulted within two years after actions were implemented, as natural processes recovered and vegetation became established on disturbed sites. Therefore, activities proposed by Alternatives 2 and 3 are expected to provide similar outcomes.

Alternative 1 (no action)

- No additional soil compaction or displacement would occur, outside of those associated with road maintenance and repair.
- Outside of removing windthrown or hazard trees from road corridors, no organic material would be removed from any plantation.
- Chronic erosion or potential mass wasting of soils from mid-slope or valley-bottom roads would not be addressed through road repair or decommissioning.
- Bare soil areas beneath older plantations with dense tree canopies would continue to undergo minor, localized columnar and rill erosion until canopies open and allow vegetation to become established on the ground.

Alternatives 2 and 3

- Skyline yarding would cause minor soil displacement and compaction, especially near landings, in yarding corridors, and in sidehill and downhill yarding areas.

- Helicopter yarding would cause less impact to soil productivity than skyline yarding, because logs would be lifted off the ground.

- Ground-based yarding restrictions—such as limiting yarding to the dry season, designating skid roads, and limiting operations to slopes 30 percent or less (appendix A)—would reduce soil displacement and compaction, resulting in minor adverse effects to soil productivity.

- Residual trees, retaining tree tops and limbs on the ground, the development of understory vegetation, and the creation of dead wood (snags and down wood) in commercially thinned plantations would maintain sufficient sources of organic material for long-term soil productivity.

- Thinning operations for the three stands in the Lower Drift Creek Restoration area (503162, 503166, 503172) would be limited to the dry season to minimize short-term adverse effects. Residual thinning slash and the development of understory vegetation would benefit soil productivity in these stands in the long term.

- New temporary roads would compact or displace about 3.3 acres of soil under Alternative 2. Loss of soil productivity from these roads would be substantially less than 15 percent of each unit.

  - To minimize the depth and extent of soil compaction on about 1.3 acres, use of new temporary roads would be limited to the dry season, where road length generally exceeds 400 feet. Loss of soil productivity due to compaction is typically restricted to the wheel tracks on dry-season roads.

  - To provide a mix of operating seasons, wet-season use of new temporary roads would generally be limited to roads that are less than 400 feet, affecting about 2 acres. In these areas, the depth, extent, and duration of soil compaction would be greater than that expected for dry-season use.

- Temporarily reopening roads would restart the soil recovery process or create new areas of displacement and compaction, where minor road realignment would be done to avoid problem areas.

- Road maintenance and repair would substantially reduce the potential for mass wasting and erosion, because poorly functioning culverts would be replaced and unstable sites stabilized.

- Managing vegetation adjacent to key forest roads can displace soil during yarding, but areas of disturbance are generally limited to previously disturbed ground, resulting in minor adverse effects to soil productivity.

- Removing two road-stream crossings (stands 504170 and 504280A) and unstable sidecast (about 2,200 cubic yards) from temporary roads would reduce sources of soil erosion in the short term and long term.

- Non-commercial or pre-commercial thinning would substantially enhance soil productivity on at least 238 acres, because felled trees would not be removed.

- Planting trees in commercially thinned plantations and riparian areas would displace soil to a minor extent at planting sites, resulting in minor and short-term adverse effects to soil productivity. Planted trees that survive would provide a long-term source of organic material for soil productivity.

- Maintaining meadows by mowing would result in minor soil compaction and displacement.

- Burning prescriptions—to treat thinning slash and to maintain or create meadows in some commercially thinned plantations—would be designed to avoid adverse impacts to soil productivity.

Water Quality—Temperature

The desired future condition for the planning area is to de-list any streams that are listed as water quality limited for stream temperature in the Oregon Department of Environmental Quality's 2004/2006 Integrated Report (DEQ 2007). All streams should produce clean, cool water consistent with their natural thermal potential (OAR 340-041-0028).

The West Alsea planning area includes two streams listed as water quality limited for summer stream temperature. These are portions of Drift Creek and the Alsea River, upstream of tidal influence. The Lower Alsea River/Drift Creek Water Quality Restoration Plan (USFS 2006b) outlines the many variables (topographic and vegetative shade, air temperature, flow, channel morphology, groundwater inflows, geology, etc.) that interact to determine stream temperatures. The Plan suggests that summer stream temperatures can be reduced by riparian planting (improves stream shade) and placing large wood in streams (increases storage of channel sediment and ground water).

Riparian areas are important for maintaining cool summer stream temperatures, since riparian areas provide shade. The width of riparian areas needed to provide shade varies depending on stream size, aspect, and topography, but 12 to 60 feet is generally needed to provide primary shade to streams (USDA, USDI 2003).

The following effects on water quality are based on the implementation of the design criteria for this project (appendix A). Field observations conducted for this project—and observations of results from other past, similar projects—indicate that the design criteria, such as maintaining no-cut buffers adjacent to streams, would maintain sufficient shade to streams. Past observations also indicate that vegetation

quickly becomes established in thinned plantations on disturbed sites within two years after thinning, resulting in additional shading of streams in the long term. Therefore, actions proposed by Alternatives 2 and 3 are expected to result in similar outcomes.

Alternative 1 (no action)

- Existing riparian and stream-channel conditions would be maintained; no changes in stream temperature would be expected in the short term.

- Long-term reductions in stream temperature are expected as trees continue to grow and provide additional shade, particularly to wider streams; shrubs slowly begin to develop in plantations over time; and trees fall into streams to increase storage of ground water.

- Trees would be allowed to naturally encroach in existing meadows, increasing stream shade and large woody debris sources over the long term. Invasive weeds exist in these meadows and would likely slow the rate of tree encroachment.

Alternatives 2 and 3

- Many researchers suggest using variable width buffers, like that planned for the Project would provide sufficient shade to streams (USDA, USDI, et al.,1993; Spence et al., 1996; IMST 1999). Chan et al. (2004) did not detect any change in western Oregon streambed temperatures, where stands were thinned to 40 trees per acre, variable width no-cut buffers were implemented, and buffer widths were less than 25 feet wide. Wilkerson, et al. (2006) found no change in mean weekly maximum stream temperature for headwater streams with 23 m (75 ft) no-cut buffers adjacent to partial cuts; and minor, not significant increases with 11 m (35 ft) no-cut buffers adjacent to clear cuts.

- Existing stream temperatures in and adjacent to plantations that would be thinned (commercially and non-commercially) would be maintained by retaining the first two rows of conifer adjacent to streams and by retaining greater than 50 percent canopy cover (Chan et al., 2004) adjacent to these two conifer rows. Measurements of similarly designed buffers on the Siuslaw National Forest found that these buffers provide about 80 percent canopy cover over streams.

- Before and after monitoring of stream temperature from two sites in the Big Blue Project in the Cape Creek watershed (USFS 1996)—which used similar design criteria as the West Alsea Project—has found no increase in stream temperature after harvest.

- The logging plan and operational restrictions in timber sale contracts would be designed to limit impacts on riparian vegetation and prevent increases in stream temperature (appendix A).

- Reopening roads, removal of culverts, and unstable sidecast removal may remove trees that provide some shade to streams. Shade reductions would be minor and short term because roads are generally less than 20 feet wide and generally at least 100 feet from streams, and residual tree

crowns adjacent to roads would respond to the additional light and continue to grow laterally and vertically, providing additional shade over time.

- Managing vegetation adjacent to key forest roads can create small openings in the canopy where roads cross streams. Residual tree crowns would close the small openings in a few years. Therefore, no measurable increases in stream temperature are expected from these actions.

- Non-commercial thinning would result in minor and short-term decreases in shading near riparian areas, which would not likely measurably increase stream temperatures. Chan, et al. (2006) found that thinned overstory in Oregon Coast Range thinning stands began to close rapidly the third year after thinning. Stands thinned to as few as 56 trees per acre had less than 20 percent skylight (greater than 80 percent canopy closure) after 8 years. Effective shade (which includes stream aspect, topography, and other factors as well as canopy closure) greater than 80 percent does not increase stream temperature. Growth of residual trees and shrubs would also enhance stream shading in the long term.

- Creating snags and down wood (dead wood) in commercially thinned plantations and riparian areas may create small breaks in tree canopies near streams. Because dead wood clumps would be located at least 100 feet from perennial streams, widely spaced, scattered, and small in size, these actions are not expected to measurably increase stream temperatures (appendix A).

- Maintaining existing meadows would be designed to prevent reductions in stream shade. Therefore, no effects to stream temperature are expected from this action.

Aquatic Restoration Actions

Sediment

Alternative 1 (no action)

- Existing road conditions would not change, increasing the risk of chronic sedimentation of streams from erosion due to an inadequately maintained road drainage network.

- Periodic pulse sedimentation of streams may occur due to deteriorating and collapsing in-stream culverts or undersized in-stream culverts.

- Sedimentation quantities associated with poorly maintained roads would adversely affect water quality.

- Undersized culverts would continue to limit natural processes by potentially obstructing the quantity and quality of coarse sediment and large wood that could be transported to lower stream reaches.

Alternatives 2 and 3

- Decommissioning roads would reduce fine sediment production from road surfaces, remove barriers (culverts) to allow natural movement of large wood and coarse sediment, and allow vegetation to grow on road prisms. Thus, these actions would benefit water quality and soil productivity in the long term.

- Minor, short-term sediment may likely be produced at sites where culverts are removed or replaced during implementation. Minor sedimentation would be expected to continue at these sites for about two years after implementation, when vegetation colonizes exposed slopes.

- Decommissioning and closing roads would eliminate traffic-caused sedimentation where roads are near streams or cross streams.

- Where fill material and culverts are removed from roads, the potential for mass wasting from fill failure that results in erosion of productive soils would be eliminated.

Water Quality-Temperature

Alternative 1 (no action)

- Existing vegetative conditions would be maintained adjacent to forest roads, with no effects to stream shade.

- The opportunity for increasing long-term stream shade in areas where roads are decommissioned would not occur.

Alternatives 2 and 3

- Decommissioning roads (e.g., removing culverts and fill material), closing forest roads, repairing and maintaining forest roads (e.g., replacing culverts), and falling alder to create small openings for placing large wood in Canal Creek may remove trees adjacent to streams. No measurable increases in stream temperatures would be expected because few trees would be removed at each site and residual trees would provide sufficient shade.

- Long-term increases in stream shade are expected in areas where roads are decommissioned because vegetation, including trees, would be allowed to grow in affected road prisms.

Water quality—Dissolved oxygen and fecal coliforms

The desired future condition for the planning area is to de-list any streams that are listed as water quality limited for reduced dissolved oxygen and increased fecal coliforms by the Oregon Department of Environmental Quality under the Clean Water Act (DEQ 2004). All streams should produce clean water (OAR 340-041-0028).

In the West Alsea planning area, the Alsea River is listed as water quality limited for reduced dissolved oxygen from river mile (RM) 4.9 to RM 31.9, and increased fecal coliforms from RM 10.0 to the mouth. The Lower Alsea River/Drift Creek Water Quality Restoration Plan (WQRP) (USFS 2006b) indicates that

cool, well-oxygenated water flowing from streams off National Forest System lands supports increased dissolved oxygen in the Alsea River. Similarly, clean water flowing off National Forest System lands contribute to dilution of waters with higher concentrations of fecal coliforms.

Alternative 1 would not change the existing conditions.

No new actions designed specifically to protect or improve factors affecting dissolved oxygen or fecal coliforms are recommended in the WQRP. Proposed actions under Alternatives 2 and 3, such as treating roads and stands, and placing large wood in streams to improve summer stream temperature are recommended in the WQRP. These actions are expected to have beneficial effects on these conditions.

Aquatic Habitat and Species (District Fish Biologist)

The effects to fish species and their habitat are based on the information contained in the West Alsea Landscape Management Fisheries Biological Assessment (USFS 2007f) and the project design criteria (appendix A).

Plantation Treatments and Associated Actions

Large wood production—Alternatives 1, 2, and 3

The desired future condition for aquatic habitat in the planning area would include an abundance of large-sized (at least 24 inches in diameter and at least 200 feet in height) conifer in riparian areas, and an abundance of down wood on floodplains and in stream channels.

Large wood benefits salmonids by creating deep pools for cool-water refugia and rearing habitat in the summer; providing slack-water refugia in stream channels and on floodplains during winter high flows for fish and other aquatic species; and by collecting and storing nutrients and sediment, including gravel required for spawning habitat.

Properly functioning streams contain at least 32 (OWEB 1999) to 80 (USDC 1996, PFMC 1999) pieces of large wood (greater than 24 inches in diameter and longer than bank-full width) per mile. Stream surveys in the West Alsea area found that Southworth, Sudan and Arnold Creeks have 20 to 25 pieces per mile, while Canal Creek has less than 2 pieces per mile. Past clear-cut harvesting has replaced large-diameter trees on about 10,000 acres in the planning area with small-diameter trees, such as those proposed for thinning under Alternatives 2 and 3 (USFS 1999a). This conversion to smaller trees has substantially reduced the availability of large-diameter trees adjacent to stream channels. This has contributed to the low abundance of large wood pieces in stream channels and on floodplains in the West Alsea area.

Alternative 1 would maintain existing dense conifer in plantations. The conifer would be left to develop at a natural rate, taking about 50 years longer to obtain an average stand diameter of 24 inches in diameter at

breast height (DBH), compared to thinned plantations. Thus without thinning, the low abundance of large wood in streams and floodplains would remain for several decades.

Proposed thinning treatments under Alternatives 2 and 3 would affect only about two percent of the area within 100 feet of salmonid habitat. It would result in trees obtaining 24-inch diameters about 50 years sooner in riparian areas, compared to no thinning.

Thinning under Alternatives 2 and 3 has the potential to remove trees that could fall into a stream; however, most existing trees that have the potential to be recruited to fish-bearing stream channels and floodplains would be maintained with no-cut buffers (appendix A). On fish-bearing streams over a 100-year period, thinning would result in the potential recruitment loss of about 10 to 20 trees per acre. No-cut buffers would retain about 100 trees per acre between each thinning unit and stream. After thinning, fish-bearing riparian areas would have about five times more trees (>21 inch DBH) per acre than mature natural stands. Thus, loss of wood recruitment over a 100-year period would not be substantial.

In the long term, large wood would increase more rapidly after thinning, moving aquatic habitat towards the desired condition sooner, than with no plantation treatments. Therefore, salmonid habitat is expected to improve in the long term.

Aquatic Restoration Actions

Sediment—Alternatives 1, 2, and 3

Alternative 1 would maintain the existing road drainage network. Existing conditions chronically add fine sediment to streams, with periodic pulses of sediment, due largely to road culvert and sidecast failure. These conditions affect the timing, type, and quantity of sediment that occurs in the planning area, by accelerating entry of fine sediment into streams above natural levels. Too much fine sediment, deposited in a constricted time frame, can reduce survival of fish eggs and fry, reduce aquatic invertebrate abundance and diversity that may affect fish forage, and fill pools needed for juvenile rearing and adult holding habitat (Naiman and Bilby 1998).

Under Alternatives 2 and 3, culverts would be removed from roads proposed for decommissioning, or replaced in forest-system roads to address the existing drainage problems in the planning area. In the short term, removing or replacing culverts on perennial streams has the potential to increase turbidity (fine sediment) through the disturbance of stream-channel beds, and through effects of rainfall on disturbed fill slopes. Effects are generally limited to the period from initial activity through the first few rainfall events. Most perennial streams affected by culvert work have very small drainage areas and are several hundred feet upstream of salmonid habitat. Observations of this type of culvert work on the Siuslaw National Forest indicate that turbidity is rarely transmitted more than a few hundred feet downstream.

A few minor, short-term turbidity pulses are expected in salmonid habitat at culvert-replacement/removal sites. Turbidity increases from these sites may be large enough to temporarily redistribute salmonids for a

few hundred feet, as they either avoid the increase or move into it to feed on drifting invertebrates. Salmonids would resume a more natural distribution as turbidity decreases. Based on monitoring of similar projects on the Siuslaw National Forest, turbidity increases would be largest at the work site, last for a few minutes, and quickly decrease in magnitude as it moves downstream. Therefore, effects to fish-rearing habitat and fish distribution at these sites would be minor and short-term.

Prior to implementing work at culvert work sites in salmonid habitat, fish and other aquatic species would be removed from the sites and placed in adjacent areas upstream and downstream of the work sites. Devices would be installed upstream and downstream of the sites primarily to prevent fish from re-entering the work areas until culvert installation is completed. Handling of aquatic species may result in physiological stress, scale removal (fish), increased risk of secondary infection, and other miscellaneous injury during capture. Captured individuals released into adjacent habitats may temporarily overcrowd other fish in these areas, until the construction barriers are removed and the fish are allowed to redistribute into the construction site.

Actions designed to replace and remove culverts would improve salmonid spawning and rearing habitat in the long term, as road drainages improve and the potential for culvert failure is reduced. Adding ditch-relief culverts would more efficiently remove surface water from the road system, reducing the road drainage network and allowing sediment to filter onto stable, vegetated slopes.

Physical barriers—Alternatives 1, 2, and 3

The desired future condition for the planning area would be the elimination of any human-caused physical barriers (e.g., poorly functioning road culverts), to the migration of fish and other aquatic organisms.

Alternative 1 would maintain existing barriers to upstream fish passage. These barriers affect about 1.1 miles of coho, steelhead, and cutthroat habitat.

Alternative 2 and 3 would remove or replace fish passage barriers, allowing fish to migrate upstream. Barriers caused by culverts in tributaries to Eckman Creek, Risley Creek, Slide Creek and the Alsea River would be replaced with properly functioning culverts. Also, two other barriers caused by culverts on tributaries to Eckman Creek would be removed during road decommissioning. These actions would benefit coho, steelhead, and cutthroat in the long term by making about 1.1 miles of additional spawning and rearing habitat available.

As much as 50 to 100 cubic yards of graded streambed-simulation rock may need to be added to some of the new fish-passage culverts and to areas immediately downstream from them. This rock would create a stable gradient for fish passage through each culvert. Rock input into salmonid habitat would kill small numbers of salmonid forage species, aquatic invertebrates, and reduce the availability of these species where the rock is placed (about 200 feet per site). This may reduce the abundance of salmonids rearing in these areas until aquatic invertebrates re-colonize affected sites in a few months, following the installations. Therefore, impacts to affected species are expected to be minor and short-term.

Large wood

Large wood (including rootwads) and boulders were placed in a three-mile reach of Canal Creek in the late 1980's and the early 1990's, and were designed to stay in place by anchoring the structures with cable and rebar. Periodic monitoring of the placement sites has revealed that fish habitat is improving, as spawning gravels accumulate over bedrock reaches.

Despite anchoring, some large-wood pieces have moved downstream because of their short length relative to stream width The function of the pieces that have moved downstream is not known, but based on past monitoring, they are likely enhancing aquatic and riparian habitats where they deposited, considering the low abundance of large wood throughout the watershed. Alternatives 2 and 3 would use long pieces of large wood to minimize potential movement (appendix A).

The fish population responses to the restoration work has not been determined, but other large-wood placement projects in other nearby watersheds have documented increases in rearing densities (Nickelson et al 1992; USFS 2006c) and freshwater survival (Solazzi et al 2000; Johnson et al 2005).

The Lower Alsea Watershed Analysis (USDA 1999a) indicates that existing fish habitat and riparian conditions lack quality and that large woody debris was removed from several streams throughout the watershed. Most Oregon coastal streams have been identified as limited in winter-rearing habitat for salmonids (Nickelson et al 1992). Key components of quality habitat include slack-water refuges during high flows for freshwater salmonid survival, food availability, and sediment storage capacity.

Alternative 1 (no action)

- Alternative 1 maintains the existing habitat conditions, large wood recruitment rates, and riparian succession in the project area, resulting in a much slower recovery rate for fish habitat than under the action alternatives.

- The streams are below NOAA Fisheries minimum levels of 80 pieces of large wood per mile; thus, they are not considered to be properly functioning for this habitat component.

- Since they contain less than 32 pieces of large wood per mile, the Oregon Watershed Enhancement Board (OWEB) considers them to be depleted of large wood.

- Some areas would continue to degrade before they begin to recover, because it would be decades before large trees develop and become sources of large wood that can be recruited into the streams.

- The current riparian area of alder and some small conifer would add an occasional piece of small wood to streams. Small wood (generally less than 24 inches in diameter) influences fish habitat development, but not as much as large wood, because small wood is more easily moved during

high flows and deteriorates more quickly. Currently, small trees are much more abundant in riparian areas than large trees.

- The low abundance of conifer in riparian areas would persist for a longer time period without riparian plantings and understory conifer release.

Alternatives 2 and 3

Large wood would be placed in Canal Creek and its major tributaries, and in the slough channels in lower Drift watershed (table 2). A few alder may be felled at a few sites with dense alder canopies over Canal Creek to facilitate precise placement of large wood. The sizes of the openings are expected to be very small and widely dispersed, thus preventing increases in stream temperature. Large wood—generally greater than 24 inches in diameter and longer than bank-full width (OWEB 1999)—is an essential habitat element for fish and helps to create quality fish habitat by:

- Creating deep pools with abundant cover and backwater areas for fish. This increases winter and summer rearing habitat for salmonids by providing more physical space and greater habitat diversity (Dolloff 1994);

- Improving long-term sediment-retention capability of the stream (Flitcroft et al. 2002; Montgomery et al. 1996; Nakamura and Swanson 1992; Jeffries et al. 2003). Trapping, sorting, and storing gravels (sediment) are required for spawning habitat;

- Creating deep sediment deposits, providing more stable spawning gravels during high flows, thus increasing egg-to-fry survival. Canal Creek and its tributaries, where large-wood additions are proposed, are either scoured to bedrock, or they have a thin layer of sediment over the bedrock that is easily eroded during high flows;

- Providing slow water refuges during high flows and increasing floodplain connection. These habitat components provide refuges for juvenile salmonids and increase the over-winter survival by reducing the potential for young fish being flushed downstream (Solazzi et al. 1998). Stored sediment would increase the frequency of over-bank flows, allowing juvenile salmonids access to off-channel habitats that are preferred for over-winter rearing (Nickelson et al. 1992);

- Creating more frequent over-bank flows, more aggraded stream channels, and more abundant pool and riffle sequences are expected to increase surface and ground water exchange (Poole and Berman 2001). Ground water can buffer natural stream-heating processes (Poole and Berman 2001) and increase the availability of preferred summer-stream temperatures for salmonids;

- Increasing fine sediment storage adjacent to streams, providing a substrate for establishing riparian vegetation. Riparian vegetation can increase stream shade, potentially reducing stream temperatures and increasing the availability of suitable habitat for salmonids; and

- Collecting and storing nutrients (e.g., leaves, needles, and salmon carcasses), that provide a suitable substrate for feeding aquatic insects, thereby increasing food availability for salmonids.

As streams adjust to and orient the added large wood, the following effects are expected:

- Sediment and nutrients (e.g., leaves, needles, and salmon carcasses) would be collected near wood-placement sites;

- A few localized banks would erode, causing minor amounts of fine sediment to be transported downstream during high flows. Sediment introduced from bank erosion is expected to be much less than that collected at wood-placement sites.

- Bank erosion may occasionally cause some small trees to fall into the channels and be captured by the large wood. These small trees would add complexity to fish habitat; and

- Large wood allows pockets of fine sediments and organics to collect in slow-water areas. Fine sediment and organic material create quality habitat for other aquatic species such as the Pacific lamprey (Lampetra tridentata). During its larvae stage the lamprey burrows into soft sediment in shallow areas where it lives and feeds from four to six years (Close et al. 2002).

Replacing or removing culverts would result in very minor reductions in the number of trees available for recruitment to streams. The very small areas of fish habitat affected, the widely dispersed geographic distribution of the effects, and the unnaturally high abundance of similar-sized trees (as those being removed) currently in riparian areas would maintain abundant small trees adjacent to streams, providing future sources of wood in the short and long term.

Riparian planting and releasing existing understory conifer from hardwood competition would improve the quality of stream shade, nutrients, and large wood in the future; improve conifer survival and rate of development; and accelerate the development of diverse riparian areas to help restore riparian conditions.

Alder felling during conifer release would be limited to trees that are directly shading understory conifers. Most of the existing alder canopy would be maintained after release is completed (appendix A).

Sensitive Species

The Regional Forester sensitive fish species currently include Oregon coast coho and chinook salmon, Pacific coast chum salmon, Oregon coast steelhead, coastal cutthroat trout, and Umpqua dace (appendix A). Umpqua dace are not known to occur in the project area.

Alternative 1 would maintain existing conditions, avoiding short-term adverse effects to sensitive species. No actions would be implemented to improve habitat conditions in the long term.

Actions proposed by Alternatives 2 and 3 have been designed to minimize short-term, adverse effects and provide long-term beneficial effects to aquatic species. Fish passage and road drainage improvements would create minor, short-term adverse effects to sensitive species at the site scale. These adverse effects would be limited to the duration of the work being done, and for up to a few months after work is completed. Improved fish passage would occur immediately after project implementation, providing access to additional spawning and rearing habitat in the long-term.

Essential Fish Habitat

The Magnuson-Stevens Act of 1976, as amended, directed Regional Fishery Management Councils to identify essential fish habitat (EFH) for commercial fish species of concern. EFH of two species—coho and chinook salmon—may be impacted by this project. There are 345 miles of EFH habitat in the Alsea basin, including about 75 miles in the West Alsea planning area. About 70 percent of EFH is located on private lands in the Alsea basin. Coho salmon are found in the Alsea River, Lint, Eckman, Southworth, Arnold, Sudan, Canal, Risley, Drift and several other smaller creeks. Chinook salmon are distributed primarily in the mainstem of the Alsea, Drift, and Canal Creeks. Juvenile chinook generally migrate out of fresh water by June, and continue rearing in estuary areas over the summer. There is some overlap in coho and Chinook freshwater habitat areas.

The West Alsea Landscape Management Biological Assessment (USDA 2007f) documents the effects to essential fish habitat, if the proposed action under Alternative 2 was implemented. Effects under Alternative 2 are expected to be similar to those under Alternative 3.

The Forest concluded that all activities associated with Alternatives 2 (and 3), in the short term, would have either minor or discountable effects on EFH, except at sites where culverts would be removed or replaced in and near EFH. The Forest concluded that removing or replacing culverts within EFH would, in the short term, produce measurable amounts of sediment above background levels and alter the abundance of aquatic invertebrates at each site, thus adversely affecting EFH.

The Forest also concluded that most activities would have long-term beneficial effects to EFH, such as improving fish passage and fish migration.

Threatened Species

The Oregon Coast coho salmon is proposed for listing as threatened under the Endangered Species Act, and its critical habitat is found on federal lands in the project area. Alternative 1 would not affect this species. Under Alternatives 2 and 3, replacing some culverts in roads and placing large wood in and near coho habitat may affect, and is likely to adversely affect coho and its critical habitat, during project implementation. In the long term, these and most other activities associated with the action alternatives would benefit coho and its critical habitat.

Public and Management Access (Forest Transportation Planner)

The desired condition of the Forest transportation system is a safe and efficient network that serves public needs and management objectives within available funding.

The Forest has more roads than it can afford to maintain. To address this problem, and other issues, the Siuslaw National Forest completed a Forest-level roads analysis in January 2003 (USDA 2003). A roads analysis was also conducted at the project scale as a guide for managing the National Forest System (NFS) roads in the project's planning area. Roads analysis considered such road-related items as risk to safety and resources, future expected use, public and private access, emergency access, and maintenance costs. The recommendations of the Forest Roads Analysis and the project-level roads analysis are included in this project.

The Forest Roads Analysis selected a set of key forest roads to keep open for public access, permitted commercial use, and administrative use. Key forest roads selected include those that make connections between communities and those that provide recognized public and administrative traffic needs.

The key forest road system includes about 30 percent of the total National Forest System (NFS) roads on the forest. All forest roads not managed as part of the key road system are considered non-key project or administrative roads, which are maintained through individual project funding.

Existing roads are deteriorating. The Forest is funded at about 20 percent of the amount needed to accomplish annual routine maintenance on the key forest road system. The Forest prioritizes available funding across the key forest road system as needs arise. Consequently, few roads receive full routine maintenance, because funding is limited to prioritized road segments. This reduction in funding is resulting in continued deterioration of the key forest road network in the watershed, which increases driving hazards, risk to natural resources, and road repair costs. In the planning area, there are about 50 miles of key forest roads with a backlog of maintenance needs.

In their current condition, most key forest roads have inadequate sight distances, uneven road surfaces, and lowered structural strength. These conditions prohibit safely mixing recreational and administrative traffic (passenger cars and light pickup trucks) with commercial-sized vehicles (log trucks). Some segments of the key road system have recently been repaired and maintained or will be repaired and maintained through timber-sale contracts not related to this project.

Most non-key NFS roads were stabilized about 10 years ago by installing waterbars and either closed with physical barriers, or left to be closed naturally by vegetation encroachment. Non-key roads are typically maintained only when access is needed for specific project activities, such as habitat restoration. The lack of maintenance on open non-key roads has resulted in many of these roads being accessible only with a high-clearance vehicle, sometimes requiring four-wheel drive. Moreover, aggregate road surfaces have degraded due to accumulation of organic material.

Alternative 1 (no action)

Alternative 1 would result in the following effects:

- The current road management objective to keep the existing key forest roads open in the project area would be maintained.
- While currently suitable for non-commercial traffic, with no immediate threat of failure from non-commercial use, forest roads would continue to deteriorate, because funding is lacking to properly maintain the roads.
- Road maintenance and repair would continue on a prioritization basis within existing budgets, addressing some of the more critical maintenance items.
- At some point, all or portions of forest roads would become unsuitable for administrative and public uses, resulting in additional road closures, reduced access, loss of capital investments, and adverse impacts to aquatic resources from road failures.
- Non-key roads would continue to grow closed and become less accessible for vehicle use, including high-clearance vehicles.
- 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 become overgrown with vegetation.
- No roads would be decommissioned, increasing the potential for damage to resources and roads due to lack of maintenance.
- Driving conditions would continue to decline, increasing safety hazards; drivers would not be able to clearly locate road turnouts or safe-stopping areas, when dealing with oncoming traffic on single-lane roads.

Alternatives 2 and 3

Road maintenance and repair, as proposed under Alternatives 2 and 3, would result in the following effects:

- Maintaining and repairing about 50 miles of key forest roads (roads 1045, 3446, 3462, 5200, 5300, 5304, 5360, 5800, and 5860) and 44 miles of non-key forest roads would improve structural strength and road surfaces to support commercial timber haul, safely accommodate mixed commercial and passenger traffic, and meet the desired condition.
- Safer driving conditions would be achieved through roadside clearing, which improves sight distances on key roads associated with commercial haul, and through repairing surface cracks and depressions associated with failing road fill and shoulder settlement.
- Some of the safety concerns associated with mixed commercial and public traffic would be addressed by posting reduced speeds, rerouting traffic to alternative routes if available, temporarily closing key roads to all public traffic, or setting scheduled times the public could use the roads (appendix A).

- Timber-sale contracts require posting of warning signs and may require use of traffic flaggers in the vicinity of logging operations. The contracts allow limited short-term road closure during logging operations. Non-key roads are typically closed to public access during logging operations.
- Actions such as increasing structural strength, replacing culverts, and adding surfacing to roads would reduce the risk of resource damage associated with road failure, culvert failure, and sediment associated with log hauling.
- During wet-weather conditions, log hauling may be suspended or additional rock may be added to road surfaces if it is determined that substantial damage to roads or natural resources would occur (appendix A).
- Conversion from asphalt to gravel surfacing may be considered where it is economically more beneficial than repairing failed asphalt surfacing and sub grade.

Table 4 summarizes total miles, miles to be treated, and funding needed to repair and maintain the key forest roads under two different scenarios. Maintenance beyond the minimum to facilitate public and commercial access, while transporting timber, would be accomplished with funding not associated with this project. Continued deferral of non-critical maintenance would normally result in an increase of maintenance costs.

Table 4. Estimated miles and costs associated with treating key forest roads

Key road	Miles in project area	Miles to be treated	Funding needed for safe mixed-use traffic	Funding needed to meet all road standards
1045	0.5	1.5	$234,750**	$330,500**
3446	9	9	$296,000	$887,250
3462*	4.2	4.2	$33,500	$33,500
5200	5.6	5.6	$242,000	$336,000
5300*	11.3	11.3	$103,500	$127,250
5304	2.5	2.5	$152,250	$258,500
5360	3.3	3.3	$69,650	$100,350
5800	10	10	$240,300	$472,800
5860	2.2	2.2	$76,750	$161,500
Total	48.6	49.6	$1,448,700	$2,707,650

*These roads have recently been partially repaired

**Includes replacing culverts to improve passage of fish and other aquatic organisms.

Closing non-key forest roads, as proposed under Alternatives 2 and 3, would result in the following effects:

- Open-road density for National Forest System (NFS) roads in the planning area would be reduced from the current 1.7 miles per square mile to 1.1 miles per square mile (includes roads proposed for decommissioning), or from 105 miles to 71 miles.
- No changes in roads administered by other public agencies, or private landowner roads would be implemented in the project area.
- About 21 miles of non-key roads, currently in maintenance level 2 (high clearance roads, requiring at least a 2-wheel drive pick-up), would be closed and placed in maintenance level 1 (closed to all motorized travel for a period of more than one year). Maintenance-level-1 roads would be opened and maintained as needed to implement projects, then re-closed. These roads are currently not routinely maintained due to lack of funds. About 12 miles of these roads are currently not accessible by vehicle due to minor slides, slumps, fallen trees, or debris in the roadway.
- About eight miles of roads currently closed by gates or earthen berms would be maintained as closed roads, with access limited to permit users and administrative traffic. These roads would continue to be maintained, using funds generated by projects such as timber sales.
- Road closures could add to the cost of post-harvest stand treatments and monitoring, depending on the timing of closures. Where possible, road closures would be timed to minimize these effects.

Decommissioning non-key forest roads, as proposed under Alternatives 2 and 3, would result in the following effects:

- About 11 miles of existing non-key forest roads, currently in maintenance level 1 (2 miles) or 2 (9 miles), would be decommissioned. These roads would be taken off the road system and closed to all vehicle traffic.
- Road treatments include removing stream crossings, waterbarring road surfaces, and closing entrances with barricades, such as earthen berms, large rocks, or guardrails.

Under Alternatives 2 and 3, the following effects are expected from reopening and building (Alternative 2 only) temporary roads:

- Temporary roads opened or built for commercial thinning operations would be designed as low-standard access for logging vehicles.
- New temporary roads would be waterbarred and closed when not used, during or after commercial thinning operations.
- Roads that are temporarily reopened would be stabilized by removing unstable sidecast material and temporary culverts, and closed after completion of thinning operations.

- Temporary roads would generally be limited to commercial thinning use; these roads may provide opportunities for limited, short-term public use, such as firewood gathering, during the dry season.
- By not building temporary roads, Alternative 3 would eliminate the opportunity for short-term public use of these roads.

Table 5 summarizes the estimated economic effects by alternative. Annual maintenance costs reflect funds needed to perform full routine maintenance operations on system roads.

Table 5. Road cost summary by alternative

Alternative	Routine annual road maintenance	Road 3446-316 extension	Decommission costs	Key forest road repair and maintenance	Total extension, decommission and repair costs
1-No action	$123,800	0	$0	$0	$0
2	$101,100	$32,000	$230,900	$1,489,900	$1,853,900
3	$101,100	$32,000	$230,900	$1,489,900	$1,853,900

Manage Roadside Vegetation

About 15 miles of key forest roads and some non-key roads adjacent to plantations or alder dominated stands require frequent maintenance, as these stands are more susceptible to windthrow and snow breakage. Management actions include removing hazardous trees, clearing roadsides, or thinning and salvaging roadsides.

Alternative 1

- Limited roadside vegetation management would be implemented adjacent to key forest roads.
- Limited management would increase the potential for windthrown trees. These trees generally have roots attached, which can create cut-bank damage and plug drainage ditches.

Alternatives 2 and 3

- Vegetation management actions would increase adjacent to 15 miles of key forest roads and some non-key roads.
- Vegetation management actions would have little effect on achieving LSR objectives, with respect to accelerating individual tree growth or promoting structural or species diversity.
- To satisfactorily daylight the roads, stands 20 to 60 years old would be thinned to 50 to 70 trees per acre, within 130 feet from above and below roads.
- Thinning would accelerate the growth of remaining trees on about 225 acres.
- Receipts from roadside treatments would help fund needed restoration work, such as non-commercial thinning and control of invasive plants.

Extend Road 3446-316

Alternative 1

- Road 3446-316 would not be extended to provide access to the Lower Drift Creek oxbow meadow and several acres of plantations on national forest lands.
- Access to the oxbow meadow and plantations would continue to rely on a weight-restricted bridge over Drift Creek on Lincoln County road 708.

Alternatives 2 and 3

- Road 3446-316 would be extended by reconstructing about 1.5 miles of existing road to access the oxbow meadow and plantations. The road would be designed, reconstructed, and maintained for limited administrative- and project-related high-clearance vehicles.
- Access would not rely on a weight-restricted bridge on Lincoln County road 708.
- Current public use of the Lincoln County bridge on County road 708 would not be affected.

Fire (Forest Fuels/Fire Planner)

Based on Forest fire records since 1975, the Siuslaw National Forest has averaged 11 fires per year, burning about 35 acres a year. About 96 percent of the fires are human-caused; in other words, on this Forest, most fires are in accessible areas.

As roads continue to deteriorate under Alternative 1, access would continue to become more difficult or be reduced. Therefore, the risk of human-caused fire ignitions is likely to be reduced over time. However, naturally caused fires would have the potential to become larger, because reduced access would increase response times of initial attack forces.

Plantation treatments and associated actions

Because the potential for fire ignition cannot be eliminated under Alternatives 2 and 3, the team is obligated to disclose the potential for wildfire as a result of an ignition in a thinned plantation. The effects described here are those more associated with stands that would be commercially thinned.

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 rangelands 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 measured from Cannibal Mountain—thinning under Alternatives 2 and 3 is expected to have the following effects on fuels and the potential results from fire ignitions:

- Thinning managed stands and adding down wood to commercially thinned plantations would increase fuels on the forest floor.

- Fuels created from thinning slash in stands fall 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.
- Several thinned stands in a given area would increase the fire hazard due to a larger area of contiguous fuels. On a high fire-danger day, spotting from one thinned stand to another would be likely, given the expected wind speed.
- 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. During this period, thinning slash could support a surface fire.
- In commercially and non-commercially thinned stands, down wood increases resistance to control by fire suppression resources beyond that for fine fuels. Down 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 down wood, fire hazard is expected to remain low due to climate, incremental additions of down wood over time, location of down wood within stands (less risk in lower, moister slopes), average down wood pieces per acre throughout the watershed, and reduced vehicle access to thinned plantations.

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. Therefore:

- Roads and skid trails would be the primary control lines in indirect suppression, likely increasing the number of acres that would burn.
- The late-successional reserve objective to limit the size of all wildfires in the reserve would be difficult to meet.

Increased fire 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 soil erosion due to overland flow.
- The severity of any damage (e.g., soils, trees, and shrubs) would be directly linked to the intensity of the fire.

Under Alternatives 2 and 3, all prescribed burning would be designed to be consistent with the requirements of the Oregon Smoke Management Plan (ODF 2005) and the Department of Environmental Quality's Air Quality and Visibility Protection Plan (DEQ 2003). Effects of fuel treatments are described below:

- Because slash volumes are relatively small or treatment areas are scattered, adverse effects to air quality from burning are expected to be short-term and localized.

- All burn plans would be designed to minimize adverse impacts to soils and residual trees, and include contingency plans, ensuring the availability of adequate fire-suppression resources in the event of an escaped fire (appendix A).

- Fuels in thinned stands and within 25 to 100 feet of roads—97 acres of handpiles, and 39 acres of landings—would be burned to reduce the volume of fuels and the potential for wildfire.

- Fuel treatments would be timed to reduce the potential for fire spread, and scorch and mortality to residual trees. High soil and duff moisture would also prevent soil damage from occurring.

- Patrol and mop-up of burned piles would occur when needed to prevent treated areas from re-burning or becoming an escaped fire (appendix A).

- Under-burning of some commercially thinned stands—733 acres under Alternative 2 and 703 acres under Alternative 3—would reduce the fuels associated with residual logging slash.

- Proposed fuel treatments, proximity of commercial thinning units to private property structures, and the generally northerly aspect of stands in the wildland-urban interface (WUI) would result in a low risk of fire starting and spreading in the WUI. Therefore, no additional fuel treatments would be needed specifically to reduce the fuel loading in the WUI.

Key and non-key forest road actions

- Road decommissioning and closure would reduce access to thinned stands, thereby reducing the risk of human-caused fire ignitions.

- These road actions would also slow the rate of initial attack in the rare event of a naturally caused wildland fire.

- Reducing fuel concentrations adjacent to roads and at landing locations would substantially reduce the risk of fires starting and spreading at rapid rates.

In summary, fuel treatments would provide a semi-contiguous fuel break in affected areas. These actions would substantially reduce the potential for fire ignition and spread.

Human Uses and Influences

Heritage Resources (Forest Archaeologist)

A literature search indicated that no known sites would be impacted by proposed activities described for Alternatives 2 and 3. 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 would be consistent with our programmatic agreement with the State Historic

Preservation Office and would meet the requirements of the National Historic Preservation Act (USFS 2005b).

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 would not require field inventories, based on our 2004 Programmatic Agreement with the State Historic Preservation Office (appendix A).

Should heritage resources be discovered as a result of any project actions, work would be stopped in that area and the Forest Archaeologist would be consulted. The sites would be protected, preserved, and treated in accordance with the National Historic Preservation Act. Based on field reviews and past experiences with similar projects, no effects to heritage resources are expected from implementing Alternatives 1, 2, and 3. Therefore, proposed activities would meet the requirements of the National Historic Preservation Act.

Recreation (Recreation Planner)

Under Alternative 1, there would be no timber harvest and log haul, resulting in no conflict between recreational and logging operations traffic. With no meadow creation and maintenance and no commercial thinning, the opportunities to improve big-game forage would be lost, likely reducing hunting opportunities in the long term.

The primary consequence of the proposed actions under Alternatives 2 and 3 would be to reduce motorized access in the interior forest, a process already happening through closing and decommissioning non-key roads across the Forest. These actions would reduce dispersed recreation opportunities for motorized travelers, but increase them for non-motorized travelers, such as hikers. Dispersed recreation opportunities affected would primarily be hunting, wildlife viewing, and hiking.

The action alternatives would provide a greater amount of big-game forage, likely increasing hunting opportunities for several years.

Existing recreational fishing opportunities would be maintained. Thinning and planting in riparian areas, placing large wood in streams, and road decommissioning are expected to improve fish habitat in the long term in the watershed, potentially benefiting recreational fishing.

To minimize conflicts between recreational traffic and traffic associated with logging operations, signs would be posted on roadways to warn recreation users about log-truck traffic. This is especially important for the roads that access Drift Creek Wilderness and Canal Creek Campground, where more recreational traffic can be expected. Roads that access the campground and the wilderness would remain open to public travel during project operations.

Scenery (Forest Landscape Architect, USDA 2007g)

From the major viewpoints along Highway 34, there is no difference between the action alternatives in the area in view to the north of the Alsea River, including Butler Peak. Highway 34 provides the main scenic viewing points of the Project. The managed appearance of the slopes southwest of Butler Peak is expected to appear more natural over time under all alternatives.

In stands proposed for commercial thinning, variable spacing of trees and no-cut leave areas would reduce the short-term effects from skyline corridors and help to retain scenery. From a landscape scale, standpoint, there is little difference between Alternatives 2 and 3, regarding visual appearance.

The additional miles of new temporary road under Alternative 2, which are generally short extensions of existing roads, would impact local scenery. These road segments would be dispersed across the landscape and are not expected to be visible from scenic viewpoints.

Both action alternatives would maintain and enhance existing meadows, which would benefit scenery. Meadows surrounded by forest would be aesthetically appealing.

Stream enhancement work proposed under Alternatives 2 and 3 is consistent with scenic quality objectives for the area. Adding large wood to streams would mimic, and is expected to retain or enhance, the natural appearance and scenic quality of affected streams and the views along them. Wood placed in streams is expected to remain effective for several decades. Under Alternatives 2 and 3, the disturbed appearance of Drift Creek is expected to improve with proposed native shrub and tree plantings near the stream banks.

The extension of FS road 3446-316 would be out of view from Highway 34, and would have no impacts to scenery.

In the long term, Alternatives 2 and 3 would likely improve the natural appearance of the Project area, helping to meet the aesthetic goals, primarily as the result of meadow and stream work**.** Alternative 3 would be slightly better in meeting these goals, because of the lesser amount of temporary road and the greater dependence on helicopter logging.

Special forest products (Resource Planner)

Opportunities to gather special forest products through permits and leases would continue in the area encompassed by the Project. Alternatives 2 and 3 would reduce vehicle access, making collection of special forest products more difficult. Reduced vehicle access has a lowering effect on the sale values of special forest products such as evergreen huckleberry, firewood, moss, mushrooms, salal, and swordfern.

Predicted Effects of Actions to Provide Timber from Matrix Lands

Commodity production is associated with the matrix land allocation. Under Alternative 1, matrix lands would continue to develop as dense, single-story Douglas-fir plantations. Because the stands would not

develop the structure and size that thinned stands of a similar age would, the value and return on previous investments made to manage these lands for timber production would be reduced.

Commercial thinning would produce about 6,275 thousand board feet of timber under Alternative 2 and about 6,112 thousand board feet of timber under Alternative 3.

In the project area, all units proposed for commercial thinning that contain designated matrix, also include the late-successional or riparian reserve designation within their boundaries. Therefore, the environmental consequences associated with commercial thinning to meet the need for commodities are the same as those actions required to meet the need for increased late-successional habitat in late-successional and riparian reserves.

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 40,175-acre planning area in the western portion of the Alsea watershed. The Team considered past, present, and reasonably foreseeable future actions of federal, State, and private landowners.

The Lower Alsea River Watershed Analysis (USFS 1999a) 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.

On federal land in the planning area, plantations are the result of past clear-cut harvesting, which began in the mid 1940's and ended in the early 1990's. About 9,895 acres were harvested—90 acres in the 1940's, 1,630 acres in the 1950's, 2,720 acres in the 1960's, 2,520 acres in the 1970's, 2,315 acres in the 1980's, and 620 acres in the 1990's. The residual logging slash in units was broadcast burned to prepare units for tree planting.

Prior to 1976, about 5,710 acres were clear-cut harvested, using mostly high-lead logging systems (generally no suspension of logs during yarding), causing substantial soil disturbance. Few, if any, trees were left to buffer streams. Roads were constructed by placing excess excavated soil on adjacent side-slopes below roads (sidecast method), using undersized culverts in streams and for draining ditches, and using insufficient numbers of ditch-relief culvert for proper drainage of water from roads, with ditches frequently draining directly into streams.

Beginning in 1976 and ending in the 1990's, about 4,185 acres were clear-cut harvested. Harvest practices on federal land during this time were improved by the requirements of the 1976 National Forest Management Act. Consequently, skyline yarding (one-end or full suspension of logs during yarding) replaced highlead yarding, reducing soil disturbance; trees were retained in units to buffer at least the larger streams to reduce sedimentation of streams and provide shade; and excess excavated soil from road building was hauled to and deposited on stable sites instead of using the sidecast method, reducing the potential for road failure and stream sedimentation. Culvert size and placement improved, but size and number used for streams and ditch drainage was still inadequate. Beginning in the late 1980's, some trees were left in units to provide snag and down wood habitat for various wildlife species.

The watershed analysis also discloses that harvesting timber, building and maintaining roads, and converting forest to agricultural uses have reduced the number of 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 on federal and private lands have resulted in current conditions that fall short of the habitat capability of streams to support salmonids (including coho) and other aquatic species. In the 1990's, in recognition of the shortage of large wood in streams, agencies added large wood to key fish-bearing streams such as Canal and Drift Creeks.

Based on field reviews, effects from past clear-cut actions have basically stabilized. In the past 10 years, many of the road culverts in streams have been replaced with larger ones that can handle 100-year flood events, and larger and more numerous ditch-relief culverts were added to some roads. Several culverts in streams have been removed from roads, as a result of past road decommissioning. These actions were designed to reduce the potential for road failure and sedimentation of streams. However, there are still many roads in the planning area that are chronic sources of fine sediment due to failing sidecast material and failing or improperly functioning culverts.

In this document, the analysis provided for each alternative and resource area reflects the sum of most planning actions on federal lands—including lands managed by the Bureau of Land Management—in the foreseeable future. Past, present, and some future actions (e.g., commercial thinning and connected actions) in the Alsea River watershed are governed by the Drift Home EA (USFS 1997a), Five Rivers Landscape Management Project (USFS 2002c), and the Lobster Landscape Management Project EA (USFS 2006a). These actions and associated project design criteria are similar to those identified for the West Alsea project.

Future actions on federal lands in the West Alsea Landscape Management Project area are likely to include changes in the transportation system for forest users and adjacent landowners; actions associated with ongoing road maintenance and repair of key forest roads; and harvesting of special forest products, such as firewood, salal, swordfern, and moss.

The Bureau of Land Management (BLM), which manages about 540 acres in the Project area, has not implemented any activities in the area for at least 10 years. Currently, the BLM has no plans for activities

in the Project area. The BLM's nearest planned activities are at least 12 miles to the east of the Project area and include commercial thinning of plantations and adding large wood to a few streams (USDI 2007).

The Lincoln County road department is expected to continue maintaining roads in the planning area. Maintenance work generally includes roadside brushing, repair of road surfaces, ditch cleaning and drainage maintenance, and replacement of some culverts, especially those that are known to hinder fish passage.

Private land comprises 32 percent (about 12,970 acres) of the Project area. Most of these acres have been clear-cut harvested, beginning about 50 years ago. 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. Some harvesting has occurred in the Barclay, Eckman, and Southworth subwatersheds within the past 10 years. Based on local knowledge, some additional harvesting is planned in the Eckman (80 acres) and Southworth (20 acres) subwatersheds in the foreseeable future. Considering current national-development trends in similar rural areas, an increase in the quantity of rural residences in the watershed is expected.

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. Alternatives 1, 2, and 3 are expected to have the following cumulative effects:

Alternative 1 (No Action)

- Managed-stand health and growth would continue to decline, increasing the severity and extent of damage from insects, disease, and wind; late-successional forest conditions in managed stands would take decades to develop.
- Habitat preferred by species dependent on late-successional forest would take longer to develop; mid-seral species habitat would remain on the landscape longer; habitat preferred by early-seral species would gradually decline as trees encroach on existing meadows and other forest openings; and short-term cumulative effects would be limited to noise disturbance from maintaining and repairing key forest roads.
- Aquatic species habitat recovery would depend on natural processes.
- Sedimentation from non-key roads would increase as roads deteriorate from lack of maintenance.
- Where streams currently lack shade and large wood, these components would take decades to develop before water temperatures would be reduced.
- Watershed function would not improve because of continued use of nearly the entire road network.

- Fire response time would increase as roads fail or roadside vegetation grows and closes roads naturally.
- Recreation experiences would 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 would remain unchanged, except where roads fail.

Alternatives 2 and 3

Forest stand conditions—Thinning managed stands under Alternatives 2 and 3 would speed the development of late-successional forest characteristics on about 4,568 acres and 4,438 acres of commercially thinned stands, respectively; and on about 238 acres of non-commercially thinned stands. These changes would cumulatively 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 (federally listed, sensitive, survey-and-manage, management-indicator, and land birds)—In the short term, disturbances from noise associated with treating managed stands and repairing, closing, or decommissioning roads would 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 would be localized and not lead to adverse cumulative effects.

In the long term, this project would mitigate or begin to mitigate past adverse cumulative effects to wildlife, especially past adverse effects to late-successional forest habitat. Considering all expected actions in the planning area, cumulative effects to wildlife would be beneficial, because this project would improve the quality or quantity of habitats that are below historic levels in the watershed and in the Oregon Coast province. The action alternatives would accelerate restoration of late-successional forest, improve diversity of young/small forest, maintain or restore grass/forb/shrub habitat, and improve dead wood habitats on lands administered by the US Forest Service.

Listed, sensitive, and survey-and-manage plants—Field surveys and protection measures indicate no adverse cumulative effects to these species. Thinning managed stands would accelerate the development of late-successional forest habitat as well as result in greater tree and shrub species diversity. In the long term, this would be beneficial to survey and manage species associated with late-successional forest.

Invasive plants, including noxious weeds—Current weed infestation levels would not expand and would likely be reduced due to remedial treatments and prevention measures.

Sediment production—No measurable cumulative additions of fine sediment are expected to enter streams from stand treatments. Using, repairing, and decommissioning roads would increase fine sediment in the short term. Stabilizing and closing reopened roads, and repairing, closing, and decommissioning other roads would reduce sedimentation of streams 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 2 and 3 would cumulatively reduce sedimentation in the project planning area.

Soil productivity—Considering past and proposed commercial-harvest operations, the detrimental soil condition (i.e., soil compaction and displacement) for each commercially thinned plantation would be substantially under the 15-percent threshold established by the Siuslaw Forest Plan (USFS 1990). Therefore, no substantial cumulative reductions in soil productivity would be expected.

Stream flow—Thinning managed stands would not measurably affect stream flows. Decommissioning roads would 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 minor increases in water withdrawal for domestic and agricultural use.

Stream temperature—Based on project design and monitoring results of past, similar projects, thinning managed stands and other actions would not likely cause any measurable increase in stream temperature. Road decommissioning would likely improve watershed function and negligibly lower stream temperatures, resulting in a cumulative decrease in temperature. Cooler water on Forest Service lands may result in cooler water on private lands near the Forest boundary. Stream temperatures on private land may increase or decrease, depending on riparian and stream-channel activities that may occur on private lands.

Aquatic species—Proposed actions would likely have minor, short-term adverse effects on aquatic species during project implementation and up to a few months later. In the long term, net improvements to aquatic habitat would be expected. These actions would substantially benefit aquatic species on federal lands. No substantial changes in management of private lands would be expected; therefore, streams in and immediately downstream from these lands are expected to maintain low quality habitat for salmonids.

Essential fish habitat—Considering past, present, and future activities on private and public land in the lower Alsea River Watershed, the proposed actions are not expected to have any adverse cumulative effects on essential fish habitat. In the long term, the proposed actions would substantially benefit essential fish habitat.

Public and management access—Closing and decommissioning roads across the watershed would reduce public and management vehicle access to public lands for several activities including hunting, sight-seeing, special forest products gathering, and Forest Service monitoring. Road maintenance costs would be reduced and limited maintenance funds would be shifted to maintaining the key forest road system.

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 would be reviewed and authorized on a case-by-case basis. Generally, permit holders would be required to perform maintenance items on National Forest System roads related to the permitted uses.

Fire—Thinning managed would increase fuel loading and associated wildfire risk in the short term (3 to 4 years). However, by reducing public access, road closure and decommissioning would cumulatively reduce the risk of human-caused fire ignition in the long term. Although fire suppression response time would increase where roads are closed or decommissioned, the cumulative effect on wildfire risk over time would be reduced.

Domestic and municipal water sources—Based on distance between proposed actions and water sources, and protection measures designed to minimize or prevent fine sediment from entering streams, no cumulative impacts to domestic and municipal water sources are expected.

Heritage resources—Treating managed stands, implementing roadwork, and maintaining meadows would have minimal risk to heritage resources, because actions are generally on previously disturbed ground. Adverse cumulative effects are not expected.

Recreation—Treating managed stands would not substantially change the recreation experience. Closing and decommissioning roads would cumulatively shift the recreation experience from motorized to non-motorized.

Scenery—All actions would be consistent with the scenic quality objectives for the project 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. Proposed stream work would protect scenery and move affected streams to a more natural function and setting.

Special forest products—The opportunity for gathering these products would be maintained in the watershed, but closing and decommissioning roads would cumulatively increase access time. Thinned plantations would allow for the growth of additional commercial shrubbery in the long term. Short-term opportunities for firewood collection would be created after plantations are commercially thinned.

In summary, considering other ongoing and likely actions on federal lands and on other lands in the planning area, Alternatives 2 and 3 would 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.

Aquatic Conservation Strategy

Relevant information from the Lower Alsea River Watershed Analysis (USFS 1999a), the Lower Alsea River/Drift Creek Water Quality Restoration Plan (USDA 2006b), the West Alsea Landscape Management Project Fisheries Biological Assessment (USDA 2007f), and the Aquatic Conservation Strategy Assessment completed for the Project was incorporated by reference into this environmental analysis.

Based on this information, all project activities would meet the ACS standards and guides, and all ACS objectives would be met at the 5th-field watershed scale and over longer time periods of decades or more.

Alternative 1 (no action)

In the short term, roads not maintained to standard provide the greatest risk to meeting the nine Aquatic Conservation Strategy objectives. Roads would deteriorate and eventually fail, especially at stream crossings. When roads fail, aquatic resources are often substantially, detrimentally affected. As such, degraded water quality would continue until natural processes have removed sediments associated with road fills; a process which could take decades. In the long term, restoration of complex aquatic and terrestrial elements—such as large wood in streams and uplands, and stands with diverse tree species and sizes—would depend on natural processes and take much longer to develop than under Alternatives 2 and 3.

Therefore, this alternative would not be expected to meet the objectives of the Northwest Forest Plan's aquatic conservation strategy, because current watershed conditions would not be maintained or improved.

Alternatives 2 and 3

The West Alsea project includes some actions that would result in short-term increases in sediment production at specific sites. For example, culvert removal or replacement and large-wood placement have the potential to increase fine sediment delivery and transport. Any stream channel disturbances or adverse water quality impacts are anticipated to be small, short-term, and localized. At the watershed scale, changes in water quality, turbidity or sediment production would not be detectable. Design criteria were developed to minimize short-term adverse impacts aquatic resources and to retain desirable watershed conditions (appendix A).

Overall, proposed actions would help restore riparian vegetation and aquatic conditions by decommissioning (including culvert removal), closing, repairing (including culvert replacement), and maintaining roads; promoting the development of late-successional forest characteristics in plantations (e.g., thinning, under-planting, and creating dead wood), both within and outside of riparian areas; planting trees in riparian areas; and adding large wood to streams.

Therefore, actions proposed by Alternatives 2 and 3 would be expected to meet the nine objectives of the Aquatic Conservation strategy.

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 US 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 would reduce

the potential for long-term loss in productivity of forest soils that may result from short-term uses. They would 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 Plan 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 2 and 3:

- 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 grasses, forbs, shrubs, and deadwood.
- Temporary increase in large vehicle traffic during commercial thinning operations.
- Loss of vehicular access through the forest as roads are closed or 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 (Alternative 2).
- Loss of vehicular access through the forest as roads are closed or decommissioned (Alternatives 2 and 3).

Environmental Justice (Resource Planner)

Based on local knowledge, small pockets of low-income populations live in the planning area and some augment incomes through actions such as gathering firewood and gathering forest products to sell. Some farms exist in the planning area and domestic-use water systems include individual wells and spring-fed systems.

Although road decommissioning and closure actions would reduce vehicle access to areas that provide shrubs for picking or wood for firewood gathering, access to these areas would be maintained. Thinning plantations improve conditions for shrub growth and provide opportunities for firewood gathering. Some proposed actions in the planning area may provide opportunities for jobs. None of the proposed actions are expected to physically affect farms or water quality of municipal or domestic-use water systems.

In summary, 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:

- 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.
- 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 would 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 would 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 would be affected.
- 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 US 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.

Chapter 4—Who was Consulted About This Project?

Introduction

As described in chapter 1, comment on the proposed action was solicited through letters, local newspapers, and the Siuslaw National Forest's quarterly "Project Update" publications. The results of specific government and agency consultations are summarized below.

Local Confederated Tribes

The Confederated Tribes of Siletz, the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw, and the Confederated Tribes of Grand Ronde were informed of the Project's proposed actions during the initial public-notification process. No comments on the proposed actions were received from them.

Federal Agencies

National Marine Fisheries Service (or NOAA-Fisheries)

The Forest Service requested conferencing with National Marine Fisheries Service (NMFS), concerning impacts on essential fish habitat (EFH). NMFS's biological opinion will be included in the EA.

US Fish and Wildlife Service

The US Fish and Wildlife Service (FWS) is responsible for the wildlife species listed under the Endangered Species Act. Listed species that may occur in the project area include the northern spotted owl and marbled murrelet. The Forest Service is responsible for supporting recovery of these species, and meets this obligation by working with the FWS through a required consultation process and by implementing their terms and conditions. These terms and conditions are included in appendix A. Consultation for this project is completed, and the FWS concluded that this project will not jeopardize the continued existence of the northern spotted owl or marbled murrelet (FWS references: 1-7-06-F-0192 and 1-7-06-I-0190).

Bureau of Land Management

The Bureau of Land Management (BLM) has been consulted regarding any plans they may have for the Project area. The information obtained was considered in the development of the cumulative effects analysis. Currently, the BLM has no plans for implementing activities in the Project area.

US Congressional Representatives

Senators Gordon Smith and Ron Wyden, and Representatives Peter DeFazio and Darlene Hooley were contacted about the proposed project. No comments were received from them.

State of Oregon

All proposed actions were evaluated under the 2004 programmatic agreement with the State Historic Preservation Office (SHPO; USFS 2005b). No further consultation with SHPO was needed.

Oregon Department of Forestry, Oregon Coastal Zone Management Program, Oregon Department of Fish and Wildlife, and State Senator Joanne Verger were notified about the proposed project. No comments were received.

Local Governments

County commissioners of Benton, Lane, and Lincoln Counties; county soil and water districts; the mayors of Waldport and Yachats; and the City Manager of Florence were notified, with no responses.

Watershed Councils and Stewardship Group

Members of the Alsea and Mid-Coast watershed councils were contacted. Several meetings were held with the Alsea Stewardship Group. Project proposals were discussed and recommendations by these groups were considered by the District Ranger. Some recommendations were incorporated as part of the proposed project, including partnering with willing landowners to add large wood to streams, and managing for pond turtle habitat in the lower Drift Creek area. In general, Project support was expressed by these groups.

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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 2003).

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 in the wildland-urban interface boundary or create grass, forb, and shrub habitats for certain wildlife species. This is accomplished by prescribed burning 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.

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 actions that protect or 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.

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 include short-term, project, or special-use roads and 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 multi-layered, multi-species canopy dominated by large overstory trees (greater than 32 inches in diameter, with some greater than 45 inches in diameter and having limbs larger than 6 inches in diameter); 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.

Prescribed burning—A controlled application of fire to reduce fuel and/or prepare sites for seeding or planting. To minimize environmental damage and maintain control of fire, timing of burning is influenced by weather conditions, fuel moisture, and soil conditions. The goal of prescribed burning is to confine the fire to a pre-determined area and at the same time, produce the intensity of heat and rate of spread to accomplish the desired objectives and to protect natural resources.

Prescribed fire burn plans—Plans that are required for all prescribed burning actions. The plans are designed to ensure that resource and fire management objectives are met by setting parameters under which burning may take place.

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.

Road structural strength—The ability of the road surface and sub-grade to support the traffic for which it is designed. Design specifications should be sufficient to avoid road damage.

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.

Semi-permanent roads—A National Oceanic and Atmospheric Administration (NOAA) term that means roads that are used for longer than one dry season but are decommissioned at the end of the contract.

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.

Silviculture--The art and science of producing and tending a forest, dealing with the principles that underlie the growth and development of single trees and of the forest as a biological unit. Fundamental natural and social sciences guide the various treatments of forest stands to maintain and enhance their utility for any given purpose(s).

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.

Streambed-simulation rock—Rock placed on the bottom of a newly installed culvert and often immediately downstream and upstream from the culvert site to facilitate fish passage. Rock ranges from small to large sizes and is similar to the existing rock in the affected stream.

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--Plant or animal species that are 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

West Alsea Landscape Management Project

Design Criteria

Introduction

Design criteria for actions identified in the West Alsea Landscape Management Project EA (EA) were developed to ensure the project is consistent with the standards and guides of the 1990 Siuslaw Forest Plan (SFP), as amended by the 1994 Northwest Forest Plan (NFP). Other requirements were followed, including those described in consultation documents for federally listed species or designated critical habitat and those in the 1997 Late-Successional Reserve Assessment, Oregon Coast Province—Southern Portion.

The objectives of this project are linked to the project needs identified in the EA, chapter 1: speed development of late successional forest habitat, improve habitat diversity, improve watershed function, maintain key forest roads, and provide timber from the matrix land allocation. The actions proposed to attain these objectives are listed in table A-1.

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.

Forest Service direction, regulations, and standards and guides for resource protection may change over time. If changes occur prior to completion of any project actions, then the actions should be modified to reflect mandatory changes.

Table A-1. Project objectives and corresponding actions to attain these objectives

Project Objectives	**Actions**
Speed the development of large (32 to 45” diameter at breast height or DBH) and giant (>45” DBH) trees. Trees with unique characteristics, such as large limbs or cavities, are especially important.	Thin plantations (stands) by commercial and non-commercial means. Release dominant trees. In commercially thinned stands, create small openings—gaps, where over-story canopy cover is less than 20 percent—so a few trees have a lot of room to grow into giant (>45” DBH) trees with large limbs. Inoculate some trees with fungi that create cavities.
Improve habitat diversity in stands by increasing tree diversity and abundance of grasses, forbs, and shrubs. Restore conifers near streams, where	Plant and tend small trees in commercially thinned stands. Create early seral habitat in commercially thinned stands by seeding some areas with grasses

Project Objectives	Actions
needed.	and forbs. Under-burn some stands prior to planting and seeding. Maintain existing early seral habitat by removing encroaching woody plants from meadows. Modify prescriptions near streams.
Maintain or restore adequate numbers of snags and down wood in commercially thinned stands. Create snags in adjacent mature conifer stands.	Maintain un-thinned areas (skips/clumps) in stands that naturally create dead wood, and create snags and down wood within stands.
Maintain dispersal habitat for the northern spotted owl.	Maintain > 40 percent canopy cover in about 90 percent of commercially thinned stands.
Protect or improve water quality, fish habitat, riparian habitat, and soil productivity.	Protect domestic waters sources. Minimize adverse impacts from road and logging activities. Remove fish-migration barriers from roads. Remove culverts and fills from unneeded roads. Maintain and create future sources of large, in-stream wood. Maintain and create down wood. Add large wood to some streams.
Maintain safety and structure of key forest roads. Maintain stability of non-key roads and manage long-term access.	Repair road surfaces and replace failing culverts. Fell existing hazard trees. Manage roadside vegetation. Stabilize and close roads not needed for continuous access. Decommission unneeded roads.
Produce timber and meet late-successional objectives in the matrix land allocation.	Treat portions of plantations in the matrix land allocation similar to adjacent late-successional reserve.

Criteria Common to All Actions

Proposed, Endangered, Threatened, or Sensitive Species (PETS), and Essential Fish Habitat

Fish

The National Marine Fisheries Service (NMFS) has been consulted about potential impacts to essential fish habitat (EFH).

Generally limit the season of operation for in-stream work—such as replacing or removing culverts in roads and road decommissioning—to July 1 through August 31. Obtain a waiver from the State where needed to conduct the work after August 31.

Proposals to modify stream crossings from hard (e.g., pavement) to soft (e.g., aggregate) will require an evaluation by aquatic specialists to determine if the modification changes the level of effect on aquatic

resources. The evaluation will include a determination that the proposed changes do not retard or prevent attainment of Aquatic Conservation Strategy objectives.

Where feasible, avoid or minimize yarding corridors directly over coho habitat.

Wildlife

Design criteria must include the most current requirements from the US Fish and Wildlife Service (FWS) for federally listed wildlife. These requirements are described in a biological opinion (BO) and a corresponding letter of concurrence (LOC) (Habitat Modification BO and LOC 2006-2007; reference numbers1-7-06-F-0192 and 1-7-06-I-0190).

The current BO (Habitat Modification BO and LOC 2007-2008) provides the following criteria relevant to this project.

Criteria from LOC p. 11-13 and BO on p. 18-20:

This consultation addresses only those projects which will have a signed record of decision or a decision notice between October 1, 2006 and December 31, 2008.

The proposed action includes all processes needed to plan, evaluate, survey, prepare and complete activities including, but not limited to, falling, bucking, hauling, post-harvest burning, and firewood sales. Post-harvest prescribed burning may take place during the critical breeding period if the unit falls within 0.25 miles of unsurveyed suitable habitat when no Activity Center is present. If an Activity Center is present within the disruption distance, surveys to protocol may be conducted to determine the breeding status of these spotted owls. If the owls are not nesting, burning during the critical breeding season may commence. If they are nesting, burning should be delayed until after the critical breeding season.

To be included within the scope of this assessment, proposed activities must be consistent with the activity descriptions and also must meet the following standards:

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

- All proposed activities should consider the analyses for the management of federally listed species contained in pertinent watershed analyses and late-successional reserve assessments, as amended.

- The interagency level 1 team recommends that administrative units schedule the implementation of activities within the disturbance distance of suitable habitat or potential structure of a species outside of the breeding or roosting period of that species.

- Activities during the breeding period (Table 3) that might adversely affect listed species shall be scheduled as late in the period as feasible to reduce potential impacts to listed species.

- To schedule as many activities as possible outside critical nesting periods, and to help quantify the likelihood of adverse effects associated with those actions, the interagency level 1 team divided each fiscal year into four working periods and tallied the proposed activities which might occur during each period. Although spotted owls and marbled murrelets have breeding periods that differ slightly,

the team determined that these four periods divide the fiscal year into time frames relevant to spotted owls and marbled murrelets in the assessment area. For the purposes of this assessment, the team agreed to consider the March 1 to July 7 period as critical for nesting spotted owls and the two time periods from March 1 to July 7 and July 8 to August 5 as the critical nesting period for marbled murrelets. Activities are quantified only under the earliest time period during which they would occur. Although actions might extend into other time period(s) within a given fiscal year, no activities would occur during a more restrictive time period. For example, an action proposed to begin during the July 8 to August 5 time period might extend into the August 6 to September 30 time period or the October 1 to February 29 time period, but would not occur between March 1 and July 7.

- No blasting shall occur as part of any proposed activity addressed by this assessment. [Note: This assessment does not address blasting. If blasting is to occur projects need to be consulted on separately.]

- Use of ICS Type I or II helicopters within the disruption distance of spotted owl occupied nest locations, occupied eagle or murrelet habitat or unsurveyed suitable owl, eagle, or murrelet habitat, and unsurveyed murrelet potential structure, during the critical nesting period and the winter roosting period is not addressed in this assessment.

- Project activities (including associated road construction, site burning and other disturbances) would not take place within the disruption distance for that activity of a known spotted owl nest site or the activity center of any known pair (i.e., a site occupied by a resident owl pair or single), or within the disruption distance for that activity of a known occupied marbled murrelet site, during the critical nesting period (March 1 - July 7 for owls, and April 1 - August 5 for murrelets). The unit wildlife biologist may increase the distance or modify the timing based on site-specific information.

- Except in the case of hazard tree removal, the activity type Individual Tree Removal for tailholds, guylines and intermediate support trees does not include the removal of: (1) individual trees with owl or murrelet nesting structure from areas where, in the opinion of the unit biologists, the loss of such a tree would limit nesting by owls or murrelets, or (2) known owl or murrelet nest trees. A known nest tree may be removed only when it is an immediate hazard and when the tree is not currently being used by nesting owls or murrelets or their young.

Table A-2**.** Breeding and roosting periods for bald eagle, northern spotted owl, and marbled murrelet.

	Breeding Period	**Critical Breeding Period**	**Winter Roosting Period**
Northern spotted owl	March 1 – September 30	March 1 – July 7	
Marbled murrelet	April 1 – September 15	April 1 – August 5	
Bald eagle (sensitive sp.)	January 1 – August 31	January 1 – August 31	October 15 – April 15

Although actions might extend into the next time period(s) within a given year, no actions may occur in a more restrictive time period. For example, an activity slated to begin during the July 8 - August 5 time period may extend into the August 6 - September 30 time period, or even the October 1 -

February 28 time period, because the potential level of effect would be the same or less. For this example, actions may not ever occur between March 1 and July 7, because the potential level of effect might be greater.

Consultation documents (tables in Siuslaw NF Biological Assessment), used for the Habitat Modification BO and LOC, 2007-2008**,** estimated that commercial thinning in the West Alsea project area would implement about 2,000 acres of heavy thinning, 5,900 acres of light to moderate thinning, and about 1,100 acres of under-burning in plantations. In addition, other activities were consulted on, including road work, water quality and fish habitat enhancement, tree cavity development, and snag and down wood creation. No treatment would occur that has the potential to disturb known nesting sites of bald eagles, northern spotted owls, or marbled murrelets during their critical breeding periods. However, based on past experience, about half of these activities could occur during breeding seasons near unsurveyed suitable habitat for the northern spotted owl or marbled murrelet, and most of these activities will have some form of restriction between March 1 and October 1.

Specific to the Spotted Owl

Heavy and light-to-moderate thinning operations may occur in suitable habitat within the Matrix (light-to-moderate thinning also may occur in suitable habitat within the AMA), and in other land use allocations where stands are: (1), not yet suitable for spotted owls; or (2), in suitable spotted owl habitat that has been surveyed to protocol and determined to be unoccupied.

Specific to the Marbled Murrelet

1. Activities associated with projects (including associated road construction) within the disruption distance of known occupied or unsurveyed suitable murrelet habitat, or potential nesting structure, and implemented between April 1 and September 15, would not begin until 2 hours after sunrise and would end 2 hours before sunset with the following exception: When the Industrial Fire Precaution Level is 2 or above, the time-of-day restriction may be waived during the late breeding period (August 6 to September 15), if sufficient incidental take has been granted. The levels of treatment where the time-of-day restriction might be waived are shown in Table 2 of the BO and LOC. For commercial thinning operations, the time-of-day restriction may not be waived when the project is being implemented within 20 miles of the coast, and under Option 3 of the Level 2 March 26, 2004 policy (Appendix A) for the management of potential nesting structure. (The time-of-day restriction does not apply to hauling along existing roads or is not required at any time for other activities that occur beyond the disruption distance—see “Definitions” in the BO and LOC.

2. To minimize the risk of attracting predators to activity areas, all garbage (especially food products) shall be contained or removed daily from the vicinity of any activity.

3. All thinning, down salvage and individual tree removal actions that may affect critical habitat of the marbled murrelet would comply with the standards of the May 13, 1997 biological opinion (USDI 1997).

4. Heavy and light-to-moderate thinning operations may occur in suitable habitat within the Matrix land use allocation, and in other land use allocations where stands are: (1), not yet suitable for murrelet use; (2), in suitable murrelet habitat that has been surveyed to protocol and determined to be unoccupied; or (3), in habitat with murrelet potential nesting structure, when the activity is being implemented in accordance with options 2 or 3 of the Level 2 policy (BO and LOC, Appendix A) for the management of potential nesting structure.

Sensitive wildlife

The following information is from Region 6 Bald Eagle Policy Following Delisting and During the Five-Year Monitoring Period: No project or associated activities would be implemented 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. No activity within 0.25 mile or a 0.5-mile sight distance of a bald eagle winter roost shall be implemented between October 15 and April 15 unless the roost is verified to be unoccupied by the unit wildlife biologist.

Plants

1. If any hazel populations are found in the project area, they will be evaluated case-by-case to determine if actions are needed to facilitate survival and growth of these populations.

2. Protect PETS and survey-and-manage species located in areas that can be affected by project activities. Use protection measures, such as no-cut, 100-foot radius buffers around sites and directionally fell trees away from buffers. More specifically, protect speckle belly—a survey and manage species—located in stand 504132.

3. Retaining at least 40 trees per acre in managed stands and minimizing soil disturbance and compaction will maintain habitat for PETS fungi species that have potential habitat in the project area.

Invasive Plants

1. Follow the Pacific Northwest Region Invasive Plant Program, Preventing and Managing Invasive Plants Final Environmental Impact Statement (ROD, Oct. 11, 2005).

2. To reduce the potential for the spread of invasive plants, 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.

3. To reduce the potential for spread of invasive plants, clean all heavy equipment (including dump trucks, excluding log trucks) free of soil, vegetative matter, or other debris that may contain or hold weed seeds prior to entering National Forest System lands (WO-C/CT 6.36).

4. Use weed free (no weed seed or plant parts) erosion control materials (seed, straw, and hay). Consider using wood strands—a weed-free straw analog made from wood fiber—in place of straw.

5. To prevent the spread of invasive plants 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.

6. To reduce the risk of spreading invasive plant infestations, begin project operations in un-infested areas before operating in weed-infested areas.

7. Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas or restrict those periods when spread of seed or propagules are least likely.

8. Inspect and document all limited-term, ground-disturbing operations in infested areas for at least three (3) growing seasons, following completion of the project. Conduct follow-up treatments, based on inspection results.

9. Inspect material sources (e.g., rock or soil borrow sites) on site and ensure that they are weed-free before use and transport. Treat weed-infested sources for eradication and strip and stockpile contaminated material before any use of pit material.

10. Implement the following site-specific management recommendations:

    a. Prior to project implementation, use manual methods to control infestations of invasive species within thinning units, meadow creation areas, meadow maintenance areas, and roads.

    b. Eliminate seed crops of selected invasive species in close proximity to project activities.

    c. Inspect and document all limited-term, ground-disturbing operations within thinning units for at least two (2) growing seasons, following completion of the project. Conduct follow-up treatments, based on inspection results.

    d. Inspect and document all limited-term, ground-disturbing operations within meadow creation areas for at least three (3) growing seasons, following completion of the project. Conduct follow-up treatments, based on inspection results.

    e. Inspect and control existing infestations within meadow maintenance areas for a period of at least three (3) years.

    f. Conduct road grading, brushing, and ditch cleaning on road 1045-114 in consultation with District- or Forest-level invasive plant specialists.

Water Quality and Heritage Resources

1. 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).

2. 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).

3. The literature was searched for possible heritage resources (historical or archaeological sites) in the project planning area. Outside of the Robnett homestead, no known sites were identified that could be affected by this project. The former building complex area of the Robnett homestead will be avoided. Riparian planting may be on undisturbed ground and new temporary roads could impact sites. To avoid impacts to unknown sites, a certified cultural resource technician will monitor riparian planting and new temporary road building. Should heritage resources be discovered as a result of any project activities, work will cease in that area and the Forest Archaeologist will be consulted. Protect, preserve, and treat sites in accordance with the National Historic Preservation Act.

4. Remove debris, including abandoned vehicles, at known dumpsites. If any material at a dumpsite looks suspicious, involve law enforcement personnel prior to removal.

Plantation Treatments and Associated Actions

Minimize short-term adverse effects and maximize long-term beneficial effects to agency goals for wildlife, water quality, and fish.

Thin and Harvest Actions to speed development of old growth forest habitat – especially large trees – and improve habitat diversity in plantations

Wildlife

1. Speed development of old growth forest habitat characteristics in plantations. These characteristics are long term goals and include (per acre) about 1 to 3 conifers > 45” diameter at breast height (DBH), 10 to 20 trees at 32 to 45” DBH, 15 to 30 trees at 21 to 32” DBH, 5 snags > 21” DBH, and 4 to 19 hardwoods > 9” DBH. The amount of each element should vary, based on Plant Sub-Series (LSRA, 1997, p. 56). Silvicultural prescriptions should trend managed stands towards these objectives.

2. Maintain dispersal habitat—at the watershed scale—for the northern spotted owl, and increase diversity of habitat within stands and across the landscape. To increase diversity, emphasis should be to develop a hardwood component, increase the amount of grasses, forbs, brush, tree-cavities, snags, and down wood. This will provide habitat for a variety of species and potentially increase food availability for northern spotted owls.

3. Retain 40 percent or greater canopy cover on at least 90 percent of treated stands to maintain dispersal and potential foraging habitat for the northern spotted owl.

4. Apply appropriate prescriptions for differing stand and site conditions. For example, maintain greater tree retention where windthrow risk is high, where plantations are less than thirty years old, and under-burning where tree diameters and species are resistant to mortality from low intensity fire. Higher retention in younger stands will provide for larger deadwood and an economic return for further ecological restoration when these stands are thinned again in about fifteen years.

5. Prescribe variable-tree spacing within stands. In addition, prescriptions should vary tree spacing across the landscape, resulting in densities that vary between stands in the project area.

6. Leave untreated areas in plantations across the landscape. This includes, but is not limited to, stream-adjacent buffers. Untreated areas help to vary densities in and between stands, and they increase habitat diversity.

7. Retain alder pockets where they exist and favor retention and release of species that comprise the minor component in stands, especially hardwoods.

8. Retain and release the larger conifer and hardwood trees, conifer trees with relatively large limbs and cavities. Retain the larger snags (where safely feasible) and down wood.

9. Retain snag patches that contain at least 5 snags, where safely feasible. Use buffers around snag patches where it will address safety, felling, and yarding concerns.

10. Retain trees with defects, such as cavities, broken tops, or forks, especially the larger trees.

11. Retain trees with large nests (greater than 12" in diameter).

12. Increase amount of grass, forb, and shrub habitats with moderate-to-heavy thinning and by creating ¼ to 1 acre openings or gaps.

13. Create small meadows in some of the created small openings.

14. Locate meadows within commercial thinned areas, on appropriate soils/plant communities, which are generally near ridge tops and dry aspects. Consider windthrow in the design. Emphasize areas that can be easily maintained in the long-term, such as adjacent to and below roads. Create openings for meadows during harvest operations.

15. Avoid creating meadows in areas (e.g., stands 504051 and 504215) that have a large percentage of minor hardwood species, including bitter cherry, cascara, and big-leaf maple.

16. Within meadow creation areas, such as gentle slopes, group the meadows to increase the benefits to wildlife and the efficiency of maintenance, but keep a minimum distance of at least 200 feet between meadows.

17. Created meadow openings should generally cover no more than 30 percent of areas suitable for meadows, and no more than 15 percent of the area thinned in each unit. For example, a 20-acre thinning area may have a 10-acre area where meadow creation is appropriate; within the 10-acre area could be three one-acre meadows (30 percent of the 10 acres and 15 percent of thinning area).

Insects, disease, and wind (NFP: p. C-12, C-13)

1. To reduce the potential for Douglas-fir bark beetle infestations, avoid felling more than 5 trees per acre for down wood during the period from May 1 through June 15 (adult beetle flight season)

2. To help document pockets of laminated-root rot, include "Treatment of Stumps" (CT6.412) in the

timber sale contract.

3. Create gaps, designed to be planted, in Swiss needle cast (SNC) infection areas to reduce the impact this disease will have on future stand stocking levels and individual tree growth rates. Limit gap size to no more than one contiguous acre and no more than 15 percent of any given harvest unit. Plant gaps in SNC areas with immune western red cedar, western hemlock, Sitka spruce, and red alder.

4. In units that are susceptible to windthrow, retain 70 or more leave trees per acre, maximize leave-tree clumping, and minimize gap creations in areas susceptible to windthrow. Additionally, where appropriate, defer thinning in high windthrow-risk areas or implement a light, non-commercial thinning activity.

Streams and riparian vegetation

1. Minimize log hauling on roads during the wet-season (generally October 15 to June 15), where such use could adversely affect water quality.

2. 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; however, they may be non-commercially thinned.

3. Determine width of no-harvest buffers, based on site-specific factors such as flow regime (i.e., perennial, intermittent, or ephemeral), 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 30 feet slope distance from the edge of the floodplain; for intermittent streams at least 15 feet from the edge. Retain the first two rows of conifer trees within 100’ of perennial streams. Increase buffer widths where needed to avoid unstable areas (SFP: FW-087, -088, -089, -112).

4. To speed the growth and development of large wood that could eventually enter streams and benefit aquatic species habitats, thin and leave (do not remove) dense conifer in riparian buffers and headwall leave areas of plantations. Site-specific conditions such as slope stability, stream shade, and slope position will influence thinning prescriptions. Retain an average of 40 to 60 trees per acre.

5. 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).

6. 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).

7. Locate landings to minimize the need for skyline corridors through riparian buffers. 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 silvicultural prescription. Where skyline corridors pass

through riparian buffers, remove no more than 20 percent of the canopy in a given 1,000 feet of stream (SFP: FW-091).

8. Add aggregate to and/or reshape roads prior to log hauling, where needed, to ensure proper drainage and reduce potential impacts to streams.

9. Minimize blading of ditches, monitor roads during periods of heavy rain, and use straw bales to trap sediment, where necessary, to reduce sedimentation of streams from aggregate-surfaced roads.

10. Where temporary roads will be open and unused over the winter, build waterbars, and place straw bales or use other erosion control measures to prevent stream sedimentation and excessive loss of the road surface.

11. 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. Include a hydrologist in making determinations about use of straw bales and suspension of log hauling.

Municipal and domestic water sources

1. Stands 504134, 504140, 504144, and 504153 are located in the Weist Creek drainage area. Weist Creek provides water for the city of Waldport. Minimize yarding over streams in these stands to protect stream buffers.

2. Provide sanitation wherever human waste would cause a hazard to human health (SFP: FW-121).

3. There are several domestic water systems under special-use permit on US Forest Service lands in the planning area. No known domestic water-diversion sites and equipment are located in areas that could be affected by stand treatments and associated activities. Therefore, no special protection measures are needed for these sites.

Soils

1. To minimize soil disturbance, use skyline cable or helicopter logging systems as the primary method of log removal for all thinning sales. Design skyline logging plans to minimize side-hill and downhill yarding, yarding through riparian buffers, and building of new temporary roads. Side-hill and downhill yarding causes greater soil disturbance and damage to residual trees than uphill yarding; new temporary roads increase the area affected by soil compaction.

2. A combination yarder-loader, preferred over ground-based systems, may by used as an economical means of yarding logs. This equipment will remain on roads and landings, with the capability of yarding up to 300 feet from roads and landings, depending on affected slopes. The equipment will maintain one-end suspension of logs during inhaul.

3. Use of ground-based yarding systems has been identified for some stands (appendix B-3). Involve

a soil scientist or hydrologist to determine use of ground-based systems in portions of other stands case-by-case. Considering the trade-offs, the specialist(s) may determine that an alternative solution—such as building a short road on a stable ridge, logging by helicopter, or thinning and leaving the cut trees on site—may be more appropriate.

4. Limit ground-based yarding to the dry season; use designated skid trails; use existing roads, where possible, for designated skid-trails; limit spacing of designated skid-trails to no less than 150 feet; and use logging slash on the surfaces of designated skid-trails, where possible. These criteria serve to minimize soil compaction and disturbance.

5. Retain in units—through breakage and topping—the tops (minimum of 5" in diameter at the large end) of at least 20 percent of the trees felled in units. Tree tops will be retained across at least 80 percent of each unit. This practice, coupled with limbs that normally break off during yarding, will serve to address soil nutrient, displacement, and erosion concerns. Observations indicate that less soil displacement occurs in units where whole-tree yarding is done, compared to log yarding.

6. 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).

7. Where slopes are greater than 60 percent immediately below mid-slope roads with stable sidecast material (e.g., no pistol-butt trees), retain two rows of conifers (where feasible) to maintain slope stability (SFP: FW-112).

Temporary roads and skyline landings

1. A team of appropriate resource specialists and sale administrators will review road sites before preparing road plans for timber-sale contracts. This group will review any changes in road plans before incorporating them into contracts.

2. Do not reuse existing roads (system or non-system) where road instability or grade is a major concern. Refer to table A-3 for a list of roads not suitable for use.

3. Limit new temporary 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).

4. 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.

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

6. Use new temporary roads during the dry season whenever possible to avoid adding rock to native surfaces and to reduce costs. Identify these roads in the timber-sale contract.

7. Limit to dry season, as much as possible, the use of the temporarily reopened non-system roads. This would minimize the need for additional rock and to reduce costs. If a road is to be used during the wet season, surface with rock aggregate where needed. Surfacing depth should allow for log trucks using constant reduced tire pressures.

8. If rock is needed for wet sites that may be present on existing non-system roads used during the dry season, limit rock to what is needed for traction, not structural strength. For the timber sale contract, identify existing non-system roads to be used during the dry season.

9. To minimize sedimentation from roads, waterbar and close temporary roads between operating seasons or as soon as the need for the road ceases.

10. 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.

11. 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).

12. Evaluate (include a hydrologist, soil scientist, or geologist) temporary roads used for timber removal (especially those used during the wet season) to determine need for ripping or subsoiling. Identify roads to be ripped in the timber-sale contract if ripping is to be done by the timber-sale contractor. Avoid subsoiling in areas where residual tree roots may be adversely affected.

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

Table A-3. Summary of roads not to be reopened

Stand*	**Road type**	**Rationale**
504109/111	Non-system	Road grade is too steep—18 to 24% adverse
504171/174/176/194	Non-system	Road is unstable and steep (22 to 24%), with failing stream crossing.
504182	Non-system	Lower portion of the road is not needed for skyline harvest and is too steep, with adverse grade
503158/503166 (lower Drift)	Non-system	This BPA-access road is too steep to use between County road 708 and stand 503158.

System Roads Associated with Commercial Thinning

Wet Season Log Hauling

1. When selecting key and non-key roads for potential log haul during the wet season, consider the length of the collector road, slope position and aspect of the road, road condition, and projected cost for additional rock to support wet-season operations.

Preferred candidates for wet-season haul include short, stable ridgetop roads or roads not located on north aspects. Refer to the project Transportation Plan for additional information.

2. Include non-key roads—expected for use as part of wet-season haul routes—in the timber-sale contract's specified road reconstruction provisions, if any reconstruction is needed. If no reconstruction is planned, specify dry-season, pre-haul maintenance. Specify road reconditioning, removal of accumulated surface organics, brushing, cleaning culvert inlets, removing slide and slough material, and removal of down trees to open roads. Level existing waterbars, replace failing ditch-relief culverts, and apply needed surfacing materials.

3. During wet-season haul, limit potential sedimentation of streams by using standard erosion control methods such as filter cloth, diverting sediment onto stable, naturally vegetated slopes, or using catch basins to allow settling out of suspended sediment. Where necessary, install culverts or create ditches to disconnect water flow in ditches from streams. Use the guidelines in the Siuslaw Road Rules (1/98) to suspend log hauling when ground conditions will result in unacceptable road or resource impacts.

Key Roads

1. Use the Forest Roads Analysis to determine the need for long-term access on system roads.

2. Repair and maintain key roads that will be used as haul routes. Limit repair and maintenance work to what is needed to make the haul routes stable and safe for a mix of commercial and public use. Design actions to improve the structural strength and stability of roads, improve drainage of road surfaces, and resurface roads where needed. Actions include replacing inadequate or failing ditch-relief culverts, repairing surface patching on asphalt roads, repairing structural patches on failing road fills, resurfacing roads with either gravel or asphalt, and seeding of exposed soils.

3. Consider retention and repair of asphalt segments near or adjacent to fish habitat and those asphalt segments that connect to existing paved access roads administered by other road management agencies.

4. Consider conversion from asphalt to gravel surfacing where it is economically more beneficial in the long term than repairing failed asphalt surfacing and sub grade (e.g., where individual asphalt segments are isolated from other asphalt roads). Asphalt to gravel conversion should only occur where it would not adversely affect fish habitat (e.g., locations with few or no live stream crossings), and where it maintains or restores the objectives of the aquatic conservation strategy.

5. Where possible, recycle ground asphalt on-site or at another location on the forest, bury on-site according to current standards, or haul to a recycling center.

6. Maintain asphalt on road surfaces less than 200 feet from perennial streams.

7. Disconnect road drainage system from streams.

8. Reestablish clearing limits in plantations from 10 feet above top of cut to 10 feet below top of fill. Consider using commercial timber sales, firewood permits, or service contracts as a means for removal.

9. Commercially thin roadside areas to prevent bank failure, reduce amount of leaf-litter on roads,

reduce the amount of time it takes for road surfaces to dry (thus reducing slippery hazards and maintenance costs), and to reduce potential for hazard trees to develop near roads.

10. Reestablish clearing limits along key forest roads—3462, 3446, 5200, 5300, 5304, 5360, 5800, and 5860—through sales or service contracts (EA, Appendix C). Consider using commercial-thinning sales as a means for removal. Implement roadside thinning in areas where adjacent plantations have merchantable volume, but will not be thinned under a timber-sale contract.

11. Include in contract provision B6.33—Traffic Control Plan and Specifications—specific requirements needed for public safety, including signing that warns the public of timber sale log hauling and equipment access on roads used by residents and recreation users. Roads affected include 5200, 3446, and 3489 (appendix C).

12. Notify affected residents and recreation users of all planned operations, including duration and timing. The Central Coast Ranger District office, local media, or phone calls will be the primary methods for notification.

Non-key Roads

1. Where needed for project access, maintain roads that access BPA towers. Maintenance may include repairing of road surfaces, replacing in-stream culverts, replacing or adding ditch-relief culverts, or removing roadside vegetation.

2. Stabilize and close roads not needed for continuous access. Decommission unneeded roads.

3. Where needed for project access, temporarily reopen closed roads.

4. 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.

5. Minimize down-stream movement of sediment from culvert replacement sites, prior to and during construction, by isolating sites that have surface flow.

6. Replace water bars, remove temporary culverts, and close project-maintained roads when the project is completed. Follow the Water Bar Placement Guide for Siuslaw Forest Roads.

7. 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.

8. Purchasers will replace closure devices that were removed for harvest operations. Appropriate closure devices generally include earthen mounds or large boulders. These requirements will be included in the timber-sale contract or waived if they do not apply.

9. Locate and design road-closure devices to ensure effectiveness and to facilitate parking for dispersed recreation use.

10. Repair, re-sign, and lock existing gates on roads 5300-311 and 5300-411, following project actions (EA, Appendix C).

11. When roads are no longer needed for this project, remove existing culverts and fill material, and

unstable sidecast material from system roads in stands (EA, Appendix B-4). Use criteria identified for road decommissioning when working on these roads.

Helicopter landings

1. Build helicopter service landings in stable areas, with stable cut-bank slopes. Use existing landings or previously disturbed sites, where feasible (SFP: FW-115, 117).

2. To minimize potential for petroleum spills affecting water quality, do not locate helicopter service landings near streams.

3. Because the number of large helicopter log-landing sites is limited, 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.

4. Where feasible, locate log and service landings to minimize the potential for damaging roads during the wet season and to minimize the need for rock on roads.

5. The knotweed located in the Canal Creek (Robnett) meadow is planned for treatment under the Siuslaw Invasive Plants EA, currently being developed. The knotweed should be treated prior to any ground-disturbing activity proposed by the West Alsea Landscape Management Project EA.

6. Burn logging slash in the Canal Creek (Robnett) meadow west of plantation 504178 after logging operations are completed. Use a brush blade when machine-piling slash to minimize the amount of dirt mixed with the slash. Seed burned areas with a native seed mixture.

Post-harvest Mitigation Actions

These treatments focus on incorporating management elements for dead wood (snags and down wood), invasive weeds, and fire and fuels.

Dead wood creation

1. The majority, but not all, of dead wood creation is mitigation (refer to Appendix B-4 for additional information. Create dead wood (cavity development, snags, and down wood) in plantations by using the following prescriptions based on DecAID and the Late-Successional Reserve Assessment, Oregon Coast Province, Southern Portion, version 1.3, p. 66-69:

   Supply a steady input, at minimal levels, of dead wood over time. The dead wood prescription for this project recommends leaving portions of dead wood in snags. The minimum level of dead wood recommended in the LSR Assessment is 525 cubic feet per acre in young stands: “Drop trees or create snags to develop 525 to 2844 cubic feet per acre”. The average diameter of trees after commercial thinning will be about 15” dbh, which is about 50 cubic feet per tree. It will require 11 of these 15” dbh trees per acre to equal 525 cubic feet.

   Retain an average of about 11 trees per acre in commercially thinned plantations to meet minimum goals for dead wood (cavities, snags, and down wood). Emphasize snag creation when creating dead wood in commercially thinned stands. Select trees for dead wood greater

than 10” DBH. These trees, coupled with the existing dead wood in plantations, will approximate the minimum amounts recommended by the LSR Assessment.

2. Retain un-thinned areas where existing deadwood will remain and where additional small dead wood will be recruited through tree mortality.

3. Do not create deadwood within 100 feet of any road.

4. Defer creating deadwood in harvested units until three or more years after harvest to allow for canopy recovery, where needed, and to allow for blow-down. At that time, monitor the canopy cover before the trees are killed to ensure canopy cover remains at or above 40 percent in thinned areas of units where desired retention is greater than 40 trees per acre. Canopy gaps > ¼ acre are not used for this calculation.

5. Concentrate majority of deadwood in ¼-acre to 1-acre clumps. These concentrations will create gaps in the canopies of stands, which will help create early seral habitat and enhance development of large diameter boles and limbs on conifer and hardwood trees.

6. Within plantations, include majority of deadwood in clumps, with at least one clump for each five acres. In general, maintain distance between larger clumps (>1/4 ac.) at 300 to 600 feet.

7. Do not create clumps of dead wood within 100 feet of perennial water.

8. Use deadwood clumps to create gaps around dominant or co-dominant conifers, or hardwoods greater than 6” dbh.

9. Maintain an average clump size of ½ acre; do not exceed 1 acre:

Clump size	**clump radius**
¼ ac.	60’
½ ac.	85’
¾ ac.	100’
1 ac.	118’

Promote development of cavities in live trees

1. Creating cavities will mitigate for past losses of large trees with cavities.

2. Promote development of large cavities by topping or inoculating large (30” to 50” DBH) trees in natural stands or smaller trees in plantations.

3. Inoculate trees with native fungi (*Phellinus pini* and *Fomitopsis canjanderi*). These fungi species cause heart-rot that can result in cavities, but will allow for continued tree growth.

Creating snags in plantations

1. Create about 6 snags per acre to mitigate for past losses of large snags and to mitigate for thinning that reduces the amount of snags in plantations. Create snags by girdling or topping trees. Create

snags in clumps that are ¼-acre to ¾-acre in size and retain a few live trees in these clumps.

2. Use existing snags > 10" DBH towards meeting the snag allotment for individual thinning stands.

3. Do not create snags from trees that appear to contain stick nests, such as those used by red tree vole or raptors.

4. Do not use blasting to create snags from between March 1 and September 30, to avoid potential disturbance to spotted owls and murrelets.

Creating down wood in plantations

1. Fall and leave about 5 trees per acre, greater than 10" DBH, for down wood. Locate these trees near snag clumps, in smaller clumps, or near individually scattered snags.

2. Refer to the stand prescription summary (Appendix B-2) for site-specific down wood requirements.

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

4. To reduce the potential for Douglas-fir bark beetle infestations, minimize felling more than 5 trees per acre for down wood during the period from May 1 through June 15 (adult beetle flight season).

Invasive plant mitigation

1. Follow the Pacific Northwest Region Invasive Plant Program, Preventing and Managing Invasive Plants Final Environmental Impact Statement (ROD, Oct. 11, 2005).

2. Control existing populations of noxious weeds (EA, maps 2 and 3; EA, appendix B-4). Treat existing populations and any new infestations detected with mechanical, manual, and biological control methods.

3. Develop noxious and undesirable weed treatment prescriptions for high weed-risk project sites and their adjacent areas. Control weeds (such as false brome, EA, maps 2 and 3) as necessary, prior to beginning project operations.

4. The knotweed located in the Canal Creek meadow is planned for treatment under the Siuslaw Invasive Plants EA, currently being developed. The knotweed should be treated prior to any ground-disturbing activity proposed by the West Alsea Landscape Management Project EA.

5. Manage sites for the survey-and-manage lichen species *Pseudocyphellaria perpetua* within stand **504132** by designating a no-cut buffer around each of two sites. Restrict equipment to outside the buffer area and directionally fell trees away from the buffer perimeter.

Fire and fuel management

1. Follow the Fire Management Plan for LSR RO267 for all wildfire suppression or pre-suppression prevention programs. For burning landing slash and hand piles, 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 and the Department of Environmental Quality's Air Quality and Visibility Protection Plan.

2. 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.

3. Implement handpile-and-burn and/or underburning in some stands to treat residual logging slash in the wildland-urban interface. Hand piles and landing piles would be burned in the fall-to-winter season after one or more inches of precipitation have occurred. Refer to Appendix B-4 for a list of stands and acres to be treated.

4. Where fuel (residual logging slash) 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. County roads and key forest roads will require a minimum 25 to 100-foot fuel break for each side of the road bordered by fuel. Refer to Appendix B-4 for a list of stands and acres to be treated.

5. Create fuel breaks by using (in order of lowest to highest cost): Untreated buffers adjacent to roads, directional felling of trees away from roads, or handpiling and burning slash adjacent to roads. High cut banks (with no slash) can be considered adequate fuel breaks. Most commonly, fuel breaks will be created by burning hand-piled slash within prescribed distances from roads.

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

7. After harvest operations are completed on any given unit, conduct fuel treatments, where necessary, adjacent to roads, as soon as practical, to minimize exposure to fire hazards.

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

9. To reduce the potential for wildfire, do not create down wood in designated fuel breaks unless the tops are kept outside of the breaks. Identify designated fuel breaks in the timber-sale contract or on implementation plan maps.

10. Patrol and mop-up of burning piles would occur when needed to prevent treated areas from re-burning or becoming an escaped fire.

11. Design all burn plans to minimize adverse impacts to soils and residual trees, and include

contingency plans, ensuring the availability of adequate fire-suppression resources in the event of an escaped fire.

Wildland-Urban Interface

1. The fuels prescription—including down wood requirements—for the wildland-urban interface was developed jointly by the fuels specialist, wildlife biologist, and silviculturist.

2. Treat stands within 300 feet of private land that contains structures (primarily residences) to reduce fire risk and create long-term fuel breaks. Thin stand density to an average 70 trees per acre or lower to allow for underburning or for hand-pile burning. Wider spacing in stands permits heat to escape, minimizing crown damage and creating a fuel break that will not easily support a running crown fire. Based on past results, no more than 10 percent of the residual trees will be damaged by fire. Count damaged trees towards meeting the down woody debris requirement. Consider whole-tree yarding and slash disposal on landings to potentially eliminate the need for burning.

3. Hand-pile and burn within 300 feet of private land boundary, affecting stands 503121, 503128, 504081, 504097, 504134, 504178, 504192, and 504215. Directional felling and whole-tree yarding could be done in place of hand-pile and burn (appendix B-4).

4. Maintain roads that access stands in the wildland-urban interface. Treat roads with rolling waterbars to facilitate access for initial-attack equipment. Leave roads open or close roads using a guardrail. Close (guardrail or gate) and sign roads for “administrative use only”, which require restricted public access. The district hydrologist, fire management officer, and transportation planner will determine closure type and locations. Refer to appendix B-4 for a list of affected roads.

5. Assess other roads in the planning area that provide primary access to private land case-by-case to determine maintenance levels. The district hydrologist, fire management officer, and transportation planner will make these assessments.

Post-harvest Enhancement Actions

Maintain or improve grass, forb, and shrub habitats

1. Grass, forb, and shrub habitats have been declining in the Forest, including the planning area, for several years. Effects on dependent species are a concern. Locations of actions designed to address this concern can be found in the EA, maps 2 and 3; Appendix B-4 contains site-specific information. The following criteria are designed to slow this declining trend:

2. Maintain existing grass-forb dominated meadows (including old homestead meadows) in riparian reserves by eliminating unwanted woody vegetation. Unwanted vegetation generally includes conifer trees and blackberry as well as other invasive weeds. Use manual, mechanical, and/or burning methods. Appendix B-4 includes acres identified for meadow maintenance by subwatershed and land allocation.

3. Using low severity fire, underburn certain areas of commercially thinned stands. Create small meadows in portions of these underburned areas and repeat underburning to maintain majority of

these meadows. See prescriptions 8 and 9 (below) for more details.

4. Burn logging slash in the Canal Creek (Robnett) meadow west plantation 504178 after logging operations are completed. Use a brush blade when machine-piling slash to minimize the amount of dirt mixed with the slash. Seed burned areas.

5. Design fuel-treatment activities to meet Aquatic Conservation Strategy objectives and mandatory terms and conditions from the US Fish and Wildlife Service and NOAA Fisheries. For additional information refer to the Northwest Forest Plan (FM-1, 3, 4, 5; pp. C-35, 36) and Forest Service R6 and BLM (Oregon State Office) Programmatic Biological Opinion for Aquatic Restoration Activities done in partnership with NOAA Fisheries and US Fish and Wildlife Service, 2007 (USDA USDI, 2007); Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NFMS) reference numbers FWS - 8330.F0055 (07) and NMFS - P\NWR\2006\06530. This BO states (p. 22 and 23):

   > Low severity burns shall constitute the dominant type of controlled burn [in riparian area], resulting in a mosaic pattern of burned and unburned landscape. Low severity burns, as defined in the National Fire Plan (2002), are characterized by the following: low soil heating, or light ground char, occurs where litter is scorched, charred, or consumed, but the duff is left largely intact, although it can be charred on the surface. Woody debris accumulation is partially consumed or charred. Mineral soil is not changed. Fire severity in forest ecosystems is low if the litter and duff layers are scorched but not altered over the entire depth.

Young stand (non-commercial) thinning

Non-commercially thin certain stands (refer to Appendix B-4). Design thinning prescriptions to reduce inter-tree competition, enhance species and structural diversity, create variable spacing in stands, and control *Phellinus* infections.

Planting and tending young trees in commercially thinned stands

1. Create and plant gaps (¼- to ¾-acre in size) in the canopies of commercially thinned stands. The gaps increase habitat diversity and create short-term early-seral habitat.

2. Generally plant stands thinned to 70 residual trees per acre or less. Define planting sites by the numerous small openings in stand canopies created by commercial thinning operations.

3. To enhance tree-species diversity, plant western red cedar, western hemlock, Sitka spruce, red alder, vine maple, and big leaf maple in gaps and selected stands.

Specific planting criteria

1. Prepare planting sites by scalping the sites to mineral soil. Size of planting sites will be a minimum of 24" x 24"

2. Plant an average of 150 trees per acre in created gaps and 50 trees per acre in selected stands, as specified in the EA, Appendix B-2.

3. Plant seedlings a minimum of 15 feet away from any residual trees.

4. Plant up to 4 seedlings in “clumps”, within 4 feet of each other. If two or more species of seedlings are specified, each species should be represented in each planted clump.

5. Plant seedlings in protected "microsites," such as near stumps or down logs.

6. Vary spacing from 4 feet to 20 feet between trees to encourage both clumping opportunities and to take advantage of preferred microsite planting spots. Although spacing can be highly variable, the number of seedlings planted per acre should average150 $\pm$ 25 percent in gaps (e.g., 28 to 47 trees per ¼-acre).

7. Where gaps are created in *Phellinus* infection centers, plant only a combination of western red cedar, red alder, bitter cherry, vine maple, and big leaf maple seedlings to prevent the spread of the disease.

8. Protect seedlings with Vexar tubing—with the exception of Sitka spruce—from excessive wildlife browsing.

9. Reduce brush competition around planted trees to aid their survival and establishment. Determine release needs based on the findings of the seedling-survival surveys that are done during the first and second year after planting. Implement manual-release treatments, if needed. Use the standard Siuslaw National Forest release contract specifications.

10. Refer to Appendix B-2 of the EA for planting acreages for each stand.

Large Wood Placement Activities

In-stream placement of large wood

1. In-stream placement of large wood must be consistent with the Biological Opinion from NOAA Fisheries (USDC 2007) and the Division of State Lands General Authorization for Fish Habitat Enhancement (DSL 2004).

2. The project will be consistent with the Oregon Aquatic Habitat Restoration and Enhancement Guide (OWEB 1999) and A Guide to Placing Large Wood in Streams by the Oregon Department of Fish and Wildlife and Oregon Department of Forestry (ODFW, ODF 1995) as required by the Division of State Lands General Authorizations for Fish Habitat Enhancement in Oregon (DSL 2004).

3. Select large wood that has a length at least 2 times bank-full width or at least 1.5 times bank-full width if a root wad is attached.

4. Place LWD in a manner to most closely mimic natural accumulations of LWD in each particular stream.

5. A few red alder may be felled near a few large wood placement sites in the Canal watershed. These small canopy openings may be needed to facilitate placement of large wood in areas where tree canopies are dense.

6. Limit in-stream activities to between July 1 and August 31, unless a waiver is obtained by ODFW (SFP: FW-117). (Alsea Bay is November 1 to February 15 – this may apply to the Oxbow Meadow area and some distance upstream; look at getting a waiver to do it in the summer which could include something about the tides when doing the work.)

7. The use of ISC Type I and Type II helicopters within 0.5 mile of spotted owl or marbled murrelet occupied or unsurveyed suitable habitat will occur after September 30 in a given calendar year to avoid impacts during the critical breeding periods.

Tree Selection

1. Survey-and-manage species—Protect any PETS and survey-and-manage sites located in areas where trees will be removed for large wood. Use protection measures, such as 300-foot radius buffers around each site. Trees outside the buffer, that will be felled for large wood and that have the potential to reach the buffer, should be directionally felled away from the buffer.

2. Listed terrestrial species—After the required surveys are completed (e.g., lichen surveys), wildlife biologists will select trees to be placed in streams for enhancing hydrologic function and water quality. First priority for tree selection will be to use suitable hazard trees or trees blown down across key forest roads. To protect interior forest habitat, existing or potential nesting structure, and neighboring trees with nesting structure from incidental damage, use the following criteria to select additional trees for placement in streams (US Fish and Wildlife Service Habitat LOC, p. 8):

   > This type of activity removes individual trees from suitable or dispersal habitat or habitat with potential nesting structure after August 6 and prior to March 1 (unless such habitat has been surveyed and determined to be unoccupied) ...
   >
   > No suitable nesting trees or trees greater than 36 inches dbh would be removed.
   >
   > Selected single trees or small groups of trees (2 to 4 trees) would be
   >
   > > (1) Along the periphery of permanent openings (*e.g.*, rights-of-way, powerlines, rivers etc.), or along the periphery of non-permanent openings (*e.g.*, along plantation edges, along recent clearcuts [less than 40 years old]);
   > >
   > > (2) Single trees may only be removed from the first two lines of trees and would be dispersed along these edges;
   > >
   > > (3) Single trees or small groups of trees (2-4 trees) must be spaced at least one site potential tree height apart and at least one crown width from any trees with potential nesting structure for any listed species (for streamside operations, spacing requirements apply to each bank independently).
   >
   > For those projects proposing to remove trees greater than 32 inches DBH, or vary the selection criteria, administrative units would obtain approval from the USFWS prior to implementation under this assessment.

Selections of Trees with Root Wads

Select and pull over plantation trees (25 to 50+ years old) adjacent to system or non-system roads, or in non-system roads. The objective is to retain the root wad with the tree bole for placement in streams.

Riparian planting and release

1. Plant in riparian areas adjacent to Canal and Drift Creeks. Plant a mix of species, including conifer (western hemlock, western red cedar, Sitka spruce, and Douglas-fir) and hardwoods (willow, red alder, and big-leaf maple). Include actions such as preparing sites for planting; and planting, protecting, and releasing seedlings. Sites for planting shall include natural openings or gaps in understories so that existing hardwood canopies in riparian areas are maintained.

2. Release riparian conifer from hardwood competition. Alder felling shall be restricted to the few trees that directly affect light to understory conifers.

3. Non-commercially thin dense conifer in riparian areas of plantations.

Road Decommissioning

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

1. Roads identified for decommissioning and associated actions are listed in appendix C. Consider decommissioning roads that are determined to no longer be needed for land management or where individual roads are causing resource impacts that can be mitigated by decommissioning. Consider a full range of decommissioning treatments—from removing drainage structures and closing roads to full obliteration of the road template.

2. Use a team of planners (at least a fish biologist or hydrologist and wildlife biologist) and engineers, to review road-project sites, before preparing design plans for road-decommissioning contracts. Involve planners and engineers before changes in design plans are incorporated into contracts.

3. Implement in-channel decommissioning activities during the dry season (July 1 to August 31). When needed, obtain a waiver from the State to conduct the work after August 31. Follow the directions in the Forest Road Obliteration and Upgrade Guide.

4. Control erosion at fill removal sites. Vary the method of control, 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.

5. Remove all fill material and culverts at all culvert-removal sites with defined stream channels. Remove all fill that extends from each edge of the natural valley floor width up to the road at about 1.5:1 slope. Where natural slopes are steeper than 1.5:1, remove only the fill between the natural slopes. Carefully remove all fill material to minimize sediment inputs into streams. (SFP: FW-123).

6. Partially remove fills (partial removal may occur only after consultation with fisheries and watershed specialists) where fills are extremely deep, contain too large of material to move (such as large boulders), or will result in adverse effects if completely removed. 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. Partial-removal sites may leave the culverts functioning in place.

7. Control erosion on stream-adjacent cut slopes, using slash placed contour to the slope, where there is a moderate to high risk of erosion affecting aquatic resources. Use a native seed mixture, if there is no slash or nearby seed sources such as red alder. Erosion is most likely where slopes are steeper than 1.5:1 or their length exceeds 20 feet.

8. 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 a large sediment plain 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.

9. 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).

10. 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.

11. 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).

12. Level and seed long-term (multiyear use) waste areas after each season of use. Shape or contour, and seed short-term (one-time use) waste sites. Plant appropriate tree species at these sites, where other resource objectives are not compromised.

13. Stabilize unstable or potentially unstable sites (such as road side-cast material), during road decommissioning projects, 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 percent, and road fills are within 200 feet slope-distance of streams (SFP: FW-108, 117).

14. 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 Waterbar Placement and Construction Guide for Siuslaw Forest Roads to determine water-bar spacing and design (SFP: FW-123).

15. Transport culverts—removed from stream crossings and ditches—to an appropriate site(s). Recycle, reuse, or dispose culverts at a landfill.

16. Minimize specified reconstruction on roads needed for this project, if they are planned to be decommissioned.

17. To meet scenic quality objectives, place and shape excavated material from road decommissioning in such a manner as to follow natural contour lines and vary with surrounding topography.

Road Closure

1. Close roads needed for intermittent project access. Use closure devices such as earth berms, boulders, guardrail barricades, or gates, depending on access needs, length of road, and amount of time between project entries. Locate and design closure devices to be effective.

2. Locate and design road-closure devices to facilitate parking for forest users.

3. Repair, re-sign, and lock existing gates on roads identified in Appendix C.

4. To the extent possible, defer road closures until harvest, post-harvest mitigation, and post-harvest enhancement actions are completed.

5. Planners and engineers will review the project sites before preparing design plans for road-closure contracts. Planners and engineers will review any changes in design plans before they are incorporated into contracts.

6. Implement road closure actions during the dry season (June 15 to October 15).

7. 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.

8. To keep streams within their channels when culverts are obstructed, build water bars immediately above existing culverts to become the overflow point. Use the Waterbar Placement and Construction Guide for Siuslaw Forest Roads to determine water-bar spacing and design (SFP: FW-123).

9. 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.

10. Where applicable, seed disturbed sites with a native, certified weed-free seed mixture that includes species that will enhance wildlife forage.

Roadside maintenance adjacent to key forest roads

Roadside maintenance includes actions that remove trees (conifer or hardwoods) from road prisms, and thin some plantations adjacent to key roads. The objectives are to prevent cutbank failure and reduce road maintenance costs caused by trees falling from cutbanks; and reduce shading and leaf litter on roads to improve drainage, reduce organic debris, and improve drying of road surfaces. Design criteria for these actions include:

1. Prohibit thinning and salvaging trees within 30 feet of perennial streams and 15 feet of intermittent streams.

2. Reestablish clearing limits in plantations from 10 feet above top of cut to 10 feet below top of fill. Commercial timber sales, firewood permits, or service contracts are appropriate tools for completing the work.

3. Maintain appropriate road drainage and erosion control during thinning and salvage operations.

4. Restrict harvest equipment to the road surface. 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, when yarding.

5. Accomplish other potential requirements such as side-cast pullback, culvert replacement, or noxious weed control, with sale receipts.

6. Accomplish 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 height (130 feet) from above or below the road. Spacing of residual trees will range from 25 to 35 feet.

Roadside danger trees

1. Identify dangerous trees, using the Field Guide for Danger Tree Identification and Response (USDA, USDI, et al. 2005).

2. Include a person qualified to assess danger trees, during evaluation of potential danger trees along key forest roads and timber-sale haul routes. Involve a road manager, a wildlife biologist, and a silviculturist. These specialists will determine which trees, snags, or both need to be felled or topped to eliminate roadside hazards.

3. Priority for felled danger trees: 1) leave trees on site to meet down wood requirements, 2) store trees (logs) for later fish-structure use, 3) remove trees through timber-sale contracts, 4) remove trees through firewood permits, or 5) remove trees through service contracts.

Stand Prescriptions

The major features of plantation prescriptions are explained below. Prescription numbers will be used to identify how each individual stand is proposed for treatment. Refer to Appendix B-2.

The long-term goal of thinning is to restore old-growth forest, especially large trees and stand diversity, including conifers, hardwoods, shrubs, grasses, forbs, snags, cavities, and down wood.

The long-term goal for old-growth-sized trees is about 20 trees greater than 30” DBH per acre, with 1 to 3 of these greater than 45” DBH per acre, and including 4 to 12 large hardwoods per acre (LSRA 1997).

Shorter-term goals are to grow old-growth-sized trees as fast as possible, and increase stand bio-complexity. Bio-complexity variables include different densities of conifers; small openings; large hardwoods (maple, alder, cherry, etc.); shrubs, grasses and forbs; and snags, down wood, and tree cavities. Dispersal habitat (> 40% canopy cover) will be maintained in the majority of thinned units.

It takes several years before plantation treatments are completed in a planning area. Therefore, plantations have been prioritized—based on existing stand conditions—to influence the timing of treatment. Three priority rankings were developed by the District Silviculturist and Wildlife Biologist—high, medium, and

low, (H, M, and L). These rankings, along with a host of other factors such as the transportation system, haul route, logging systems, and season of operation are used to establish the order in which plantations will be treated.

Two individual tree characteristics—live crown ratios and ten-year diameter growth rates—and one stand characteristic—understory habitat diversity—carry the highest weight when prioritizing plantations for thinning treatment.

The two tree characteristics are good indicators of a tree's capacity to respond commercial thinning. As trees compete, crown ratios and diameter growth rates decline. Over a period of 10 or more years, live crown ratios can drop to 30 percent or less and diameter growth rates to less than 2.0 inches per decade. Trees that develop these characteristics are slower to respond with increased crown development and diameter growth, following a thinning, than those trees with larger live crown ratios and higher diameter growth rates.

Low crown ratios (less than 30 percent) and low diameter growth rates indicate low understory habitat diversity. Low crown ratios equate to low amounts of light reaching below the tops of trees, and low amounts of light equate to reduced crowns and diameter growth as well as low amounts of grass, forb, and shrub habitat. Understory habitat diversity is a good indicator of potential use by wildlife. Low diversity, such as limited amount of grasses, forbs, or brush, results in low potential use by most wildlife species for food.

Prescription 1—Leave 35 to 49 trees per acre (TPA) after all actions

1. Leave 35 to 49 TPA in 15 to 30 percent of the acres proposed for treatment. The intent of this prescription is to thin the plantation only once and let it develop late successional attributes. Any future restoration activities generally will not entail a commercial thinning treatment.

2. Generally, plantations treated with Prescription 1 fall into one or more of the following categories: (1), they are 40 years old or older; (2) they are scheduled for an underburn; (3), they have significant conifer diseases such as Swiss needlecast or lamentated root rot; or (4), they are located along roads scheduled for closure or decommissioning.

3. Develop 4 to 19 hardwood trees per acre > 9” dbh (LSRA, 1997, p. 56), and 15-30 smaller hardwoods in understories by thinning around existing hardwoods or planting. Amounts should vary, based on Plant Sub-Series and specific site conditions. Preferred species are big-leaf maple and alder.

4. Underplant 75 to 100 percent of the treated acres—which are not planned for under-burning or meadow creation—with about 50 to 75 TPA.

Prescription 2—Leave 50 to 69 TPA after all actions

1. Leave 50 to 69 TPA in 60 to 70 percent of the acres proposed for treatment. Provide for variable spacing in all prescriptions. The intent of this prescription is to thin the plantation only once and let it develop late successional attributes, but future restoration activities could entail an additional commercial thinning treatment.

2. Generally, plantations treated with Prescription 2 fall into one or more of the following categories: (1), they are 30 to 40 + years old; (2), they are scheduled for an underburn; (3), they are absent of significant conifer diseases; or (4), they are located along key roads that are to remain open.

3. Develop 4 to 19 hardwood trees per acre > 9" dbh (LSRA, 1997, p. 56), and 15-30 smaller hardwoods in understories by thinning around existing hardwoods or planting. Amounts should vary, based on Plant Sub-Series and specific site conditions. Preferred species are big-leaf maple and alder.

4. Underplant about 25 to 50 percent of the treated acres—which are not planned for under-burning or meadow creation in this project or future projects—with about 50 TPA.

Prescription 3—Leave 70 or more TPA after all actions

1. Leave 70 or more TPA in 10 to 25 percent of the acres proposed for treatment. Provide for variable spacing in all prescriptions. The intent of this prescription is to thin the plantation twice to promote the development of late successional attributes.

2. Generally, plantations treated with Prescription 3 fall into one or more of the following categories: (1), they are 30 years old or younger; (2), they are absent of significant conifer diseases; (3), they are located along key roads that are to remain open; (4), they contain conifers of marginal size for recruitment as snags and course down woody material; or (5), they are located in high windthrow risk areas.

3. Develop 4 to 19 hardwood trees per acre > 9" dbh (LSRA, 1997, p. 56), and 15-30 smaller hardwoods in understories by thinning around existing hardwoods or planting. Amounts should vary, based on Plant Sub-Series and specific site conditions. Preferred species are big-leaf maple and alder.

4. Underplant about 10 to 15 percent of the treated acres—which are not planned for under-burning or meadow creation in this project or future projects—with about 50 trees per acre.

Prescription 4—Select individual trees

Select conifers with the largest diameters, the largest live crown ratios, and ideally the largest diameter limbs for retention (wolf trees). These trees will be designated by painting an orange band around the tree at diameter breast height and two orange butt marks. All designated cut-tree species within 37 feet (1/10 acre) of the designated retention tree will be removed during thinning operations.

Prescription 5—Clump trees

Retain clumps of 2 to 4 co-dominant conifer trees by designating them with a band of orange paint at DBH and two butt marks. All designated tree species within 37 feet (1/10 acre) of the marked trees will be removed during thinning operations.

Prescription 6—Retain Oregon big leaf maple

When employing a diameter-by-prescription designation, remove all conifers less than 20 inches DBH, designated as harvest species in the timber sale contract, within 37 feet of big leaf maples 6 inch DBH and larger. Consider a clump of big leaf maples as one individual tree.

Prescription 7—Create canopy gaps to improve grass, forb, shrub, or hardwood habitats

1. Create canopy gaps in all commercially thinned stands, where feasible. Create gaps during harvest operations or through creating concentrations of snags and down wood after harvest operations are completed. Roughly, 50 percent of gaps would be created during harvest operations and the remainder through post-harvest deadwood creation.

2. Limit size of gaps to between 1/4 and 1 acre. Limit gap presence in stands to no more than 15 percent of the total area thinned. Create gaps at least 100’ away from stream channels and headwalls and at least 200’ from other gaps or meadows.

3. Leave 1 to 6 trees in the gaps to speed the development of very large trees and limbs. Leave fewer trees in small gaps and more in larger gaps.

4. Locate gaps, favoring the flatter slopes (less than 50 percent slope) or ridge tops where windthrow risk is low.

5. Create some gaps adjacent to late-successional forest habitat.

6. Where feasible, locate canopy gaps to avoid removing hardwoods during harvest operations.

7. Where safe and feasible, retain existing snags.

8. Where gaps are designated to be planted, plant an average of 150 tree seedlings per acre. Preferred species include western hemlock, western red cedar, and native hardwoods.

Prescription 8—Create meadows

1. Within commercial thinning units, create 1/8- to 1-acre meadows in conifer-dominated areas. Create all openings for meadows during harvest operations. After completion of harvest operations, burn the meadows to improve the seed-bed, and seed meadows with grasses or forbs**.** Preferred shape is linear and up and down the hill on ridges; generally on less than 40% slope. The EA, Appendix B-2, identifies stands and acres for meadow creation by subwatershed. Maps 2 and 3 show proposed underburning areas, where small complexes of meadows could be created within mapped areas.

2. Created meadow openings should generally cover less than 30 percent of areas containing these groups and less than about 15 percent of the area thinned in each unit. For example, a 20-acre thinning area may have a 10-acre area where meadow creation is appropriate; within the 10-acre area could be three one-acre meadows (30 percent of the 10 acres and 15 percent of thinning

area).

3. Locate meadows at least 100’ away from stream channels and headwalls, and at least 200’ from other meadows or gaps in the stand. Limit meadow presence in stands to less than 15 percent of the total area thinned.

4. Leave no live conifer trees in the meadows.

5. Areas with machine access: remove majority of duff, litter, and stumps on slopes 30 percent or less.

6. Areas without machine access: use low severity burning to remove > 70% of litter on >70% of the planned meadow area and remove > 10% of duff on > 50% of the planned meadow area. Occupy sites with grasses or forbs by seeding 10 to 20 lbs. per acre with native species if available. A wildlife biologist and botanist will determine appropriate species for seed mixes. Mow or burn periodically to help establish and maintain meadow.

7. Burn plans will be reviewed by appropriate specialists (e.g., wildlife and fish biologists, botanist, and hydrologist) for consistency with project EA and Forest Plan Standards and Guidelines.

Prescription 9—Underburn and seed plantations to improve quality of grass, forb, or shrub habitats

1. Improve grass, forb, and shrub habitats through underburning and seeding in certain stands; generally where commercial thinning reduces canopy cover below 60 percent (less than about 60 trees per acre). Underburn portions of stands to encourage maintenance or restoration of grasses, forbs, or shrubs. Refer to the EA, maps 2 and 3 for locations. Appendix B-4 includes stands and acres identified for underburning by subwatershed.

2. Remove > 50 percent of litter on >60 percent of the under-burned area. Remove > 10 percent of duff on > 50 percent of the under-burned area. Retain > 85 percent of leave-tree live conifers—post-harvest and before deadwood creation—and consider potential for protecting hardwoods > 6” dbh.

3. Prepare a burn plan that meets all the parameters identified in FSM 5150 for burning sites designated for early seral habitat creation and for meadow maintenance. 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.

4. Burn plans will be reviewed by appropriate specialists (e.g., wildlife and fish biologists, botanist, and hydrologist) for consistency with project EA purpose and need objectives and Forest Plan Standards and Guidelines.

5. Minimize fire spreading into areas within 200 feet of the high quality, low-gradient (less than 8 percent) streams below the stand—this especially applies to stand 503170. Minimize fire spreading into areas within 50 feet of all other streams. Include methods to keep fire from spreading into these areas, such as reducing edge fuels, wetting perimeters before ignition, or, as a last resort, building firelines.

6. Apply seed in portions of under-burned stands and gaps, on temporary roads, on burned landings, and where road maintenance or reconstruction exposes soil. Apply native seed to permanent meadows with native grasses or forbs. Apply native seed, if available, to transitory areas, such as roads. The Forest botanist and District wildlife biologist will determine appropriate species for seeding.

7. Control non-native or unwanted vegetation in meadows and underburned areas during periods identified to be most effective for the target species. Use biological methods over other methods, if biological methods are available and are more effective.

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.

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

1. Involve appropriate specialists to ensure activities are implemented as designed, when developing timber sale, roadside salvage or thinning, road decommissioning and other projects. The appropriate specialists will also participate periodically during contract work, especially when unusual circumstances arise that may require a contract modification.

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

3. During thinning operations, monitor the consistency of the silvicultural prescriptions in achieving the desired leave-tree stocking, variable spacing, and species and structural diversity. This implementation monitoring is imperative in those stands that are being treated using "Designation by Description" or "Designation by Prescription" methods. With each of these methods, the number and type of leave trees have been specified contractually, but only wolf trees, clumped trees, intermediate trees, and gaps are physically designated on the ground.

Effectiveness Monitoring

Monitoring will be tiered to the Siuslaw Forest Plan. Involve the appropriate specialists in the various monitoring tasks identified below.

Threatened and Endangered Species

Complete and submit implementation and monitoring forms, with a cover letter from the Forest Supervisor, to formally verify that all adverse effects to listed species have been reported. Submit these reports yearly by November 3.

Vegetation Management

1. Monitor thinning effectiveness in achieving the desired leave tree stocking, variable spacing, species and structural diversity, and treatment of *Phellinus* infection centers. Adjust post-thinning prescriptions for planting and dead wood creation, where necessary, to further enhance wolf tree creation, stand spacing variability, and structural and species diversity.

2. Monitor leave-tree stocking, following meadow and underburning activities. Adjust quantities of snags and down wood to create, depending on the number of conifers killed by underburning.

3. Monitor planting effectiveness in achieving survival, variable spacing, and species diversity in planted gaps, and underplanted sites in upland and riparian areas.

4. Monitor created snags and wildlife trees by observing effects of treatments. Focus observations on the location and rate of decay, and use by cavity nesters.

5. Evaluate stands for existing snags and down wood within 3 years after the thinning treatment. Modify down wood and snag creation numbers, if necessary, to meet the snag, down wood, and wolf tree objectives.

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

7. Evaluate riparian leave areas as to their effectiveness in maintaining stream shade.

8. For a period of three years after project activities are completed, monitor project sites that have a high risk of invasive plant infestation. Conduct monitoring annually and focus on effectiveness of invasive plant management as well as detection of new infestations. Refer to the botanist report for specific treatment areas and prescriptions.

Wildlife Habitat Treatments

1. Use sample plots to monitor vegetation response to areas under-burned for early seral habitat enhancement.

2. Sample post-harvest canopy closures in stands with different residual trees per acre. The information will provide a more accurate picture of how canopies respond to thinning in the watershed, both short-term and long-term. Stands should be sampled within one year after harvest, and then every two years, for up to 10 years after harvest.

3. Sample all post-harvest densities to quantify cavity nester use of created snags. Sample stands at approximately 1, 3, 5 and 10 years after harvest for evidence of both cavity nesting and foraging.

Road Treatments

1. Review excavated slopes after road-stabilization activities and note areas where eroded materials enter stream channels. Eliminate or reduce erosion, if the surface is eroding and could adversely affect aquatic habitat.

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

Plantation Stand Exam Summary

Stand Number	Year of Plantation Origin	Total Stand Acres	Average Trees per Acre	Mean Tree DBH (Inches)	Mean Tree Height (Feet)	Past 10 Years Mean Dia Growth (Inches)	Average Basal Area per Acre (Sq Ft)	Relative Density	Total Board Feet/Acre (MBF)	Total Cubic Feet/Acre (CCF)	
Arnold Creek Subwatershed											
504109	1979	73	400	9.0	66	3.8	176.0	58.7			
504111	1968	39	195	11.0	75	1.1	129.0	38.9			
504124	1973	46	255	12.5	84	2.5	217.0	61.4			
504156	1976	22	205	10.5	79	2.0	123.0	38.0			
504161	1959	6	270	12.0	106	3.0	212.0	61.2			
504162	1965	18	230	12.0	93	2.2	181.0	52.3			
504170	1954	52	280	13.5	98	1.2	274.0	74.6			
504171	1973	39	175	11.0	81	3.7	116.0	35.0			
504172	1968	73	245	11.5	81	1.9	176.0	51.9			
504174	1956	4	100	17.0	110		160.0	38.8			
504176	1955	8	235	12.5	113	1.9	200.0	56.6			
504194	1956	7	310	13.0	110	2.2	275.0	76.3			
504226	1968	43	240	10.5	84	2.1	144.0	44.4			
504227	1976	6	220	9.5	74	3.2	108.0	35.0			
504229	1976	124	230	11.0	86	2.7	152.0	45.8			
504243	1963	30	203	14.1	87	2.0	221.0	58.9	39.6	91.2	
504408	1971	52	220	12.5	75	2.0	184.0	52.0			
Barclay Creek Watershed											
503153		38									38
503155		4									4
503156	1956	33	225	14.0	100	1.4	234.0	62.5			33
504032	1965	27	175	13.0	84	3.6	161.0	44.7			27
504035	1966	6	220	13.0	95	1.6	202.0	56.0			6
504037	1979	91	253	10.5	68	4.0	152.0	46.9			91
504041	1957	38	145	15.5	105	2.0	190.0	48.3			38
504049	1989	30	400	5.0	35	5.0	55.0	24.6			30
504050	1965	22	190	13.8	95	1.6	198.0	53.3	34.4	82.5	22
504060	1980	18	180	11.5	60	4.5	130.0	38.3			18
504062	1985	11	180	8.5	45		70.0	24.0			11
504063	1989	32	180	6.0	40		35.0	14.3			32
504065	1990	53	325	5.0	35	5.5	54.0	24.1			53
504069	1984	3	150	8.0	55		52.0	18.4			3

Plantation Stand Exam Summary

Stand Number	Year of Plantation Origin	Total Stand Acres	Average Trees per Acre	Mean Tree DBH (Inches)	Mean Tree Height (Feet)	Past 10 Years Mean Dia Growth (Inches)	Average Basal Area per Acre (Sq Ft)	Relative Density	Total Board Feet/Acre (MBF)	Total Cubic Feet/Acre (CCF)	
504075	1985	18	190	9.0	55		84.0	28.0			18
504076	1975	12	400	9.0	75	1.7	175.0	58.3			12
504080	1967	42	400	9.0	85	1.5	175.0	58.3			42
504097	1971	55	170	13.0	78	2.4	157.0	43.5			55
504101	1956	7	80	20.0	120		176.0	39.4			7
504105		31									31
504116		2									2
504119	1954	14	230	14.0	102	1.2	246.0	65.7			14
504129	1955	6	275	16.0	115	2.4	385.0	96.3			6
504132	1961	17	300	11.0	98	1.9	198.0	59.7			17
504137	1968	18	320	10.5	79	2.0	192.0	59.3			18
504138	1970	18	120	12.0	77	1.5		94.0	27.1	65.0	18
504147	1967	6	220	12.0	82	1.0		173.0	49.9	119.8	6
504151	1967	26	190	11.5	95	1.6		137.0	40.4	97	26
504158	1962	111	185	12.5	94	2.0	159.0	45.0			111
504165	1965	35	140	13.5	85	1.2	137.0	37.3			35
504180	1978	40	200	9.5	67	2.6	98.0	31.8			40
504182	1971	27	160	12.0	75	2.0	121.0	34.9			27
504183	1971	13	200	11.0	67	3.1	132.0	39.8			13
504394	1956	50	180	15.0	112	2.2	221.0	57.1			50
504406	1975	33	190	11.0	68	3.4	125.0	37.7			33

Plantation Stand Exam Summary

Stand Number	Year of Plantation Origin	Total Stand Acres	Average Trees per Acre	Mean Tree DBH (Inches)	Mean Tree Height (Feet)	Past 10 Years Mean Dia Growth (Inches)	Average Basal Area per Acre (Sq Ft)	Relative Density	Total Board Feet/Acre (MBF)	Total Cubic Feet/Acre (CCF)	
Southworth Creek Subwatershed											
504104	1990	23	300	5.5	35		51.0	21.7			
504110	1966	55	240	12.5	89	2.4	204.0	57.7			
504117	1974	31	220	11.5	76	2.7	158.0	46.6			
504118	1969	49	180	14.1	80	1.6	196.0	52.2	29.3	72.2	
504121	1990	30	365	5.0	35	2.6	50.0	22.4			
504125	1984	99	160	9.5	47	4.3	78	25.3			
504126	1973	16	320	10.0	81	2.6	175.0	55.3			
504131	1982	122	134	9.0	60		59.0	19.7			
504133	1969	30	260	12.5	82	2.5	221.0	62.5			
504135	1969	24	290	10.5	82	1.1	174.0	53.7			
504146	1973	11	245	11.5	80	1.5	176.0	51.9			
504198	1975	33	205	10.0	69	2.7	112.0	35.4			
504201	1973	3	150	10.0	60		82.0	25.9			
504213	1963	191	255	12.0	100	2.3	200.0	57.7			
504222	1961	95	240	14.0	90	2.0	256.0	68.4			
504407	1971	14	220	11.5	73	1.5	158.0	46.6			
506179	1968	25	240	11.5	80	2.5	173.0	51.0			
Eckman Creek Subwatershed											
504127	1992	51	140	5.5	35		22.0	9.4			
504134	1983	31	150/360	12	59	4.1	122	35.2			
504140	1982	17	110	11.0	60		73.0	22.0			
504144	1979	61	225	12.0	65	3.2	170.0	49.1			
504153	1966	9	270	12.0	83	1.5	212.0	61.2			
504177	1966	25	220	12.0	97	2.0	172.0	49.7			
504185	1979	2	400	6.0	30	1.7	79.0	32.3			
504192	1974	14	300	11.0	65		198.0	59.7			
504207	1967	12	260	12.0	98	2.2	204.0	58.9			
504208	1959	44	260	14.0	90	2.0	275.0	73.5			
504212	1982	12	134	9.5	47		67.0	21.7			
504240	1984	13	100	11.0	50		66.0	19.9			
504280	1952	525	330	13.5	115	1.2	320.0	87.1			
504280A	1952	61	340	13.5	100	1.8	326.0	88.7			
504280B	1951	24	425	13.0	95	1.5	391.0	108.4			

Plantation Stand Exam Summary

Stand Number	Year of Plantation Origin	Total Stand Acres	Average Trees per Acre	Mean Tree DBH (Inches)	Mean Tree Height (Feet)	Past 10 Years Mean Dia Growth (Inches)	Average Basal Area per Acre (Sq Ft)	Relative Density	Total Board Feet/Acre (MBF)	Total Cubic Feet/Acre (CCF)	
504280C	1941	5	220	14.0	100	1.6	235.0	62.8			
504280C	1941	41	220	16.0	115	1.6	308.0	77.0			
504280D	1955	37	340	12.0	100	1.6	267.0	77.1			
504280E	1952	88	375	13.0	95	1.1	345.0	95.7			
504280F	1954	46	320	14.0	105	1.1	342.0	91.4			
504280G	1949	70	375	14.0	115	1.4	401.0	107.2			
504280H	1962	10	270	13.0	90	1.6	253.0	70.2			
504299	1981	35	150	12.0	63	4.3	118.0	34.1			
504320	1977	124	200	11.5	60	3.0	145.0	42.8			
504324	1988	44	350	5.5	40	5.0	53.0	22.6			
504334	1977	4	230	12.5	65	2.8	195.0	55.2			
504400	N/A	9	515	12.0	95	2.0	405.0	116.9			
504404	N/A	38	515	12.0	95	2.0	405.0	116.9			
504179A	1975	334	280	9.5	66	3.5	137.0	44.4			
504179B	1981	167	240	9.0	54	4.3	106.0	35.3			
504179C	1976	35	360	8.5	55	2.5	140.0	48.0			
506005	1977	5	230	12.5	65	2.8	195.0	55.2			

Plantation Stand Exam Summary

Stand Number	Year of Plantation Origin	Total Stand Acres	Average Trees per Acre	Mean Tree DBH (Inches)	Mean Tree Height (Feet)	Past 10 Years Mean Dia Growth (Inches)	Average Basal Area per Acre (Sq Ft)	Relative Density	Total Board Feet/Acre (MBF)	Total Cubic Feet/Acre (CCF)	
Lower Alsea River Subwatershed											
504023	1989	11	190	6.0	37		37.0	15.1			
504157	1990	11	140	7.0	35	6.0	37.0	14.0			
504159	1990	48	140	7.0	35	6.0	37.0	14.0			
504188	1965	60	290	13.5	80	1.7	281.0	76.5			
504189	1975	55	230	12.0	60	4.4	181.0	52.3			
504191	1984	66	135	12.0	40		106.0	30.6			
504209	1969	26	300	12.5	85	2.1	249.0	70.4			
504211	1976	39	195	12.5	75	3.2	166.0	47.0			
504218	1969	16	290	12.5	80	1.8	246.0	69.6			
504228	1983	8	130	11.0	40		85.0	25.6			
504231	1961	42	190	14.0	90	1.6	209.0	55.9			
504233	1981	43	120	12.5	45	3.7	60.0	17.0			
505094	1961	9	195	13.0	85	2.6	180.0	49.9			
505097	1978	20	210	12.5	55	3.1	176.0	49.8			
505121	1980	19	120	12.0	50		94.0				
Lower Canal Creek Subwatershed											
504169	1956	11	300	10.0	80		164.0	51.9			
504178	1973	44	180	11.5	87	3.0	131.0	38.6			
504195	1952	28	75	16.5	115		108.0	26.6			
504196	1964	70	196	14.5	91	1.7	224.0	58.8	38.6	92.3	
504214	1962	45	250	12.5	93	1.7	210.0	59.4			
504215	1957	149	200	11.5	104	1.6	144.0	42.5			
504216	1956	11	250	13.5	115	1.2	245.0	66.7			
504230	1966	62	210	12.0	98	1.4	165.0	47.6			
504234	1978	43	240	10.0	62	4.0	131.0	41.4			
504235	1965	69	400	11.5	101	1.5	288.0	84.9			
504237	1979	133	200	11.0	75	2.8	132.0	39.8			
504245	1953	40	225	14.0	115		240.0	64.1			
504247	1984	39	145	8.5	60		55.0	18.9			
504251	1984	60	160	9.0	60		71.0	23.7			
504253	1964	36	200	12.0	97	2.1	157.0	45.3			
504263	1981	78	180	11.0	70		119.0	35.9			
504269	1965	11	235	11.0	88	1.7	155.0	46.7			

Plantation Stand Exam Summary

Stand Number	Year of Plantation Origin	Total Stand Acres	Average Trees per Acre	Mean Tree DBH (Inches)	Mean Tree Height (Feet)	Past 10 Years Mean Dia Growth (Inches)	Average Basal Area per Acre (Sq Ft)	Relative Density	Total Board Feet/Acre (MBF)	Total Cubic Feet/Acre (CCF)	
504272	1987	56	190	9.5	40		93.0	30.2			
504277	1965	26	275	12.5	90	2.0	231.0	65.3			
504282	1986	62	180	9.5	40		86.0	27.9			
504283	1956	12	215	14.0	113	1.5	230.0	61.5			
504288	1989	12	270	6.5	35	5.0	62.0	24.3			
504289	1964	13	240	12.0	94	1.0	188.0	54.3			
504295	1967	76	245	12.0	93	2.2	192.0	55.4			
504296	1965	7	260	10.5	103	1.1	156.0	48.1			
504297	1990	55	180	8.0	37		63.0	22.3			
504302	1988	6	150	7.5	44	3.0	45.0	16.4			
504322	1986	59	170	8.0	48		59.0	20.9			
504323	1987	58	135	11.5	45	6.5	97.0	28.6			
504325	1991	6	200	6.0	40		39.0	15.9			
504329	1966	53	225	12.0	99	1.7	177.0	51.1			
504344	1966	15	160	13.5	100	2.0	157.0	42.7			
504345	1964	30	240	14.0	102	1.8	256.0	68.4			
504357	1963	61	275	12.4	88	1.9	231.0	65.6	38.9	93.5	
504361	1970	23	200	10.0	84	1.9	109.0	34.5			
506178	1976	90	210	12.5	82	3.0	179.0				

Plantation Stand Exam Summary

Stand Number	Year of Plantation Origin	Total Stand Acres	Average Trees per Acre	Mean Tree DBH (Inches)	Mean Tree Height (Feet)	Past 10 Years Mean Dia Growth (Inches)	Average Basal Area per Acre (Sq Ft)	Relative Density	Total Board Feet/Acre (MBF)	Total Cubic Feet/Acre (CCF)	
Risley Creek Subwatershed											
504038	1973	40	231	13.3	73	2.7	223.0	61.1	33.3	82.1	
504042	1955	61	180	17.5	125		285.0	68.1			
504047	1988	46	230	8.5	40	5.3	92.0	31.6			
504048	1964	31	200	14.0	95	2.2	214.0	57.2			
504051	1962	97	203	14.5	90	2.0	231.0	60.7	40.1	94.0	
504054	1983	44	150	9.0	55	4.5	67.0	22.3			
504055	1954	4	120	16.0	125		170.0	42.5			
504058	1967	30	240	13.0	95	1.6	220.0	61.0			
504064	1953	41	190	15.5	120		247.0	62.7			
504066	1973	2	100	15.0	75		123.0	31.8			
504070	1973	12	480	8.5	70	2.3	145.0	49.7			
504071	1972	12	260	8.5	81	2.4	95.0	32.6			
504072	1955	8	180	20.0	115		176.0	39.4			
504077	1981	14	190	10.0	60	6.0	104.0	32.9			
504078	1984	35	150	8.5	55		60	20.6			
504081	1951	54	190	15.0	110	2.2	233.0	60.2			
504082	1954	18	290	14.0	100	1.4	300.0	80.2			
504083	1984	19	160	10.0	55		88.0	27.8			
504084	1973	6	280	12.0	80	1.9	220.0	63.5			
504099	1958	4	15	24.0	125		50.0	10.2			
504106	1969	68	218	13.2	84	2.1	205.0	56.4	33.9	81.2	
504123	1983	12	130	12.0	55		102.0	29.4			

Plantation Stand Exam Summary

Stand Number	Year of Plantation Origin	Total Stand Acres	Average Trees per Acre	Mean Tree DBH (Inches)	Mean Tree Height (Feet)	Past 10 Years Mean Dia Growth (Inches)	Average Basal Area per Acre (Sq Ft)	Relative Density	Total Board Feet/Acre (MBF)	Total Cubic Feet/Acre (CCF)	
Upper Canal Creek Subwatershed											
504266	1986	66	180	8.0			30.0	10.6			
504284	1980	148	225	11.0	67	3.8	149.0	44.9			
504308	1962	47	250	12.0	89	1.5	195.0	56.3			
504313	1990	42	200	5.5	35		35.0	14.9			
504314	1990	20	190	5.0	35		26.0	11.6			
504316	1973	68	178	13.0	79	2.2	164.0	45.5	24.7	60.1	
504317	1990	30	325	4.0	37	4.0	28.0	14.0			
504318	1959	18	225	13.0	119	1.8	207.0	57.4			
504321	1979	63	240	11.0	65	3.0	158.0	47.6			
504330	1960	88	200	13.0	91	1.5	184.0	51.0			
504335	1990	66	250	6.5	39	5.2	57.0	22.4			
504336	1981	5	120	9.0	55		53.0	17.7			
504338	1964	70	260	12.0	95	1.5	204.0	58.9			
504339	1986	39	200	10.5	50		120.0	37.0			
504343	1975	5	235	12.5	55	4.2	200.0	56.6			
504347	1973	221	235	12.0	90	2.0	186.0	53.7			
504353	1985	60	150	10.0	50		82.0	25.9			
504358	1979	63	240	11.5	71	2.1	173.0	51.0			
504360	1969	34	195	13.0	86	2.0	180.0	49.9			
504364	1993	28	260	4.5	26	4.0	26.0	12.3			
504365	1979	38	185	10.0	67	3.3	101.0	31.9			
504367	1966	54	260	10.5	102	1.6	156.0	48.1			
504369	1990	69	290	6.0	43	5.5	57.0	23.3			
504374	1969	59	235	12.5	92	1.7	202.0	57.1			
504375	1987	68	140	9.0	50	6.0	62.0	20.7			
504376	1960	79	150	13.5	97	1.9	147.0	40.0			
504378	1963	50	250	12.0	93	1.1	196.0	56.6			
504379	1961	57	220	13.0	98	1.9	203.0	56.3			
504380	1990	13	205	5.0	35		28.0	12.5			
504381	1970	55	230	12.5	86	2.4	198.0	56.0			
504382	1987	40	140	9.0	45	5.5	62.0	20.7			
504383	1979	247	140	10.0	69	3.7	76.0	24.0			
504387	1961	78	255	12.0	97	1.5	200.0	57.7			
506182	1976	47	240	10.0	80	2.5	131.0	41.4			

Plantation Stand Exam Summary

Stand Number	Year of Plantation Origin	Total Stand Acres	Average Trees per Acre	Mean Tree DBH (Inches)	Mean Tree Height (Feet)	Past 10 Years Mean Dia Growth (Inches)	Average Basal Area per Acre (Sq Ft)	Relative Density	Total Board Feet/Acre (MBF)	Total Cubic Feet/Acre (CCF)	
Drift Creek Subwatershed											
503118	1990	60	250	5.5	35		40.0	17.1			
503119	1973	20	250	11.0	75	2.2	165.0	49.7			
503120	1948	7	200	11.0	75		135.0	40.7			
503121	1973	22	250	11.0	75	2.2	165.0	49.7			
503126	1977	90	275	10.5	70	2.3	165.0	50.9			
503128	1972	72	255	12.5	83	2.1	216.0	61.1			
503134	1989	39	250	6.5	30	6.0	57.0	22.4			
503135	1972	4	235	10.5	80		141.0	43.5			
503136	1984	41	140	10.5	58	6.0	84.0	25.9			
503142	1988	25	160	5.0	35		22.0	9.8			
503149	1971	46	290	11.5	74	1.1	191.0	56.3			
503158	1979	43	285	10	70	2	155	49.0			
503159	1989	33	75	6	35		15	6.1			
503160	1942	13	210	18	115	1.3	325	76.6			
503161	1993	10	400	4.5	35		36	17.0			
503162	1984	24	350	11.0	40	2.0	200	60.3			
503163	1979	34	460	8.0	55	3.0	161	56.9			
503164	1993	10	450	4	30		36	18.0			
503165	1985	36	300	7	45		80	30.2			
503166	1982	18	325	9	45	2.8	144	48.0			
503167	1982	46	350	7.5	55	2.4	105	38.3			
503168	1982	20	340	10.5	60	2.0	205	63.3			
503169	1984	157	425	7.5	50	3.0	125	45.6			
503170	1985	42	400	9	55	2.0	177	59.0			
503171	1980	78	355	8	56	2.9	123	43.5			
503172	1984	8	350	7.5	50	1.5	105	38.3			
503173	1984	19	150	12	40	2.0	119	34.4			
504023	1989	10	150	10	40	2	119	37.6			
Total		**10415**				454.4					

Alternative 2 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by Commercial Thinning	Acres of Meadows Created by Commercial Thinning	Non-Commercial Thinning Acres--Young Stands	Acres Deferred From Commercial or Non-commericall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
Arnold Creek Subwatershed																									
504109	1979	73	HTH	H	48		5		25		0	26		0	5 to 10		5	6	18.1	12.5	64	11.0	61/81	240	288	50/70
504111	1968	39	HTH	H	25				14	12				2			5	6	18.5	13.5	68	13.5	71	125	150	60
504124	1973	46	HTH	MH	31	3			15	25	3			0		3 to 12	5	6	11.5	14	43	12.0	51	155	186	40
504156	1976	22	HTH	H	14				8					1			5	6	16.6	13	60	12.0	76	70	84	65
504161	1959	6	HTH	M	4				2					0			5	6	22.8	16	91	13.0	76	20	24	65
504162	1965	18	HTH	M	12				6					1			5	6	16.0	15	62	12.5	61	60	72	50
504170	1954	52	HTH	M	31		3		21		0	24		0	3 to 6		5	6	23.1	16.5	94	14.0	76	155	186	65
504171	1973	39	HTH	ML	27	2	1		12		2	3		0	1 to 2	2 to 8	5	6	22.2	15	86	12.5	56/76	135	162	45/65
504172	1968	73	HTH	M	48	4			25	22	4					8 to 16	5	6	19.7	14.5	75	12.5	71	240	288	60
504174	1956	4	HTH	L	2				2								5	6	18.9	18	80	13.0	56	10	12	45
504176	1955	8	HTH	MH	5				3								5	6	15.8	17.5	66	13.5	51	25	30	40
504194	1956	7	HTH	M	4				3								5	6	17.2	16.5	70	14.5	56	20	24	45
504226	1968	43	HTH	M	28				15	14				3			5	6	13.1	14.5	50	11.5	56	140	168	45
504227	1976	6	HTH	MH	5		0.5		1			4			1		5	6	14.2	14	53	13.0	61	25	30	50
504229	1976	124	HTH	M	77	3	3		47		3	11	2	1	3 to 6	6 to 12	5	6	16.8	15	65	12.5	61	385	462	50
504243	1963	30	HTH	MH	18				12					2			5	6	17.5	17	72	16.0	56	90	108	45
504408	1971	52	HTH	M	34				18					3			5	6	22.2	15	86	13.0	81	170	204	70

Alternative 2 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by Commercial Thinning	Acres of Meadows Created by Commercial Thinning	Non-Commercial Thinning Acres--Young Stands	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
Barclay Creek Subwatershed																									
503153	1965	38	HTH	M	33.0		5		5			33			10 to 20		5	6	17.6	15	68	5.0	66	165	198	55
503155	1956	4	HTH	H	4.0		0.5		0	0		4			1 to 2		5	6	25.8	17.5	108	5.0	61	20	24	50
503156	1956	33	HTH	H	27.0		3		6	0		27			3 to 6		5	6	25.8	17.5	108	12.0	61	135	162	50
504032	1965	27	HTH	L	19.0		2		8			18			8		5	6	19.3	16	77	12.5	66	95	114	55
504035	1966	6	HTH	H	4.0				2	0							5	6	16.3	16	65	15.0	61	20	24	50
504037	1979	91	HTH	M	59.0		6		32			43			6 to 12		5	6	17.6	15	68	14.0	66	295	354	55
504041	1957	38	HTH	MH	26.0		3		12			13			3 to 6		5	6	24.7	18	105	14.5	66	130	156	55
504049	1989	30	SPC	M	0.0			30	0										3.1	4.5	6.5	0.0	195	0	0	195
504050	1965	22	HTH	MH	14.0		1		8	11		4			1 to 2		5	6	19.7	16.5	80	13.5	66	70	84	55
504060	1980	18	HTH	L	16.0		2		2	0		16			2 to 4		5	6	21.1	17	87	13.0	66	80	96	55
504062	1985	11	DEF	L	0.0				11										24.0	8.5	70	0.0	180	0	0	180
504063	1989	32	DEF	L	0.0				32										14.3	6	35	0.0	180	0	0	180
504065	1990	53	SPC	MH	0.0			53	0										17.3	6.5	44	0.0	195	0	0	195
504069	1984	3	DEF	L	0.0				3										18.4	8	52	0.0	150	0	0	150
504075	1985	18	DEF	L	0.0				18										28.0	9	84	0.0	190	0	0	190
504076	1975	12	HTH	H	8.0		1		4	5		3			2 to 4		5	6	15.6	12.5	55	11.0	66/76	40	48	55/65
504080	1967	42	HTH	H	27.0		3		15	21		9			3 to 6		5	6	16.5	14.5	63	12.0	66	135	162	55
504097	1971	55	HTH	M	33.0				22					3			5	6	16.5	15.5	65	12.0	61	165	198	50
504101	1956	7	DEF	L	0.0				7										39.4	20	176	0.0	80	0	0	80
504105	1954	31	HTH	MH	10.0				21				2.5	1			5	6	5.5	16	22	11.0	56	50	60	45
504116	1961	2	DEF	L	0.0				2										28.6	17	118	0.0	75	0	0	75
504119	1954	14	DEF	H	0.0				14										65.7	14	246	0.0	230	0	0	230
504129	1955	6	HTH	M	4.0		0.5		2			3			1		5	6	17.4	18.5	75	16.0	51	20	24	40
504132	1961	17	HTH	H	16.0	2			1	14	2					2 to 8	5	6	15.2	14.5	58	15.0	61	80	96	50
504137	1968	18	HTH	H	12.0				6	12				1			5	6	17.1	14	64	13.5	71	60	72	60
504138	1970	18	DEF	L	0.0				18										27.1	12	94	0.0	120	0	0	120
504147	1967	6	HTH	MH	4.0				2				1				5	6	18.1	14.5	69	10.0	71	20	24	60
504151	1967	26	HTH	MH	14.0				12					1			5	6	18.1	14.5	69	11.5	71	70	84	60

Alternative 2 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by Commercial Thinning	Acres of Meadows Created by Commercial Thinning	Non-Commercial Thinning Acres--Young Stands	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
504158	1962	111	HTH	H	73.0	6			38	67	6		3			6 to 24	5	6	15.3	17	63	16.0	56	365	438	45
504165	1965	35	HTH	MH	25.0				10					2			5	6	14.2	14	53	10.5	61	125	150	50
504180	1978	40	HTH	ML	26.0				14					2			5	6	19.2	14	72	11.0	71	130	156	60
504182	1971	27	HTH	MH	18.0	2			9		2					2 to 8	5	6	18.1	14.5	69	11.0	71	90	108	60
504183	1971	13	HTH	MH	9.0		1		4			6			1 to 2		5	6	16.0	15	62	13.0	61	45	54	50
504394	1956	50	HTH	H	33.0		3		17	11		22			3 to 6		5	6	24.1	19	105	15.0	66	165	198	55
504406	1975	33	DEF	L	0.0				33										37.7	11	125	0.0	190	0	0	190
Southworth Creek Subwatershed																										
504104	1990	23	DEF	ML	0				23										21.7	5.5	51	0.0	300	0	0	300
504110	1966	55	HTH	H	36		3		19			3	11		3 to 6		5	6	16.0	15	62	14.5	61	180	216	50
504117	1974	31	HTH	MH	20				11										16.1	13.5	59	12.0	60	0	0	60
504118	1969	49	HTH	H	32		3		17	0	0	11			3 to 6		5	6	19.3	16	77	14.0	46/66	160	192	35/55
504121	1990	30	DEF	L	0				30										22.4	5	50	0.0	365	0	0	365
504125	1984	99	DEF	L	0				99										25.3	9.5	78	0.0	160	0	0	160
504126	1973	16	HTH	M	10				6	5				1			5	6	15.3	13	55	10.5	71	50	60	60
504131	1982	122	DEF	L	0				122										19.7	9	59	0.0	134	0	0	134
504133	1969	30	HTH	MH	20				10					2			5	6	16.0	14	60	11.5	61/71	100	120	50/60
504135	1969	24	HTH	MH	16				8					1			5	6	14.2	14	53	13.0	61	80	96	50
504146	1973	11	HTH	ML	7	1			4		1			1		1 to 4	5	6	13.3	13.5	49	11.5	61	35	42	50
504198	1974	33	HTH	ML	21				12					2			5	6	17.1	14	64	13.0	71	105	126	60
504201	1973	3	DEF	L	0				3										25.9	10	82	0.0	150	0	0	150
504213	1963	191	HTH	H	125	10			66		0			5		10 to 40	5	6	19.7	14.5	75	16.0	81	625	750	70
504222	1961	95	HTH	H	62	5			33		0					5 to 20	5	6	24.9	15.5	98	15.0	86	310	372	75
504407	1971	14	HTH	M	9				5					1			5	6	20.0	14	75	11.0	81	45	54	70
506179	1968	25	HTH	M	22	2			3	0						2 to 8	5	6	19.1	15	74	13.0	71	110	132	60

Alternative 2 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by Commercial Thinning	Acres of Meadows Created by Commercial Thinning	Non-Commercial Thinning Acres--Young Stands	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
Eckman Creek Subwatershed																									
504127	1992	51	DEF	L	0				51										9.4	5.5	22	0.0	140	0	0	140
504134	1983	31	HTH	L	20				11					1			5	6	13.3	12.5	47	12.0	66	100	120	55
504140	1982	17	DEF	L	0				17										22.0	11	73	0.0	110	0	0	110
504144	1979	61	HTH	MH	42	5			19	12	5					5 to 20	5	6	16.0	15	62	12.5	61	210	252	50
504153	1966	9	HTH	MH	6				3								5	6	14.7	13.5	54	12.5	66	30	36	55
504177	1966	25	HTH	H	10				15	10				1			5	6	17.5	16	70	14.5	61	50	60	50
504185	1979	2	SPC	ML	0			2	0										16.6	8	47	0.0	134	0	0	134
504192	1974	14	HTH	MH	9				5					1			5	6	16.1	13.5	59	11.0	71	45	54	60
504207	1967	12	HTH	MH	8				4					1			5	6	19.3	16	77	12.0	66	40	48	55
504208	1959	44	DEF	MH	0				44		0								73.5	14	275	0.0	260	0	0	260
504212	1982	12	DEF	L	0				12										21.7	9.5	67	0.0	134	0	0	134
504240	1984	13	DEF	L	0				13										19.9	11	66	0.0	100	0	0	100
504280	1952	525	DEF	H	0				525										111	15	430	0.0	400	0	0	400
504280A	1952	61	HTH	H	19				42		0			2			5	6	24.5	16	98	14.0	76	95	114	65
504280B	1951	24	DEF	MH	0				24								0	0	25.7	14.5	98	13.0	425	0	0	425
504280C	1941	46	HTH	H	10	4	1		36		0	5			1 to 2	5 to 20	5	6	25.0	18	106	15.0	71	50	60	60
504280D	1955	37	HTH	H	22	2			15		2					2 to 8	5	6	28.6	17	118	17.0	86	110	132	75
504280E	1952	88	HTH	H	24	5			64		5					5 to 20			23.1	15.5	91	18.0	70	0	0	70
504280F	1954	46	HTH	H	10				36		0						0		26.3	16	105	17.0	75	0	0	75
504280G	1949	70	HTH	H	30	5			40		5					5 to 20			31.0	17	128	19.0	80	0	0	80
504280H	1962	10	HTH	H	8		1		2		0	8			1 to 2		5	6	16.0	15	62	12.0	61	40	48	50
504299	1981	35	DEF	L	0				35										34.1	12	118	0.0	150	0	0	150
504320	1977	124	HTH	MH	81				43					8			5	6	14.1	12.5	50	10.5	66	405	486	55
504324	1988	44	SPC	MH	0			44	0										18.7	8	53	0.0	150	0	0	150
504334	1977	4	HTH	H	3				1								5	6	18.6	15	72	11.0	66	15	18	55
504400	N/A	9	DEF	H	0				9										117	12	405	0.0	515	0	0	515
504404	N/A	38	HSG	H	6	6			32		6					6 to 24	2	3	2.0	16.5	8	50.0	11	12	18	6
504179A	1975	334	HTH	MH	222	20	2		112		0	6			2 to 4	20 to 80	5	6	17.8	13	64	12.0	81	1110	1332	70

Alternative 2 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by Commercial Thinning	Acres of Meadows Created by Commercial Thinning	Non-Commercial Thinning Acres--Young Stands	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
504179B	1981	167	HTH	L	112	10	2		55		10	4			2 to 4	10 to 40	5	6	17.8	13	64	12.0	81	560	672	70
504179C	1976	35	HTH	ML	23				12					2			5	6	15.9	12	55	10.5	86	115	138	75
506005	1977	5	HTH	H	5				0								5	6	18.6	15	72	11.0	66	25	30	75
Lower Alsea River Subwatershed																										
504023	1989	11	DEF	L	0				11										15.1	6	37	0.0	190	0	0	190
504157	1990	11	DEF	L	0				11										35.9	7	95	0.0	140	0	0	140
504159	1990	48	DEF	L	0				48										35.9	7	95	0.0	140	0	0	140
504188	1965	60	HTH	MH	39	3			21		3					3 to 12	5	6	19.1	15	74	13.5	71	195	234	60
504189	1975	55	HTH	M	21		2		34			11			2 to 4		5	6	21.0	16	84	11.0	71	105	126	60
504191	1984	66	HTH	L	43				23					4			5	6	14.2	15	55	8.0	56	215	258	45
504209	1969	26	HTH	MH	18	2			8		2					2 to 8	5	6	16.0	15	62	13.5	61	90	108	50
504211	1976	39	HTH	MH	26	3	1		13		3	3			1 to 2	3 to 12	5	6	18.3	15.5	72	11.5	66	130	156	55
504218	1969	16	HTH	M	6				10								5	6	16.0	15	62	13.0	61	30	36	50
504228	1983	8	HTH	L	5				3								5	6	14.7	14	55	8.0	61	25	30	50
504231	1961	42	HTH	MH	30	5			12		5					5 to 20	5	6	27.1	20	121	15.0	66	150	180	55
504233	1981	43	HTH	L	28				15					3			5	6	17.7	18	75	8.0	61	140	168	50
505094	1961	9	HTH	H	6				3								5	6	16.0	15	62	13.5	61	30	36	50
505097	1978	20	DEF	MH	0				20										49.8	12.5	176	0.0	210	0	0	210
505121	1980	19	DEF	L	0				19										27.1	12	94	0.0	120	0	0	120
Lower Canal Creek Subwatershed																										
504169	1956	11	DEF	L	0				11										51.5	10	163	0.0	300	0	0	300
504178	1973	22	HTH	M	14	1			8		1		4			1 to 4	5	6	14.0	16	56	15.0	51	70	84	40
504178	1973	22	HTH	M	15	2			7		2					2 to 8	5	6	14.0	16	56	15.0	51	75	90	40
504195	1952	28	DEF	L	0				28										26.6	16.5	108	0.0	75	0	0	75
504196	1964	70	HTH	H	45	3	4		25	31	3	11			4 to 8	3 to 12	5	6	17.5	16	70	16.5	61	225	270	50

Alternative 2 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by Commercial Thinning	Acres of Meadows Created by Commercial Thinning	Non-Commercial Thinning Acres--Young Stands	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
504214	1962	5	HTH	H	3				2								5	6	26.4	15.5	104	12.5	81	15	18	70
504214	1962	40	HTH	H	26				14	13				2			5	6	19.8	15.5	78	14.0	71	130	156	60
504215	1957	149	HTH	H	91	2	7		58	40	2	24	1		7 to 14	2 to 8	5	6	12.3	16	49	15.0	46	455	546	35
504216	1956	11	HTH	MH	7				4	4				1			5	6	17.5	16	70	13.5	61	35	42	50
504230	1966	62	HTH	H	37				25	37	0			3			5	6	15.8	16	63	13.5	56	185	222	45
504234	1978	43	HTH	ML	28		3		15			22			3 to 6		5	6	14.2	14	53	13.5	61	140	168	50
504235	1965	69	HTH	M	41				28		0			4			5	6	23.8	15	92	12.0	76	205	246	65
504237	1979	133	HTH	ML	88		9		45			50			9 to 18		5	6	14.2	15	55	12.5	56	440	528	45
504245	1954	40	HTH	MH	26	2			14	0	2					2 to 8	5	6	19.1	18	81	15.0	56	130	156	45
504247	1984	39	DEF	L	0				39										18.9	8.5	55	0.0	145	0	0	145
504251	1984	60	DEF	L	0				60										23.7	9	71	0.0	160	0	0	160
504253	1964	36	HTH	H	23				13	23				2			5	6	16.5	15.5	65	14.0	61	115	138	50
504263	1981	78	DEF	L	0				78										35.9	11	119	0.0	180	0	0	180
504269	1965	11	HTH	MH	7				4	3				1			5	6	12.8	14	48	13.0	56	35	42	45
504272	1987	56	DEF	L	0				56										30.2	9.5	93	0.0	190	0	0	190
504277	1965	26	HTH	H	18	2			8	16	2					2 to 8	5	6	15.8	14.5	60	14.5	61	90	108	50
504282	1986	62	DEF	L	0				62										27.9	9.5	86	0.0	180	0	0	180
504283	1956	12	HTH	M	9				3					1			5	6	18.0	16.5	73	12.5	51	45	54	40
504288	1989	12	DEF	L	0				12										24.3	6.5	62	0.0	270	0	0	270
504289	1964	13	HTH	H	10	2			3	8	2		2			2 to 8	5	6	17.3	15	67	14.0	61	50	60	50
504295	1967	76	HTH	MH	57	4			19	15	4			1		4 to 16	5	6	17.3	15	67	13.5	61	285	342	50
504296	1965	7	HTH	H	5				2	5							5	6	13.3	13.5	49	13.5	61	25	30	50
504297	1990	55	DEF	L	0				55										22.3	8	63	0.0	180	0	0	180
504302	1988	6	DEF	L	0				6										16.4	7.5	45	0.0	150	0	0	150
504322	1986	59	DEF	L	0				59										17.7	8	50	0.0	170	0	0	170
504323	1987	58	DEF	L	0				58										28.6	11.5	97	0.0	135	0	0	135
504325	1991	6	DEF	L	0				6										15.9	6	39	0.0	200	0	0	200
504329	1966	53	HTH	MH	35				18	18				3			5	6	18.1	14.5	69	14.0	71	175	210	60
504344	1966	15	HTH	MH	10			2	3					1			5	6	22.8	17	94	12.5	71	50	60	60
504345	1964	30	HTH	H	19	1			11		1					1 to 4	5	6	21.0	18	89	14.0	66	95	114	55

Alternative 2 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by Commercial Thinning	Acres of Meadows Created by Commercial Thinning	Non-Commercial Thinning Acres--Young Stands	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
504357	1963	51	HTH	H	34	3			17	31	3					3 to 12	5	6	19.4	17	80	15.0	61	170	204	50
504357	1963	10	HTH	H	7				3					1			5	6	26.0	16	104	13.5	81	35	42	70
504361	1970	23	HTH	M	12				11	4				1			5	6	11.5	14	43	12.0	51	60	72	40
506178	1976	71	HTH	H	36		5		35		0	36			5 to 10		5	6	22.6	14.5	86	12.5	66	180	216	55
506178	1976	19	HTH	H	19				0		0	0		2			5	6	22.6	14.5	86	12.0	81	95	114	70
Risley Creek Subwatershed																										
504038	1973	40	HTH	M	33		5		7			33			5 to 10		5	6	17.8	13	64	15.0	66	165	198	55
504042	1955	61	HTH	H	31		4		30			19			4 to 8		5	6	18.1	19.5	80	14.0	51	155	186	40
504047	1988	46	DEF	L	0				46										23.3	7.1	62	0.0	230	0	0	230
504048	1964	31	HTH	H	19		3		12		0	8			3 to 6		5	6	15.8	16	63	14.0	51/61	95	114	40/50
504051	1962	97	HTH	H	78		9		19	0	0	78			9 to 18		5	6	16.5	16.5	67	17.0	56	390	468	45
504054	1983	44	DEF	L	0				44										22.0	9	66	0.0	150	0	0	150
504055	1954	4	HTH	M	4				0								5	6	19.5	20	87	14.0	51	20	24	40
504058	1967	30	HTH	H	18				12	18	0			1			5	6	17.6	15	68	14.0	51	90	108	40
504064	1953	41	HTH	MH	8				33					1			5	6	19.1	18	81	14.5	56	40	48	45
504066	1973	2	DEF	L	0				2										31.8	15	123	0.0	100	0	0	100
504070	1973	12	DEF	H	0				12										64.1	8.5	187	0.0	480	0	0	480
504071	1972	12	HTH	M	8	1			4		1					1 to 4	5	6	17.8	13	64	12.0	81	40	48	70
504072	1955	8	HTH	M	6				2								5	6	20.9	21	96	15.0	51	30	36	40
504077	1981	14	DEF	L	0				14										32.6	10	103	0.0	190	0	0	190
504078	1984	35	DEF	L	0				35										20.6	8.5	60	0.0	150	0	0	150
504081	1951	54	HTH	H	5				49	5							5	6	19.3	18.5	83	14.0	56	25	30	45
504082	1954	18	HTH	M	11				7	0				1			5	6	17.2	18.5	74	14.0	51	55	66	40
504083	1984	19	DEF	L	0				19										27.8	10	88	0.0	160	0	0	160
504084	1973	6	HTH	MH	6		1		0			6			1 to 2				22.6	14.5	86	12.0	75	0	0	75
504099	1958	4	DEF	L	0				4										10.2	24	50	0.0	15	0	0	15
504106	1969	68	HTH	H	46	1	4		22		1	22			4 to 8	1 to 4	5	6	16.1	13.5	59	13.5	71	230	276	60
504123	1983	12	DEF	L	0				12										29.4	12	102	0.0	130	0	0	130

Alternative 2 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by Commercial Thinning	Acres of Meadows Created by Commercial Thinning	Non-Commercial Thinning Acres--Young Stands	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
Upper Canal Creek Subwatershed																									
504266	1986	66	DEF	L	0				66										10.6	8	30	0.0	180	0	0	180
504284	1980	100	HTH	M	62	2			38		2			4		2 to 8	5	6	19.1	13	69	11.5	86	310	372	75
504284	1980	48	HTH	M	31	2			17		2			1		2 to 8	5	6	16.6	13	60	12.5	76	155	186	65
504308	1962	47	HTH	H	31	3			16	28	3					3 to 12	5	6	15.8	15	61	15.0	61	155	186	50
504313	1990	42	DEF	L	0				42										85.3	5.5	200	0.0	200	0	0	200
504314	1990	20	DEF	L	0				20										11.6	5	26	0.0	190	0	0	190
504316	1973	68	HTH	M	44	3			24		3			1		3 to 12	5	6	19.1	15	74	13.0	71	220	264	60
504317	1990	30	DEF	L	0				30										14.0	4	28	0.0	325	0	0	325
504318	1959	18	HTH	H	13	2			5	11	2					2 to 8	5	6	15.8	16	63	14.0	56	65	78	45
504321	1979	63	HTH	M	40	2			23		2			1		2 to 8	5	6	17.1	14	64	12.5	71	200	240	60
504330	1960	29	HTH	MH	25		4		4			25			4 to 8		5	6	23.1	15.5	91	11.0	81	125	150	70
504330	1960	59	HTH	MH	38				21	19				3			5	6	19.4	17	80	13.0	61	190	228	50
504335	1990	66	DEF	L	0				66										22.4	6.5	57	0.0	250	0	0	250
504336	1981	5	DEF	L	0				5										17.7	9	53	0.0	120	0	0	120
504338	1964	41	HTH	H	25				16		0			2			5	6	23.1	15.5	91	13.0	76	125	150	65
504338	1964	29	HTH	H	19		2		10	0	0	18			2 to 4		5	6	17.6	15	68	14.0	66	95	114	55
504339	1986	39	DEF	L	0				39										37.0	10.5	120	0.0	200	0	0	200
504343	1975	5	HTH	M	3				2	3			2				5	6	13.4	14	50	8.0	56	15	18	45
504347	1973	73	HTH	M	46	2			27		2			2		2 to 8	5	6	21.3	14.5	81	12.0	81	230	276	70
504347	1973	148	HTH	H	94	5			54	89	5			4		5 to 20	5	6	16.5	14.5	63	13.0	66	470	564	55
504353	1985	60	DEF	L	0				60										25.9	10	82	0.0	150	0	0	150
504358	1979	63	HTH	M	41	3			22		3					3 to 12	5	6	18.4	14	69	13.0	76	205	246	65
504360	1969	34	HTH	H	22	2			12	20	2					2 to 8	5	6	16.8	15.5	66	14.0	61	110	132	50
504364	1993	28	SPC	M	0			28	0									0	9.4	5.5	22	0.0	135	0	0	135
504365	1979	11	HTH	L	11		2		0			11			2 to 4		5	6	17.4	14	65	13.0	61	55	66	50
504365	1979	27	HTH	L	17				10			0			0		5	6	18.0	13	65	12.0	81	85	102	70

Alternative 2 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by Commercial Thinning	Acres of Meadows Created by Commercial Thinning	Non-Commercial Thinning Acres--Young Stands	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
504367	1966	12	HTH	H	12		2		0	0	0	12			2 to 4		5	6	12.7	15	49	15.0	51	60	72	40
504367	1966	42	HTH	H	32	1.5			11	28	1.5			1		1.5 to 6	5	6	15.8	14	59	14.0	66	158	189	55
504369	1990	69	SPC	M	0			69	0										19.8	8	56	0.0	160	0	0	160
504374	1969	59	HTH	H	37	2			22	25	2					2 to 8	5	6	15.2	14.5	58	15.0	61	185	222	50
504375	1987	68	DEF	L	0				68										20.7	9	62	0.0	140	0	0	140
504376	1960	12	HTH	M	8				4			8		1			5	6	15.6	18	66	14.0	51	40	48	40
504376	1960	67	HTH	M	44				23					4			5	6	23.0	17	95	12.0	71	220	264	60
504378	1963	50	HTH	H	33				17					3			5	6	17.4	14	65	10.0	71	165	198	60
504379	1961	57	HTH	H	36	2			21	34	2			1		2 to 8	5	6	17.2	17	71	15.0	56	180	216	45
504380	1990	13	DEF	L	0				13										12.5	5	28	0.0	205	0	0	205
504381	1970	55	HTH	MH	36				19					3			5	6	14.7	14	55	12.0	56	180	216	45
504382	1987	40	DEF	L	0				40										20.7	9	62	0.0	140	0	0	140
504383	1979	247	HTH	ML	161				86					16			5	6	20.0	14	75	12.0	81	805	966	70
504387	1961	78	HTH	MH	26				52		0			2			5	6	14.2	14	53	13.5	61	130	156	50
506182	1976	47	HTH	M	31				16					3			5	6	17.8	13	64	11.0	81	155	186	70
Drift Creek Subwatershed																										
503118	1990	60	DEF	L	0				60										17.1	5.5	40		250	0	0	250
503119	1973	20	DEF	MH	0				20										49.7	11	165	0.0	250	0	0	250
503120	1948	7	DEF	L	0				7										51.0	7	135		200	0	0	200
503121	1973	22	HTH	MH	14				8					1			5	6	15.5	13	56	12.0	71	70	84	60
503126	1977	90	HTH	H	59				31	45				6			5	6	15.8	14	59	11.5	66	295	354	55
503128	1972	72	HTH	MH	51	4			21		4					4 to 16	5	6	16.5	15.5	65	13.0	61	255	306	50
503134	1989	39	DEF	ML	0				39										22.4	6.5	57		250	0	0	250
503135	1972	4	DEF	M	0				4										43.5	10.5	141		235	0	0	235
503136	1984	41	DEF	L	0				41										25.9	10.5	84		140	0	0	140

Alternative 2 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by Commercial Thinning	Acres of Meadows Created by Commercial Thinning	Non-Commercial Thinning Acres--Young Stands	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
503142	1988	25	DEF	L	0				25										9.8	5	22		160	0	0	160
503149	1971	46	HTH	H	30				16	30				3			5	6	17.8	13	64	10.5	61	150	180	50
503158	1979	43	HTH	M	28				15					3			5	6	17.0	12.5	60	10.5	81	140	168	70
503159	1989	33	DEF	L	0				33										6.1	6	15		75	0	0	75
503160	1942	13	HTH	H	12				1					1			5	6	25.7	24	126	23.0	51	60	72	40
503161	1993	10	SPC	M	0			10	0										17.0	4.5	36	0.0	134	0	0	134
503162	1984	24	HTH	H	12				12	12				1			1	1	21.4	14	80	10.0	62	12	12	60
503163	1979	34	DEF	H	0				34										35.8	10.5	116	0.0	194	0	0	194
503164	1993	10	DEF	H	0				10										11.6	5	26		134	0	0	134
503165	1985	36	DEF	L	0				36										30.2	7	80		300	0	0	300
503166	1982	18	HTH	M	12				6	0	0			1			5	6	13.6	12	47	11.0	71	60	72	60
503167	1982	46	HTH	M	33				13					4			5	6	17.1	14	64	12.0	71	165	198	60
503168	1982	20	HTH	MH	16				4	8				1			5	6	12.8	13	46	11.5	61	80	96	50
503169	1980	157	DEF	H	0				157										28.7	9	86		194	0	0	194
503170	1985	42	HTH	M	34		4		8	0		30	11		4 to 8		5	6	14.7	13	53	12.0	61	170	204	50
503171	1980	78	HTH	MH	51				27					5			2	3	15.9	12	55	11.0	75	102	153	70
503172	1984	8	HTH	M	4				4	4							5	6	12.1	11	40	9.0	71	20	24	60
503173	1984	19	DEF	MH	0				19				31						6.9	12	24		30	0	0	30
504023	1989	10	DEF	L	0				10										37.6	10	119		150	0	0	150
TOTALS		**10,415**			**4,568**	**170**	**126.5**	**238**	**5610**	**868**	**129**	**733**	**70.5**	**163**										**26690**	**22530**	

Key

Silvicultural Prescriptions

HTH = Commercial Thinning
HSG = Gap Creation
SPC = Non-Commercial Thinning
DEF = Treatment is Deferred

Silvicultural Treatment Priorities

H = High Priority for Treatment
M = Moderate Priority for Treatment
L = Low Priority for silvicultural Treatment
* See Appendix A, Design Criteria, for Priority Definitions

Alternative 3 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by the Commercial Thinning	Acres of Meadows Created by the Commercial Thinning	Acres of Young Stands Non-Commercially Thinned	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
Arnold Creek Subwatershed																									
504109	1979	73	HTH	H	48		5		25			26		0	5 to 10		5	6	18.1	12.5	64	11.0	61/81	240	288	50/70
504111	1968	39	HTH	H	25				14	12				2			5	6	18.5	13.5	68	13.5	71	125	150	60
504124	1973	46	HTH	MH	31	3			15	25	3			0		3 to 12	5	6	11.5	14	43	12.0	51	155	186	40
504156	1976	22	HTH	H	14				8					1			5	6	16.6	13	60	12.0	76	70	84	65
504161	1959	6	HTH	M	4				2					0			5	6	22.8	16	91	13.0	76	20	24	65
504162	1965	18	HTH	M	12				6					1			5	6	16.0	15	62	12.5	61	60	72	50
504170	1954	52	HTH	M	31		3		21			24		0	3 to 6		5	6	23.1	16.5	94	14.0	76	155	186	65
504171	1973	39	HTH	ML	27	2	1		12		2	3		0	1 to 2	2 to 8	5	6	22.2	15	86	12.5	56/76	135	162	45/65
504172	1968	73	HTH	M	48	4			25	22	4					8 to 16	5	6	19.7	14.5	75	12.5	71	240	288	60
504174	1956	4	HTH	L	2				2								5	6	18.9	18	80	13.0	56	10	12	45
504176	1955	8	HTH	MH	5				3								5	6	15.8	17.5	66	13.5	51	25	30	40
504194	1956	7	HTH	M	4				3								5	6	17.2	16.5	70	14.5	56	20	24	45
504226	1968	43	HTH	M	28				15	14				3			5	6	13.1	14.5	50	11.5	56	140	168	45
504227	1976	6	HTH	MH	5		0.5		1			4			1		5	6	14.2	14	53	13.0	61	25	30	50
504229	1976	124	HTH	M	77	3	3		47		3	11	2	1	3 to 6	6 to 12	5	6	16.8	15	65	12.5	61	385	462	50
504243	1963	30	HTH	MH	18				12					2			5	6	17.5	17	72	16.0	56	90	108	45
504408	1971	52	HTH	M	34				18					3			5	6	22.2	15	86	13.0	81	170	204	70

Alternative 3 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by the Commercial Thinning	Acres of Meadows Created by the Commercial Thinning	Acres of Young Stands Non-Commercially Thinned	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
Barclay Creek Subwatershed																									
503153	1965	38	HTH	M	33		5		5			33			10 to 20		5	6	17.6	15	68	5.0	66	165	198	55
503155	1956	4	HTH	H	4		0.5		0			4			1 to 2		5	6	25.8	17.5	108	5.0	61	20	24	50
503156	1956	33	HTH	H	22		2		11			22			3 to 6		5	6	25.8	17.5	108	12.0	61	110	132	50
504032	1965	27	HTH	L	13		2		14			18			8		5	6	19.3	16	77	12.5	66	65	78	55
504035	1966	6	HTH	H	4				2								5	6	16.3	16	65	15.0	61	20	24	50
504037	1979	91	HTH	M	59		6		32			43			6 to 12		5	6	17.6	15	68	14.0	66	295	354	55
504041	1957	38	HTH	MH	26		3		12			13			3 to 6		5	6	24.7	18	105	14.5	66	130	156	55
504049	1989	30	SPC	M	0			30	0										3.1	4.5	6.5	0.0	195	0	0	195
504050	1965	22	HTH	MH	14		1		8	11		4			1 to 2		5	6	19.7	16.5	80	13.5	66	70	84	55
504060	1980	18	HTH	L	16		2		2			16			2 to 4		5	6	21.1	17	87	13.0	66	80	96	55
504062	1985	11	DEF	L	0				11										24.0	8.5	70	0.0	180	0	0	180
504063	1989	32	DEF	L	0				32										14.3	6	35	0.0	180	0	0	180
504065	1990	53	SPC	MH	0			53	0										17.3	6.5	44	0.0	195	0	0	195
504069	1984	3	DEF	L	0				3										18.4	8	52	0.0	150	0	0	150
504075	1985	18	DEF	L	0				18										28.0	9	84	0.0	190	0	0	190
504076	1975	12	HTH	H	8		1		4	5		3			2 to 4		5	6	15.6	12.5	55	11.0	66/76	40	48	55/65
504080	1967	42	HTH	H	27		3		15	21		9			3 to 6		5	6	16.5	14.5	63	12.0	66	135	162	55
504097	1971	55	HTH	M	33				22					3			5	6	16.5	15.5	65	12.0	61	165	198	50
504101	1956	7	DEF	L	0				7										39.4	20	176	0.0	80	0	0	80
504105	1954	31	HTH	MH	10				21					1			5	6	5.5	16	22	11.0	56	50	60	45
504116	1961	2	DEF	L	0				2										28.6	17	118	0.0	75	0	0	75
504119	1954	14	DEF	H	0				14										65.7	14	246	0.0	230	0	0	230
504129	1955	6	HTH	M	3		0.5		3			3			1		5	6	17.4	18.5	75	16.0	51	15	18	40
504132	1961	17	HTH	H	13	2			4	13	2					2 to 8	5	6	15.2	14.5	58	15.0	61	65	78	50
504137	1968	18	HTH	H	10				8	10				1			5	6	17.1	14	64	13.5	71	50	60	60
504138	1970	18	DEF	L	0				18										27.1	12	94	0.0	120	0	0	120
504147	1967	6	HTH	MH	4				2								5	6	18.1	14.5	69	10.0	71	20	24	60
504151	1967	26	HTH	MH	14				12					1			5	6	18.1	14.5	69	11.5	71	70	84	60

Alternative 3 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by the Commercial Thinning	Acres of Meadows Created by the Commercial Thinning	Acres of Young Stands Non-Commercially Thinned	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
504158	1962	111	HTH	H	73	6			38	67	6					6 to 24	5	6	15.3	17	63	16.0	56	365	438	45
504165	1965	35	HTH	MH	24				11					2			5	6	14.2	14	53	10.5	61	120	144	50
504180	1978	40	HTH	ML	25				15					2			5	6	19.2	14	72	11.0	71	125	150	60
504182	1971	27	HTH	MH	17	2			10		2					2 to 8	5	6	18.1	14.5	69	11.0	71	85	102	60
504183	1971	13	HTH	MH	9		1		4			6			1 to 2		5	6	16.0	15	62	13.0	61	45	54	50
504394	1956	50	HTH	H	29		3		21	11		22			3 to 6		5	6	24.1	19	105	15.0	66	145	174	55
504406	1975	33	DEF	L	0				33										37.7	11	125	0.0	190	0	0	190
Southworth Creek Subwatershed																										
504104	1990	23	DEF	ML	0				23										21.7	5.5	51	0.0	300	0	0	300
504110	1966	55	HTH	H	36		3		19			3	11		3 to 6		5	6	16.0	15	62	14.5	61	180	216	50
504117	1974	31	HTH	MH	20				11										16.1	13.5	59	12.0	60	0	0	60
504118	1969	49	HTH	H	27		2		22			9			3 to 6		5	6	19.3	16	77	14.0	46/66	135	162	35/55
504121	1990	30	DEF	L	0				30										22.4	5	50	0.0	365	0	0	365
504125	1984	99	DEF	L	0				99										25.3	9.5	78	0.0	160	0	0	160
504126	1973	16	HTH	M	10				6	5				1			5	6	15.3	13	55	10.5	71	50	60	60
504131	1982	122	DEF	L	0				122										19.7	9	59	0.0	134	0	0	134
504133	1969	30	HTH	MH	16				14					2			5	6	16.0	14	60	11.5	61/71	80	96	50/60
504135	1969	24	HTH	MH	16				8					1			5	6	14.2	14	53	13.0	61	80	96	50
504146	1973	11	HTH	ML	7	1			4		1			1		1 to 4	5	6	13.3	13.5	49	11.5	61	35	42	50
504198	1974	33	HTH	ML	21				12					2			5	6	17.1	14	64	13.0	71	105	126	60
504201	1973	3	DEF	L	0				3										25.9	10	82	0.0	150	0	0	150
504213	1963	191	HTH	H	125	10			66					5		10 to 40	5	6	19.7	14.5	75	16.0	81	625	750	70
504222	1961	95	HTH	H	62	5			33							5 to 20	5	6	24.9	15.5	98	15.0	86	310	372	75
504407	1971	14	HTH	M	9				5					1			5	6	20.0	14	75	11.0	81	45	54	70
506179	1968	25	HTH	M	22	2			3							2 to 8	5	6	19.1	15	74	13.0	71	110	132	60
Eckman Creek Subwatershed																										

Alternative 3 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by the Commercial Thinning	Acres of Meadows Created by the Commercial Thinning	Acres of Young Stands Non-Commercially Thinned	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
504127	1992	51	DEF	L	0				51										9.4	5.5	22	0.0	140	0	0	140
504134	1983	31	HTH	L	20				11					1			5	6	13.3	12.5	47	12.0	66	100	120	55
504140	1982	17	DEF	L	0				17										22.0	11	73	0.0	110	0	0	110
504144	1979	61	HTH	MH	37	3			24	10	3					5 to 20	5	6	16.0	15	62	12.5	61	185	222	50
504153	1966	9	HTH	MH	6				3								5	6	14.7	13.5	54	12.5	66	30	36	55
504177	1966	25	HTH	H	10				15	10				1			5	6	17.5	16	70	14.5	61	50	60	50
504185	1979	2	SPC	ML	0			2	0										16.6	8	47	0.0	134	0	0	134
504192	1974	14	HTH	MH	9				5					1			5	6	16.1	13.5	59	11.0	71	45	54	60
504207	1967	12	HTH	MH	8				4					1			5	6	19.3	16	77	12.0	66	40	48	55
504208	1959	44	DEF	MH	0				44										73.5	14	275	0.0	260	0	0	260
504212	1982	12	DEF	L	0				12										21.7	9.5	67	0.0	134	0	0	134
504240	1984	13	DEF	L	0				13										19.9	11	66	0.0	100	0	0	100
504280	1952	525	DEF	H	0				525										111	15	430	0.0	400	0	0	400
504280A	1952	61	HTH	H	13				48					2			5	6	24.5	16	98	14.0	76	65	78	65
504280B	1951	24	DEF	MH	0				24								0	0	25.7	14.5	98	13.0	425	0	0	425
504280C	1941	46	HTH	H	10	5	1		36			5			1 to 2	5 to 20	5	6	25.0	18	106	15.0	71	50	60	60
504280D	1955	37	HTH	H	22	2			15		2					2 to 8	5	6	28.6	17	118	17.0	86	110	132	75
504280E	1952	88	HTH	H	24	3			64		3					5 to 20			23.1	15.5	91	18.0	70	0	0	70
504280F	1954	46	HTH	H	10				36								0		26.3	16	105	17.0	75	0	0	75
504280G	1949	70	HTH	H	30	5			40		5					5 to 20			31.0	17	128	19.0	80	0	0	80
504280H	1962	10	HTH	H	8		1		2			8			1 to 2		5	6	16.0	15	62	12.0	61	40	48	50
504299	1981	35	DEF	L	0				35										34.1	12	118	0.0	150	0	0	150
504320	1977	124	HTH	MH	81				43					8			5	6	14.1	12.5	50	10.5	66	405	486	55
504324	1988	44	SPC	MH	0			44	0										18.7	8	53	0.0	150	0	0	150
504334	1977	4	HTH	H	3				1								5	6	18.6	15	72	11.0	66	15	18	55
504400	N/A	9	DEF	H	0				9										117	12	405	0.0	515	0	0	515
504404	N/A	38	HSG	H	3	3			35		3					6 to 24	2	3	2.0	16.5	8	50.0	11	6	9	6
504179A	1975	334	HTH	MH	222	20	2		112			6			2 to 4	20 to 80	5	6	17.8	13	64	12.0	81	1110	1332	70
504179B	1981	167	HTH	L	112	10	2		55		10	4			2 to 4	10 to 40	5	6	17.8	13	64	12.0	81	560	672	70
504179C	1976	35	HTH	ML	23				12					2			5	6	15.9	12	55	10.5	86	115	138	75
506005	1977	5	HTH	H	5				0								5	6	18.6	15	72	11.0	66	25	30	55

Alternative 3 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by the Commercial Thinning	Acres of Meadows Created by the Commercial Thinning	Acres of Young Stands Non-Commercially Thinned	Acres Deferred From Commercial or Non-commercial Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
Lower Alsea River Subwatershed																									
504023	1989	11	DEF	L	0				11										15.1	6	37	0.0	190	0	0	190
504157	1990	11	DEF	L	0				11										35.9	7	95	0.0	140	0	0	140
504159	1990	48	DEF	L	0				48										35.9	7	95	0.0	140	0	0	140
504188	1965	60	HTH	MH	39	3			21		3					3 to 12	5	6	19.1	15	74	13.5	71	195	234	60
504189	1975	55	HTH	M	21		2		34			11			2 to 4		5	6	21.0	16	84	11.0	71	105	126	60
504191	1984	66	HTH	L	43				23					4			5	6	14.2	15	55	8.0	56	215	258	45
504209	1969	26	HTH	MH	18	2			8		2					2 to 8	5	6	16.0	15	62	13.5	61	90	108	50
504211	1976	39	HTH	MH	23	1	1		16		1	1			1 to 2	1 to 4	5	6	18.3	15.5	72	11.5	66	115	138	55
504218	1969	16	HTH	M	6				10								5	6	16.0	15	62	13.0	61	30	36	50
504228	1983	8	HTH	L	5				3								5	6	14.7	14	55	8.0	61	25	30	50
504231	1961	42	HTH	MH	30	5			12		5					5 to 20	5	6	27.1	20	121	15.0	66	150	180	55
504233	1981	43	HTH	L	28				15					3			5	6	17.7	18	75	8.0	61	140	168	50
505094	1961	9	HTH	H	6				3								5	6	16.0	15	62	13.5	61	30	36	50
505097	1978	20	DEF	MH	0				20										49.8	12.5	176	0.0	210	0	0	210
505121	1980	19	DEF	L	0				19										27.1	12	94	0.0	120	0	0	120
Lower Canal Creek Subwatershed																									
504169	1956	11	DEF	L	0				11										51.5	10	163	0.0	300	0	0	300
504178	1973	22	HTH	M	14	1			8		1					1 to 4	5	6	14.0	16	56	15.0	51	70	84	40
504178	1973	22	HTH	M	15	2			7		2					2 to 8	5	6	14.0	16	56	15.0	51	75	90	40
504195	1952	28	DEF	L	0				28										26.6	16.5	108	0.0	75	0	0	75
504196	1964	70	HTH	H	45	3	4		25	31	3	11			4 to 8	3 to 12	5	6	17.5	16	70	16.5	61	225	270	50
504214	1962	5	HTH	H	3				2								5	6	26.4	15.5	104	12.5	81	15	18	70
504214	1962	40	HTH	H	26				14	13				2			5	6	19.8	15.5	78	14.0	71	130	156	60
504215	1957	149	HTH	H	91	2	7		58	40	2	24			7 to 14	2 to 8	5	6	12.3	16	49	15.0	46	455	546	35
504216	1956	11	HTH	MH	7				4	4				1			5	6	17.5	16	70	13.5	61	35	42	50

Alternative 3 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by the Commercial Thinning	Acres of Meadows Created by the Commercial Thinning	Acres of Young Stands Non-Commercially Thinned	Acres Deferred From Commercial or Non-commercial Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
504230	1966	62	HTH	H	37				25	37				3			5	6	15.8	16	63	13.5	56	185	222	45
504234	1978	43	HTH	ML	28		3		15			22			3 to 6		5	6	14.2	14	53	13.5	61	140	168	50
504235	1965	69	HTH	M	41				28					4			5	6	23.8	15	92	12.0	76	205	246	65
504237	1979	133	HTH	ML	88		9		45			50			9 to 18		5	6	14.2	15	55	12.5	56	440	528	45

Alternative 3 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by the Commercial Thinning	Acres of Meadows Created by the Commercial Thinning	Acres of Young Stands Non-Commercially Thinned	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
504245	1954	40	HTH	MH	26	2			14		2					2 to 8	5	6	19.1	18	81	15.0	56	130	156	45
504247	1984	39	DEF	L	0				39										18.9	8.5	55	0.0	145	0	0	145
504251	1984	60	DEF	L	0				60										23.7	9	71	0.0	160	0	0	160
504253	1964	36	HTH	H	23				13	23				2			5	6	16.5	15.5	65	14.0	61	115	138	50
504263	1981	78	DEF	L	0				78										35.9	11	119	0.0	180	0	0	180
504269	1965	11	HTH	MH	7				4	3				1			5	6	12.8	14	48	13.0	56	35	42	45
504272	1987	56	DEF	L	0				56										30.2	9.5	93	0.0	190	0	0	190
504277	1965	26	HTH	H	18	2			8	16	2					2 to 8	5	6	15.8	14.5	60	14.5	61	90	108	50
504282	1986	62	DEF	L	0				62										27.9	9.5	86	0.0	180	0	0	180
504283	1956	12	HTH	M	9				3					1			5	6	18.0	16.5	73	12.5	51	45	54	40
504288	1989	12	DEF	L	0				12										24.3	6.5	62	0.0	270	0	0	270
504289	1964	13	HTH	H	10	2			3	8	2					2 to 8	5	6	17.3	15	67	14.0	61	50	60	50
504295	1967	76	HTH	MH	57	4			19	15	4			1		4 to 16	5	6	17.3	15	67	13.5	61	285	342	50
504296	1965	7	HTH	H	5				2	5							5	6	13.3	13.5	49	13.5	61	25	30	50
504297	1990	55	DEF	L	0				55										22.3	8	63	0.0	180	0	0	180
504302	1988	6	DEF	L	0				6										16.4	7.5	45	0.0	150	0	0	150
504322	1986	59	DEF	L	0				59										17.7	8	50	0.0	170	0	0	170
504323	1987	58	DEF	L	0				58										28.6	11.5	97	0.0	135	0	0	135
504325	1991	6	DEF	L	0				6										15.9	6	39	0.0	200	0	0	200
504329	1966	53	HTH	MH	35				18	18				3			5	6	18.1	14.5	69	14.0	71	175	210	60
504344	1966	15	HTH	MH	10			2	3					1			5	6	22.8	17	94	12.5	71	50	60	60
504345	1964	30	HTH	H	19	1			11		1					1 to 4	5	6	21.0	18	89	14.0	66	95	114	55
504357	1963	51	HTH	H	34	3			17	31	3					3 to 12	5	6	19.4	17	80	15.0	61	170	204	50
504357	1963	10	HTH	H	7				3					1			5	6	26.0	16	104	13.5	81	35	42	70
504361	1970	23	HTH	M	12				11	4				1			5	6	11.5	14	43	12.0	51	60	72	40
506178	1976	71	HTH	H	36		5		35			36			5 to 10		5	6	22.6	14.5	86	12.5	66	180	216	55
506178	1976	19	HTH	H	19				0					2			5	6	22.6	14.5	86	12.0	81	95	114	70

Alternative 3 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by the Commercial Thinning	Acres of Meadows Created by the Commercial Thinning	Acres of Young Stands Non-Commercially Thinned	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
Risley Creek Subwatershed																									
504038	1973	40	HTH	M	33		5		7			33			5 to 10		5	6	17.8	13	64	15.0	66	165	198	55
504042	1955	61	HTH	H	31		4		30			19			4 to 8		5	6	18.1	19.5	80	14.0	51	155	186	40
504047	1988	46	DEF	L	0				46										23.3	7.1	62	0.0	230	0	0	230
504048	1964	31	HTH	H	19		3		12			8			3 to 6		5	6	15.8	16	63	14.0	51/61	95	114	40/50
504051	1962	97	HTH	H	78		9		19			78			9 to 18		5	6	16.5	16.5	67	17.0	56	390	468	45
504054	1983	44	DEF	L	0				44										22.0	9	66	0.0	150	0	0	150
504055	1954	4	HTH	M	4				0								5	6	19.5	20	87	14.0	51	20	24	40
504058	1967	30	HTH	H	18				12	18				1			5	6	17.6	15	68	14.0	51	90	108	40
504064	1953	41	HTH	MH	8				33					1			5	6	19.1	18	81	14.5	56	40	48	45
504066	1973	2	DEF	L	0				2										31.8	15	123	0.0	100	0	0	100
504070	1973	12	DEF	H	0				12										64.1	8.5	187	0.0	480	0	0	480
504071	1972	12	HTH	M	8	1			4		1					1 to 4	5	6	17.8	13	64	12.0	81	40	48	70
504072	1955	8	HTH	M	6				2								5	6	20.9	21	96	15.0	51	30	36	40
504077	1981	14	DEF	L	0				14										32.6	10	103	0.0	190	0	0	190
504078	1984	35	DEF	L	0				35										20.6	8.5	60	0.0	150	0	0	150
504081	1951	54	HTH	H	4				50	4							5	6	19.3	18.5	83	14.0	56	20	24	45
504082	1954	18	HTH	M	10				8					1			5	6	17.2	18.5	74	14.0	51	50	60	40
504083	1984	19	DEF	L	0				19										27.8	10	88	0.0	160	0	0	160
504084	1973	6	HTH	MH	5		1		1			5			1 to 2				22.6	14.5	86	12.0	75	0	0	75
504099	1958	4	DEF	L	0				4										10.2	24	50	0.0	15	0	0	15
504106	1969	68	HTH	H	26	1	2		42		1	12			4 to 8	1 to 4	5	6	16.1	13.5	59	13.5	71	130	156	60
504123	1983	12	DEF	L	0				12										29.4	12	102	0.0	130	0	0	130
Upper Canal Creek Subwatershed																										
504266	1986	66	DEF	L	0				66										10.6	8	30	0.0	180	0	0	180

Alternative 3 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by the Commercial Thinning	Acres of Meadows Created by the Commercial Thinning	Acres of Young Stands Non-Commercially Thinned	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
504284	1980	100	HTH	M	59	2			41		2			4		2 to 8	5	6	19.1	13	69	11.5	86	295	354	75
504284	1980	48	HTH	M	31	2			17		2			1		2 to 8	5	6	16.6	13	60	12.5	76	155	186	65
504308	1962	47	HTH	H	31	3			16	28	3					3 to 12	5	6	15.8	15	61	15.0	61	155	186	50
504313	1990	42	DEF	L	0				42										85.3	5.5	200	0.0	200	0	0	200
504314	1990	20	DEF	L	0				20										11.6	5	26	0.0	190	0	0	190
504316	1973	68	HTH	M	27	2			41		2			1		3 to 12	5	6	19.1	15	74	13.0	71	135	162	60
504317	1990	30	DEF	L	0				30										14.0	4	28	0.0	325	0	0	325
504318	1959	18	HTH	H	13	2			5	11	2					2 to 8	5	6	15.8	16	63	14.0	56	65	78	45
504321	1979	63	HTH	M	40	2			23		2			1		2 to 8	5	6	17.1	14	64	12.5	71	200	240	60
504330	1960	29	HTH	MH	15		2		14			15			4 to 8		5	6	23.1	15.5	91	11.0	81	75	90	70
504330	1960	59	HTH	MH	38				21	19				3			5	6	19.4	17	80	13.0	61	190	228	50
504335	1990	66	DEF	L	0				66										22.4	6.5	57	0.0	250	0	0	250
504336	1981	5	DEF	L	0				5										17.7	9	53	0.0	120	0	0	120
504338	1964	41	HTH	H	25				16					2			5	6	23.1	15.5	91	13.0	76	125	150	65
504338	1964	29	HTH	H	19		2		10			18			2 to 4		5	6	17.6	15	68	14.0	66	95	114	55
504339	1986	39	DEF	L	0				39										37.0	10.5	120	0.0	200	0	0	200
504343	1975	5	HTH	M	3				2	3							5	6	13.4	14	50	8.0	56	15	18	45
504347	1973	73	HTH	M	35	2			38		2			2		2 to 8	5	6	21.3	14.5	81	12.0	81	175	210	70
504347	1973	148	HTH	H	94	5			54	89	5			4		5 to 20	5	6	16.5	14.5	63	13.0	66	470	564	55
504353	1985	60	DEF	L	0				60										25.9	10	82	0.0	150	0	0	150
504358	1979	63	HTH	M	41	3			22		3					3 to 12	5	6	18.4	14	69	13.0	76	205	246	65
504360	1969	34	HTH	H	9	1			25	9	1					2 to 8	5	6	16.8	15.5	66	14.0	61	45	54	50
504364	1993	28	SPC	M	0			28	0									0	9.4	5.5	22	0.0	135	0	0	135
504365	1979	11	HTH	L	11		2		0			11			2 to 4		5	6	17.4	14	65	13.0	61	55	66	50
504365	1979	27	HTH	L	17				10						0		5	6	18.0	13	65	12.0	81	85	102	70
504367	1966	12	HTH	H	12		2		0			12			2 to 4		5	6	12.7	15	49	15.0	51	60	72	40
504367	1966	42	HTH	H	32	1.5			11	28	1.5			1		1.5 to 6	5	6	15.8	14	59	14.0	66	158	189	55
504369	1990	69	SPC	M	0			69	0										19.8	8	56	0.0	160	0	0	160
504374	1969	59	HTH	H	37	2			22	25	2					2 to 8	5	6	15.2	14.5	58	15.0	61	185	222	50
504375	1987	68	DEF	L	0				68										20.7	9	62	0.0	140	0	0	140
504376	1960	12	HTH	M	8				4			8		1			5	6	15.6	18	66	14.0	51	40	48	40

Alternative 3 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by the Commercial Thinning	Acres of Meadows Created by the Commercial Thinning	Acres of Young Stands Non-Commercially Thinned	Acres Deferred From Commercial or Non-commerciall Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
504376	1960	67	HTH	M	44				23					4			5	6	23.0	17	95	12.0	71	220	264	60
504378	1963	50	HTH	H	33				17					3			5	6	17.4	14	65	10.0	71	165	198	60
504379	1961	57	HTH	H	36	2			21	34	2			1		2 to 8	5	6	17.2	17	71	15.0	56	180	216	45
504380	1990	13	DEF	L	0				13										12.5	5	28	0.0	205	0	0	205
504381	1970	55	HTH	MH	36				19					3			5	6	14.7	14	55	12.0	56	180	216	45
504382	1987	40	DEF	L	0				40										20.7	9	62	0.0	140	0	0	140
504383	1979	247	HTH	ML	161				86					16			5	6	20.0	14	75	12.0	81	805	966	70
504387	1961	78	HTH	MH	26				52					2			5	6	14.2	14	53	13.5	61	130	156	50
506182	1976	47	HTH	M	31				16					3			5	6	17.8	13	64	11.0	81	155	186	70
Lower Drift Creek Subwatershed																										
503118	1990	60	DEF	L					60										17.1	5.5	40		250	0	0	250
503119	1973	20	DEF	MH	0				20										49.7	11	165	0.0	250	0	0	250
503120	1948	7	DEF	L	0				7										51.0	7	135		200	0	0	200
503121	1973	22	HTH	MH	14				8					1			5	6	15.5	13	56	12.0	71	70	84	60
503126	1977	90	HTH	H	59				31	45				6			5	6	15.8	14	59	11.5	66	295	354	55
503128	1972	72	HTH	MH	51	4			21		4					4 to 16	5	6	16.5	15.5	65	13.0	61	255	306	50
503134	1989	39	DEF	ML					39										22.4	6.5	57		250	0	0	250
503135	1972	4	DEF	M	0				4										43.5	10.5	141		235	0	0	235
503136	1984	41	DEF	L					41										25.9	10.5	84		140	0	0	140

Alternative 3 Silvicultural Prescription Summary

Stand Identifier and Thinning Prescription					Thinning Treatments (Acres)					Post Harvest Treatments (Acres)					Post Harvest Treatments (Numbers)				Post Thinning Stand Conditions							
Stand Number	Year Plantation was Established	Total Stand Acres	Thinning Prescription	Silvicultural Treatment Priority	Commercial Thinning Acres	Acres of Gaps Created by the Commercial Thinning	Acres of Meadows Created by the Commercial Thinning	Acres of Young Stands Non-Commercially Thinned	Acres Deferred From Commercial or Non-commercial Thinning	Underplanting Acres	Gap Planting Acres	Combined Stand & Meadow Underburning Acres	Existing Meadow Maintenance Acres	Acres of Gaps to Create Through Down Wood/Snag Creation Work	Range of Number of Meadows to Create	Range of Number of Gaps to Create	Down Wood Creation (Trees/Ac)	Snag Creation/Cavity Development (Trees/ac)	Average Relative Density	Average Tree Diameter at Breast Height	Average Basal Area/Acre	Average Commercial Conifer Volume Removed /Acre (MBF)	Average Residual Conifer Stocking (Trees/Acre) Prior to Down Wood and Snag/Cavity Creation	Down Wood Creation (Total Trees in Stand)	Snag Creation/Cavity Development (Total Trees in Stand)	Average Residual Conifer Stocking (Trees/Ac) Following Down Wood and Snag/Cavity Creation
503142	1988	25	DEF	L					25										9.8	5	22		160	0	0	160
503149	1971	46	HTH	H	27				19	27				3			5	6	17.8	13	64	10.5	61	135	162	50
503158	1979	43	HTH	M	28				15					3			5	6	17.0	12.5	60	10.5	81	140	168	70
503159	1989	33	DEF	L	0				33										6.1	6	15		75	0	0	75
503160	1942	13	HTH	H	12				1					1			5	6	25.7	24	126	23.0	51	60	72	40
503161	1993	10	SPC	M				10	0										17.0	4.5	36	0.0	134	0	0	134
503162	1984	24	HTH	H	12				12	12				1			1	1	21.4	14	80	10.0	62	12	12	60
503163	1979	34	DEF	H	0				34										35.8	10.5	116	0.0	194	0	0	194
503164	1993	10	DEF	H					10										11.6	5	26		134	0	0	134
503165	1985	36	DEF	L					36										30.2	7	80		300	0	0	300
503166	1982	18	HTH	M	12				6					1			5	6	13.6	12	47	11.0	71	60	72	60
503167	1982	46	HTH	M	33				13					4			5	6	17.1	14	64	12.0	71	165	198	60
503168	1982	20	HTH	MH	16				4	8				1			5	6	12.8	13	46	11.5	61	80	96	50
503169	1980	157	DEF	H	0				157										28.7	9	86		194	0	0	194
503170	1985	42	HTH	M	34		4		8			30	3		4 to 8		5	6	14.7	13	53	12.0	61	170	204	50
503171	1980	78	HTH	MH	51				27					5			2	3	15.9	12	55	11.0	75	102	153	70
503172	1984	8	HTH	M	4				4	4							5	6	12.1	11	40	9.0	71	20	24	60
503173	1984	19	DEF	MH					19										6.9	12	24		30	0	0	30
504023	1989	10	DEF	L					10										37.6	10	119		150	0	0	150
TOTALS		**10,415**			**4,438**	**160**	**120.5**	**238**	**5740**	**848**	**118**	**703**	**16**	**163**										**25633**	**21770**	

Key

Silvicultural Prescriptions

HTH = Commercial Thinning
HSG = Gap Creation
SPC = Non-Commercial Thinning
DEF = Treatment is Deferred

Silvicultural Treatment Priorities

H = High Priority for Treatment
M = Moderate Priority for Treatment
L = Low Priority for silvicultural Treatment
* See Appendix A, Design Criteria, for Priority Definitions

Alternative 2 Harvest Plan Summary

Arnold

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total Harvest Volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
504106	1969	46	1,479	621	0	0.25/21	0.1/20	46	2	3	0	0
109	1979	48	1,089	480	0	0	0	48	3	0	0	0
111	1968	25	767	338	0	0	0	25	3	0	0	0
124	1973	31	774	341	0	0.11/10	0	31	5	0	0	0
156/172	1976-54	62	1,778	783	0	0.5/35	0	62	12	0	0	0
161/170/171/ 174/176/194	1954-73	73	2,153	948	0	0.42/18	0	54	10	0	0	19*
162	1965	12	341	150	0	0	0	12	2	0	0	0
226	1968	28	731	322	0	0.1/9	0	28	6	0	0	0
227/229	1976-71	82	2,326	1,025	0	0.1/19	0	82	10	0	0	0
243	1963	18	613	270	0	0.13/10	0	18	4	0	0	0
408	1971	34	1,052	442	0	0.1/34	0	34	2	0	0	0
Subtotal		459	13,103	5720	0	1.71/156	0.1/20	440	59	3	0	19

*Includes portions of stands 171 and 176, and all of stand 194

Project Total**	4,568	130,141	57,233	2.99/224	19.22/1,485	2.28/339	4,084	606	71	135	349

** Volume and acre estimates are based on the silvicultural prescription summary

Alternative 2 Harvest Plan Summary

Barclay

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total Harvest Volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
503153	1965	33	374	165	0	0.68/33	0	33	6	0	0	0
503155/503156	1956	31	799	352	0	0.45/17	0.05/5	31	4	1	0	0
504032	1965	19	394	174	0	0.68/13	0.06/5	16	6	2	3	0
035	1966	4	145	64	0	0	0	4	2	0	0	0
037/060	1979-80	75	2,075	914	0.3/13	0.34/11	0.04/12	75	16	2	0	0
041/050	1957-65	40	1,282	565	0.25/13	0	0	40	7	0	0	0
076/080	1975-67	35	935	412	0	0.27/23	0	35	6	0	0	0
097	1971	33	899	396	0	0	0.02/3	22	3	1	0	11
105	1954	10	326	144	0	0	0	10	2	0	0	0
129/132/137	1955-68	32	853	376	0	0	0.04/6	32	7	2	0	0
147	1967	4	91	40	0	0	0	4	1	0	0	0
151	1967	14	350	154	0	0	0	14	3	0	0	0
158	1962	73	2,651	1,168	0	0	0.03/7	49	7	2	0	24
165/180/182	1965-78	69	1,535	676	0	0.3/58	0	64	5	0	0	5
183	1971	9	227	100	0	0	0	9	1	0	0	0
394	1956	33	1,053	464	0	0.11/12	0.06/4	33	4	1	0	0
Subtotal		514	13989	6164	0.55/26	2.83/167	0.30/42	471	80	11	3	40

Alternative 2 Harvest Plan Summary

Eckman

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total Harvest Volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
504134	1983	20	544	240	0	0	0	20	2	0	0	0
144/153	1979-66	48	1,219	537	0	0.03/3	0	48	7	0	0	0
177	1966	10	329	145	0	0.13/5	0	10	3	0	0	0
179A	1975	222	6,047	2,664	0	0.75/63	0.08/11	222	33	2	0	0
179B	1981	112	3,050	1,344	0	0.36/21	0.09/13	112	16	3	0	0
179C	1976	23	549	242	0	0.19/9	0	23	5	0	0	0
192/207	1974-67	17	442	195	0	0.11/8	0	9	3	0	3	5
280A	1952	19	472	208	0	0.75/19	0.04/6	19	2	1	0	0
280C	1952	10	726	320	0	0.15/8	0	6	2	0	4	0
280D	1952	22	848	374	0	0.32/22	0	0	0	0	22	0
280E	1952	24	1,029	432	0	0.23/31	0	10	4	0	14	0
280F	1952	10	385	170	0	0.10/8	0	10	3	0	0	0
280G	1952	30	1,294	570	0	0.9/30	0	5	1	0	25	0
280H	1952	8	217	96	0	0	0	8	2	0	0	0
320	1977	81	1,930	850	0	0	0	81	14	0	0	0
334/506005	1977	8	199	88	0	0.15/8	0	8	1	0	0	0
404	N/A	6	715	300	0	0.1/6	0	0	1	0	6	0
Subtotal		670	19,995	8775	0	4.27/241	0.21/30	591	99	6	74	5

Lower Alsea

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total harvest volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
504188	1965	39	1,193	525	0	0.13/25	0.02/2	39	6	1	0	0
189	1975	21	524	231	0	0	0.07/10	21	1	2	0	0
191/228	1984-83	48	872	384	0	0.5/25	0	48	5	1	0	0
209/505094	1969-61	24	744	328	0	0.19/15	0.05/9	24	4	2	0	0
211	1976	26	601	265	0	0.25/13	0	26	5	0	0	0
218	1969	6	170	75	0	0	0	6	1	0	0	0
231	1961	30	1,089	480	0	0.51/18	0	30	8	0	0	0
233	1981	28	508	224	0	0.07/23	0	28	6	0	0	0
Subtotal		222	5,701	2,512	0	1.65/119	0.14/21	222	36	6	0	0

Alternative 2 Harvest Plan Summary

Lower Canal

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total harvest volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
504178	1973	29	952	419	0	0	0	29	4	0	0	0
196	1964	45	1,685	742	0	0.18/18	0.05/6	45	4	2	0	0
214/234	1962-78	57	1,738	766	0	0	0	57	6	0	0	0
215	1957	91	2,994	1,318	0	0.21/30	0.02/4	91	8	1	0	0
216	1956	7	215	95	0	0	0	0	0	0	0	7
230	1966	37	1,134	500	0	0	0	0	0	0	0	37
235	1965	41	953	420	0	0	0	0	0	0	0	41
237	1979	88	2,497	1,100	0.19/11	0	0.02/11	88	12	1	0	0
245	1953	26	855	377	0	0	0	0	0	0	0	26
253	1964	23	731	322	0.32/17	0.11/6	0	23	5	0	0	0
269	1965	7	207	91	0	0	0	0	0	0	0	7
277	1965	18	592	261	0	0	0	0	0	0	0	18
283	1956	9	268	112	0	0	0	0	0	0	0	9
289	1964	10	317	140	0	0	0	0	0	0	0	10
295	1967	57	1,713	754	0	0	0	0	0	0	0	57
296	1965	5	154	68	0	0	0	0	0	0	0	5
329	1966	35	1,067	470	0	0.13/18	0.04/3	35	3	1	0	0
344	1966	10	295	130	0	0	0.03/8	10	1	1	0	0
345	1964	19	603	266	0	0	0	19	2	0	0	0
357	1963	41	1,371	604	0	0.05/18	0.07/9	41	6	2	0	0
361	1970	12	327	144	0	0	0.04/8	12	1	1	0	0
506178	1976	55	1,498	660	0	0.16/19	0.05/11	55	6	2	0	0
Subtotal		722	22,166	9,759	0.51/28	0.84/109	0.32/60	505	58	11	0	217

Alternative 2 Harvest Plan Summary

Lower Drift

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total harvest volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
503121	1973	14	381	168	0	0.02/7	0	14	3	0	0	0
503126	1977	59	1,541	679	0	0.25/53	0	59	7	0	0	0
503128	1972	51	1,505	663	0	0.13/18	0	51	10	0	0	0
503149	1971	30	643	283	0	0.25/19	0.02/3	30	4	1	0	0
503158	1979	28	667	294	0	0.39/26	0	28	2	0	0	0
503160	1942	12	627	276	0	0	0	12	1	0	0	0
503162	1984	12	272	120	0	0	0	0	1	0	12	0
503166	1982	12	272	120	0	0	0	0	0	0	0	12
503167	1982	33	788	347	0	0.4/33	0	33	5	0	0	0
503168	1982	16	381	168	0	0	0	0	1	0	16	0
503170	1985	34	771	340	0	0	0	10	1	0	24	0
503171	1980	51	1,273	561	0	0.83/59	0.15/19	51	13	3	0	0
503172	1984	4	91	40	0	0	0	0	1	0	4	0
Subtotal		356	9,212	4,059	0	2.27/215	0.17/22	288	49	4	56	12

Risley

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total harvest volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
)38/042/048/72	1955-73	63	1,621	714	0	0.27/27	0	63	10	0	0	0
042/048/055**	1954-73	30	1,092	481	0.45/30	0	0	30	7	0	0	0
051	1962	78	3,010	1326	0.42/78	0.35/16	0	78	11	0	0	0
058	1967	18	511	225	0.45/18	0	0	18	2	0	0	0
064	1953	8	245	108	0.21/8	0	0	8	2	0	0	0
071	1972	8	184	81	0	0	0	8	1	0	0	0
081/082/084	1951/73	22	564	248	0	0.05/4	0.04/3	20	3	1	2	0
Subtotal		227	7,227	3,183	1.53/134	0.67/47	0.04/3	225	36	1	2	0

*Includes upper portions of 042 and 048; **Includes lower portions of 042 and 048

Alternative 2 Harvest Plan Summary

Southworth

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total harvest volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
504110	1966	36	1,144	504	0.4/36	0.07/13	0	36	6	0	0	0
117*	1974	20	545	240	0	0.05/9	0	20	2	0	0	0
118*	1969	32	827	364	0	0	0.04/5	32	6	1	0	0
126	1973	10	238	105	0	0	0	10	3	0	0	0
133	1969	20	417	184	0	0	0.02/4	20	5	1	0	0
135	1969	16	472	208	0	0.11/15	0	16	1	0	0	0
146	1973	7	182	80	0	0	0	7	2	0	0	0
198	1974	21	620	273	0	0	0	21	3	0	0	0
213	1963	125	4,504	1,984	0	0.38/54	0.1/19	125	18	3	0	0
222	1961	62	2,111	930	0	0.27/25	0.06/11	62	8	2	0	0
407	1971	9	236	99	0	0	0	9	2	0	0	0
506179	1968	22	649	286	0	0	0	22	2	0	0	0
Subtotal		380	11,945	5,257	0.4/36	0.88/116	0.22/39	380	58	7	0	0

*In Risley subshed, but roads are mainly in Southworth subshed

Alternative 2 Harvest Plan Summary

Upper Canal

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total harvest volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
504284	1980	93	2,414	1,063	0	0	0.04/3	93	11	1	0	0
308	1962	31	1,055	465	0	0	0	31	7	0	0	0
316	1973	44	612	270	0	0.2/40	0.09/17	44	6	2	0	0
318	1959	13	413	182	0	0	0	13	3	0	0	0
321	1979	40	1,089	480	0	0	0	40	8	0	0	0
330	1960	63	1,202	529	0	0	0.1/10	63	6	3	0	0
338	1964	44	1,327	584	0	0.32/15	0.04/7	44	4	1	0	0
343/347	1975-73	143	3,761	1,656	0	0.79/48	0.1/11	143	24	2	0	0
358	1979	41	1,153	508	0	0	0	41	4	0	0	0
360	1969	22	286	126	0	0	0.05/13	22	3	2	0	0
365	1979	28	732	322	0	0.13/25	0	28	4	0	0	0
367	1966	44	1,377	606	0	0.42/26	0	44	6	0	0	0
374	1969	37	1,138	501	0	0.05/5	0.05/7	37	4	3	0	0
376	1960	52	1,453	640	0	0.34/8	0.15/14	52	8	3	0	0
378	1963	33	749	330	0	0.19/28	0.04/5	33	2	2	0	0
379	1961	36	1,186	522	0	0.97/28	0.04/9	36	5	1	0	0
381	1970	36	899	396	0	0.17/7	0	36	6	0	0	0
383	1979	161	4,386	1,932	0	0.21/40	0.08/6	113	11	1	0	48
387	1961	26	797	351	0	0.18/20	0	26	5	0	0	0
506182	1976	31	774	341	0	0.13/25	0	23	2	0	0	8
Subtotal		1018	26,803	11,804	0	4.1/315	0.78/102	962	129	21	0	56

Alternative 3 Harvest Plan Summary

Arnold

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total Harvest Volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
504106	1969	26	836	351	0	0.25/21	0	26	2	0	0	0
109	1979	48	1,089	480	0	0	0	48	3	0	0	0
111	1968	25	767	338	0	0	0	25	3	0	0	0
124	1973	31	774	341	0	0.11/10	0	31	5	0	0	0
156/172	1976-54	62	1,778	783	0	0.5/35	0	62	12	0	0	0
161/170/171/174/176/194	1954-73	73	2,153	948	0	0.42/18	0	54	10	0	0	19*
162	1965	12	341	150	0	0	0	12	2	0	0	0
226	1968	28	731	322	0	0.1/9	0	28	6	0	0	0
227/229	1976-71	82	2,326	1,025	0	0.1/19	0	82	10	0	0	0
243	1963	18	613	270	0	0.13/10	0	18	4	0	0	0
408	1971	34	1,052	442	0	0.1/34	0	34	2	0	0	0
Subtotal		439	12,460	5450	0	1.71/156	0	420	59	0	0	19

*Includes portions of stands 171 and 176, and all of stand 194

Project Total**	4,438	129,140	56,813	2.99/201	19.12/1,479	0	3,745	596	0	126	567

** Volume and acre estimates are based on the silvicultural prescription summary

Alternative 3 Harvest Plan Summary

Barclay

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total Harvest Volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
503153	1965	33	374	165	0	0.68/33	0	33	6	0	0	0
503155/503156	1956	26	799	352	0	0.45/17	0	26	3	0	0	0
504032	1965	13	394	174	0	0.68/13	0	13	6	0	0	0
035	1966	4	145	64	0	0	0	4	2	0	0	0
037/060	1979	75	2,075	914	0.3/13	0.34/11	0	63	14	0	0	12
041/050	1957-65	40	1,282	565	0.25/13	0	0	40	7	0	0	0
076/080	1975-67	35	935	412	0	0.27/23	0	35	6	0	0	0
097	1971	33	899	396	0	0	0	19	3	0	0	14
105	1954	10	326	144	0	0	0	10	2	0	0	0
129/132/137	1955-68	26	853	376	0	0	0	20	7	0	0	6
147	1967	4	91	40	0	0	0	4	1	0	0	0
151	1967	14	350	154	0	0	0	14	3	0	0	0
158	1962	73	2,651	1,168	0	0	0	42	7	0	0	31
165/180/182	1965-78	66	1,535	676	0	0.3/58	0	61	5	0	0	5
183	1971	9	227	100	0	0	0	9	1	0	0	0
394	1956	29	1,053	464	0	0.11/12	0	29	4	0	0	0
Subtotal		490	13989	6164	0.55/26	2.83/167	0	422	71	0	0	68

Alternative 3 Harvest Plan Summary

Eckman

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total Harvest Volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
134	1983	20	544	240	0	0	0	20	2	0	0	0
144/153	1979-66	43	1,219	537	0	0.03/3	0	43	7	0	0	0
177	1966	10	329	145	0	0.13/5	0	10	3	0	0	0
179A	1975	222	6,047	2,664	0	0.75/63	0	211	33	0	0	11
179B	1981	112	3,050	1,344	0	0.36/21	0	99	16	0	0	13
179C	1976	23	549	242	0	0.19/9	0	23	5	0	0	0
192/207	1974-67	17	442	195	0	0.11/8	0	9	3	0	3	5
280A	1952	13	472	208	0	0.75/23	0	13	2	0	0	0
280C	1952	10	726	320	0	0.15/4	0	6	2	0	4	0
280D	1952	22	848	374	0	0.32/22	0	0	0	0	22	0
280E	1952	24	1,029	432	0	0.23/31	0	10	4	0	14	0
280F	1952	10	385	170	0	0.10/8	0	10	3	0	0	0
280G	1952	30	1,294	570	0	0.9/30	0	8	1	0	22	0
280H	1952	8	217	96	0	0	0	8	2	0	0	0
320	1977	81	1,930	850	0	0	0	81	14	0	0	0
334/506005	1977	8	199	88	0	0.15/8	0	8	1	0	0	0
404	N/A	3	357	150	0	0.1/6	0	0	0	0	3	0
Subtotal		656	19,637	8625	0	4.17/235	0	559	98	0	68	29

Lower Alsea

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total Harvest Volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
188	1965	39	1,193	525	0	0.13/25	0	37	6	0	0	2
189	1975	21	524	231	0	0	0	11	1	0	0	10
191/228	1984-83	48	872	384	0	0.5/25	0	48	5	0	0	0
209/505094	1969-61	24	744	328	0	0.19/15	0	15	4	0	0	9
211	1976	23	601	265	0	0.25/13	0	23	5	0	0	0
218	1969	6	170	75	0	0	0	6	1	0	0	0
231	1961	30	1,089	480	0	0.51/18	0	30	8	0	0	0
233	1981	28	508	224	0	0.07/23	0	28	6	0	0	0
Subtotal		219	5,701	2,512	0	1.65/119	0	198	36	0	0	21

Alternative 3 Harvest Plan Summary

Lower Canal

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total Harvest Volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
178	1973	29	952	419	0	0	0	29	4	0	0	0
196	1964	45	1,685	742	0	0.18/18	0	39	4	0	0	6
214/234	1962-78	57	1,738	766	0	0	0	57	6	0	0	0
215	1957	91	2,994	1,318	0	0.21/30	0	87	8	0	0	4
216	1956	7	215	95	0	0	0	0	0	0	0	7
230	1966	37	1,134	500	0	0	0	0	0	0	0	37
235	1965	41	953	420	0	0	0	0	0	0	0	41
237	1979	88	2,497	1,100	0.19/11	0	0	77	12	0	0	11
245	1953	26	855	377	0	0	0	0	0	0	0	26
253	1964	23	731	322	0.32/17	0.11/6	0	23	5	0	0	0
269	1965	7	207	91	0	0	0	0	0	0	0	7
277	1965	18	592	261	0	0	0	0	0	0	0	18
283	1956	9	268	112	0	0	0	0	0	0	0	9
289	1964	10	317	140	0	0	0	0	0	0	0	10
295	1967	57	1,713	754	0	0	0	0	0	0	0	57
296	1965	5	154	68	0	0	0	0	0	0	0	5
329	1966	35	1,067	470	0	0.13/18	0	32	3	0	0	3
344	1966	10	295	130	0	0	0	2	1	0	0	8
345	1964	19	603	266	0	0	0	19	2	0	0	0
357	1963	41	1,371	604	0	0.05/18	0	32	6	0	0	9
361	1970	12	327	144	0	0	0	4	1	0	0	8
506178	1976	55	1,498	660	0	0.16/19	0	44	6	0	0	11
Subtotal		722	22,166	9,759	0.51/28	0.84/109	0	445	58	0	0	277

Alternative 3 Harvest Plan Summary

Lower Drift

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total Harvest Volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
503121	1973	14	381	168	0	0.02/7	0	14	3	0	0	0
503126	1977	59	1,541	679	0	0.25/53	0	59	7	0	0	0
503128	1972	51	1,505	663	0	0.13/18	0	51	10	0	0	0
503149	1971	27	643	283	0	0.25/19	0	27	4	0	0	0
503158	1979	28	667	294	0	0.39/26	0	28	2	0	0	0
503160	1942	12	627	276	0	0	0	12	1	0	0	0
503162	1984	12	272	120	0	0	0	0	1	0	12	0
503166	1982	12	272	120	0	0	0	0	0	0	0	12
503167	1982	33	788	347	0	0.4/33	0	33	5	0	0	0
503168	1982	16	381	168	0	0	0	0	1	0	16	0
503170	1985	34	771	340	0	0	0	10	1	0	24	0
503171	1980	51	1,273	561	0	0.83/59	0	44	13	0	0	7
503172	1984	4	91	40	0	0	0	0	1	0	4	0
Subtotal		353	9,212	4,059	0	2.27/215	0	278	49	0	56	19

*Helicopter service landing (HSL) inside or nearby stand

Risley

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total Harvest Volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
038/042/048/72*	1955-73	63	1,621	714	0	0.27/27	0	63	10	0	0	0
042/048/055**	1954-73	30	1,092	481	0.45/27	0	0	30	7	0	0	0
051	1962	78	3,010	1326	0.42/58	0.35/16	0	78	11	0	0	0
058	1967	18	511	225	0.45/18	0	0	18	2	0	0	0
064	1953	8	245	108	0.21/8	0	0	8	2	0	0	0
071	1972	8	184	81	0	0	0	8	1	0	0	0
081/082/084	1951/73	19	564	248	0	0.05/4	0	17	3	0	2	0
Subtotal		224	7,227	3,183	1.53/111	0.67/47	0	222	36	0	2	0

Alternative 3 Harvest Plan Summary

Southworth

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total Harvest Volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
110	1966	36	1,144	504	0.4/36	0.07/13	0	36	6	0	0	0
117*	1974	20	545	240	0	0.05/9	0	20	2	0	0	0
118*	1969	27	827	364	0	0	0	27	6	0	0	0
126	1973	10	238	105	0	0	0	10	3	0	0	0
133	1969	16	417	184	0	0	0	16	5	0	0	0
135	1969	16	472	208	0	0.11/15	0	16	1	0	0	0
146	1973	7	182	80	0	0	0	7	2	0	0	0
198	1974	21	620	273	0	0	0	21	3	0	0	0
213	1963	125	4,504	1,984	0	0.38/54	0	106	18	0	0	19
222	1961	62	2,111	930	0	0.27/25	0	51	8	0	0	11
407	1971	9	236	99	0	0	0	9	2	0	0	0
506179	1968	22	649	286	0	0	0	22	2	0	0	0
Subtotal		371	11,945	5,257	0.4/36	0.88/116	0	341	58	0	0	30

Alternative 3 Harvest Plan Summary

Upper Canal

Stand Number	Year of Origin	Harvest Acres	Total Harvest Volume (CCF)	Total Harvest Volume (MBF)	Reopen System Road Miles/Acres Accessed	Reopen Non-system Road Miles/Acres Accessed	New Temporary Road Miles/Acres Accessed	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Ground-based Acres	Helicopter Acres
284	1980	90	2,414	1,063	0	0	0	90	11	0	0	0
308	1962	31	1,055	465	0	0	0	31	7	0	0	0
316	1973	27	612	270	0	0.2/40	0	27	6	0	0	0
318	1959	13	413	182	0	0	0	13	3	0	0	0
321	1979	40	1,089	480	0	0	0	40	8	0	0	0
330	1960	53	1,202	529	0	0	0	53	6	0	0	0
338	1964	44	1,327	584	0	0.32/15	0	37	4	0	0	7
343/347	1975-73	132	3,761	1,656	0	0.79/48	0	132	24	0	0	0
358	1979	41	1,153	508	0	0	0	41	4	0	0	0
360	1969	9	286	126	0	0	0	9	3	0	0	0
365	1979	28	732	322	0	0.13/25	0	28	4	0	0	0
367	1966	44	1,377	606	0	0.42/26	0	44	6	0	0	0
374	1969	37	1,138	501	0	0.05/5	0	30	4	0	0	7
376	1960	52	1,453	640	0	0.34/8	0	38	8	0	0	14
378	1963	33	749	330	0	0.19/28	0	28	2	0	0	5
379	1961	36	1,186	522	0	0.97/28	0	27	5	0	0	9
381	1970	36	899	396	0	0.17/7	0	36	6	0	0	0
383	1979	161	4,386	1,932	0	0.21/40	0	107	11	0	0	54
387	1961	26	797	351	0	0.18/20	0	26	5	0	0	0
506182	1976	31	774	341	0	0.13/25	0	23	2	0	0	8
Subtotal		964	26,803	11,804	0	4.1/315	0	860	129	0	0	104

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Arnold Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																1						
Specific Stand Treatments																						
504109	73	48				26	13	5			5	6	240	288	5.2	5						
504111	39	25	12	2							5	6	125	150	2.7						0.8	
504124	46	31	25		3						5	6	155	186	3.4							
504156	22	14		1							5	6	70	84	1.5							
504161	6	4									5	6	20	24	0.4							
504162	18	12		1							5	6	60	72	1.3							
504170	52	31				24	12	3			5	6	155	186	3.4	3						
504171	39	27			2	3	2	1			5	6	135	162	2.9	1						500
504172	73	48	22		4						5	6	240	288	5.2							
504174	4	2									5	6	10	12	0.2							
504176	8	5									5	6	25	30	0.5							
504194	7	4									5	6	20	24	0.4							
504226	43	28	14	3							5	6	140	168	3							
504227	6	5				4	2	0.5			5	6	25	30	0.5	1						
504229	124	77		1	3	11	6	3	2		5	6	385	462	8.4	3						
504243	30	18		2							5	6	90	108	2							
504408	52	34		3							5	6	170	204	3.7							

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Barclay Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																27						
Specific Stand Treatments																						
													0	0								
503153	38	33				33	17	5			5	6	165	198	3.6	5						
503155	4	4.0				4	2	0.5			5	6	20	24	0.4	1						
503156	33	27				27	14	3			5	6	135	162	2.9	3						
504032	27	19				18	9	2			5	6	95	114	2.1	2						
504035	6	4									5	6	20	24	0.4						0.7	
504037	91	59				43	22	6			5	6	295	354	6.4	6						
504041	38	26				13	7	3			5	6	130	156	2.8	3						
504049	30	0								30			0	0	0							
504050	22	14	11			4	2	1			5	6	70	84	1.5	1						
504060	18	16				16	6	2			5	6	80	96	1.7	2						
504062	11	0											0	0	0							
504063	32	0											0	0	0							
504065	53	0								53			0	0	0							
504069	3	0											0	0	0							
504075	18	0											0	0	0							
504076	12	8	5			3	2	1			5	6	40	48	0.9	1						
504080	42	27	21			9	5	3			5	6	135	162	2.9	3						
504097	55	33		3							5	6	165	198	3.6							
504101	7	0											0	0	0							
504105	31	10		1					2.5		5	6	50	60	1.1							

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
504116	2	0											0	0	0							
504119	14	0											0	0	0							
504129	6	4				3	2	0.5			5	6	20	24	0.4	1						
504132	17	16	14		2						5	6	80	96	1.7							
504137	18	12	12	1							5	6	60	72	1.3							
504138	18	0											0	0	0							
504147	6	4							1		5	6	20	24	0.4							
504151	26	14		1							5	6	70	84	1.5							
504158	111	73	67		6				3		5	6	365	438	7.9	73					3	
504165	35	25		2							5	6	125	150	2.7							300
504180	40	26		2							5	6	130	156	2.8							
504182	27	18			2						5	6	90	108	2							
504183	13	9				6	3	1			5	6	45	54	1	1						
504394	50	33	11			22	11	3			5	6	165	198	3.6	3						
504406	33	0											0	0	0							
Southworth Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																2						
Specific Stand Treatments																						
504104	23	0											0	0	0							
504110	55	36				3	2	3	11		5	6	180	216	3.9	3					0.6	
504117	31	20											0	0	2.2						1	
504118	49	32				11	6	3			5	6	160	192	3.5	3						

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
504121	30	0											0	0	0							
504125	99	0											0	0	0							
504126	16	10	5	1							5	6	50	60	1.1						0.7	
504131	122	0											0	0	0							
504133	30	20		2							5	6	100	120	2.2						1.5	
504135	24	16		1							5	6	80	96	1.7							
504146	11	7		1	1						5	6	35	42	0.8						0.7	
504198	33	21		2							5	6	105	126	2.3							
504201	3	0											0	0	0							
504213	191	125		5							5	6	625	750	13.6						3.8	
504222	95	62									5	6	310	372	6.7						1.6	
504407	14	9		1							5	6	45	54	1						1.4	
506179	25	22									5	6	110	132	2.4						1.4	
Eckman Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																16						
Specific Stand Treatments																						
504127	51	0											0	0	0							
504134	31	20		1							5	6	100	120	2.2							
504140	17	0											0	0	0							

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
504144	61	42	12		5						5	6	210	252	4.6							
504153	9	6									5	6	30	36	0.7							
504177	25	10	10	1							5	6	50	60	1.1						1.4	
504185	2	0								2			0	0	0							
504192	14	9		1							5	6	45	54	1	9					1.4	
504207	12	8		1							5	6	40	48	0.9						1.4	
504208	44	0											0	0	0						1.1	
504212	12	0											0	0	0							
504240	13	0											0	0	0							
504280	525	0											0	0	0							
504280A	61	19		2							5	6	95	114	2.1							
504280B	24	0											0	0	0							
504280C	46	10				5	3	1			5	6	50	60	1.1	1						
504280D	37	22			2						5	6	110	132	2.4							
504280E	88	24			5								0	0	2.6							
504280F	46	10											0	0	1.1							
504280G	70	30			5								0	0	3.3							
504280H	10	8				8	4	1			5	6	40	48	0.9	1						
504299	35	0											0	0	0							
504320	124	81		8							5	6	405	486	8.8							
504324	44	0								44			0	0	0							
504334	4	3									5	6	15	18	0.3							
504400	9	0											0	0	0							
504404	38	6			6						2	3	12	18	0.7							
504179A	334	222				6	3	2			5	6	1110	1332	24.1	2						
504179B	167	112			10	4	2	2			5	6	560	672	12.2	2						
504179C	35	23		2							5	6	115	138	2.5							
506005	5	5									5	6	25	30	0.5							

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Lower Alsea River Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																7						
Specific Stand Treatments																						
504023	11	0											0	0	0							
504157	11	0											0	0	0							
504159	48	0											0	0	0							
504188	60	39			3						5	6	195	234	4.2	39						
504189	55	21				11	6	2			5	6	105	126	2.3	23						
504191	66	43		4							5	6	215	258	4.7						1.7	
504209	26	18			2						5	6	90	108	2	18						
504211	39	26			3	3	2	1			5	6	130	156	2.8	26						
504218	16	6									5	6	30	36	0.7							
504228	8	5									5	6	25	30	0.5							
504231	42	30			5						5	6	150	180	3.3	30						
504233	43	28		3							5	6	140	168	3						5.7	
505094	9	6									5	6	30	36	0.7	6						
505097	20	0											0	0	0							
505121	19	0											0	0	0							

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Lower Canal Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																20						
About 50 acres of riparian planting and 25 acres of riparian conifer release.																						
About 250 pieces of large wood would be placed in 5 miles of streams.																						
Specific Stand Treatments																						
504169	11	0											0	0	0							
504178	22	14			1						5	6	70	84	1.5			Y	Y	Y		
504178	22	15			2				4		5	6	75	90	1.6							
504195	28	0											0	0	0							
504196	70	45	31		3	11	6	4			5	6	225	270	4.9	4					3.1	
504214	5	3									5	6	15	18	0.3							
504214	40	26	13	2							5	6	130	156	2.8	26						
504215	149	91	40		2	24	12	7	1		5	6	455	546	9.9	91		Y	Y	Y		
504216	11	7	4	1							5	6	35	42	0.8			Y	Y	Y		
504230	62	37	37	3							5	6	185	222	4			Y	Y	Y		
504234	43	28				22	11	3			5	6	140	168	3	3						
504235	69	41		4							5	6	205	246	4.5			Y	Y	Y	4.6	
504237	133	88				50	25	9			5	6	440	528	9.6	9						
504245	40	26			2						5	6	130	156	2.8			Y	Y	Y		
504247	39	0											0	0	0							
504251	60	0											0	0	0							
504253	36	23	23	2							5	6	115	138	2.5							
504263	78	0											0	0	0							
504269	11	7	3	1							5	6	35	42	0.8							
504272	56	0											0	0	0							
504277	26	18	16		2						5	6	90	108	2							

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
504282	62	0											0	0	0							
504283	12	9		1							5	6	45	54	1							
504288	12	0											0	0	0							
504289	13	10	8		2				2		5	6	50	60	1.1			Y	Y	Y		
504295	76	57	15	1	4						5	6	285	342	6.2			Y	Y	Y		
504296	7	5	5								5	6	25	30	0.5			Y	Y	Y		
504297	55	0											0	0	0							
504302	6	0											0	0	0							
504322	59	0											0	0	0							
504323	58	0											0	0	0							
504325	6	0											0	0	0							
504329	53	35	18	3							5	6	175	210	3.8			Y	Y	Y		
504344	15	10		1						2	5	6	50	60	1.1						1.5	
504345	30	19			1						5	6	95	114	2.1							
504357	51	34	31		3						5	6	170	204	3.7						9.3	
504357	10	7		1							5	6	35	42	0.8						1.1	
504361	23	12	4	1							5	6	60	72	1.3							
506178	71	36				36	18	5			5	6	180	216	3.9	5						
506178	19	19		2							5	6	95	114	2.1							
Risley Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																11						
Specific Stand Treatments																						
504038	40	33				33	17	5			5	6	165	198	3.6	5						
504042	61	31				19	10	4			5	6	155	186	3.4	4						
504047	46	0											0	0	0							

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
504048	31	19				8	4	3			5	6	95	114	2.1	3						
504051	97	78				78	39	9			5	6	390	468	8.5	78						
504054	44	0											0	0	0							
504055	4	4									5	6	20	24	0.4							
504058	30	18	18	1							5	6	90	108	2							
504064	41	8		1							5	6	40	48	0.9							
504066	2	0											0	0	0							
504070	12	0											0	0	0		12					
504071	12	8			1						5	6	40	48	0.9							
504072	8	6									5	6	30	36	0.7						1.1	
504077	14	0											0	0	0							
504078	35	0											0	0	0							
504081	54	5	5								5	6	25	30	0.5						1.7	
504082	18	11		1							5	6	55	66	1.2							
504083	19	0											0	0	0							
504084	6	6				6	3	1					0	0	0.7	1						
504099	4	0											0	0	0							
504106	68	46			1	22	11	4			5	6	230	276	5	4						
504123	12	0											0	0	0							

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Upper Canal Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																20						
About 50 acres of riparian planting and 25 acres of riparian conifer release.																						
About 250 pieces of large wood would be placed in 5 miles of streams.																						
Specific Stand Treatments																						
504266	66	0											0	0	0							
504284	100	62		4	2						5	6	310	372	6.7			Y	Y	Y		
504284	48	31		1	2						5	6	155	186	3.4							
504308	47	31	28		3						5	6	155	186	3.4						2.1	
504313	42	0											0	0	0							
504314	20	0											0	0	0							
504316	68	44		1	3						5	6	220	264	4.8			Y	Y	Y		
504317	30	0											0	0	0							
504318	18	13	11		2						5	6	65	78	1.4			Y	Y	Y		
504321	63	40		1	2						5	6	200	240	4.3			Y	Y	Y		
504330	29	25				25	13	4			5	6	125	150	2.7							
504330	59	38	19	3							5	6	190	228	4.1	4		Y	Y	Y		
504335	66	0											0	0	0							
504336	5	0											0	0	0							
504338	41	25		2							5	6	125	150	2.7			Y	Y	Y	4.6	400
504338	29	19	0			18	9	2			5	6	95	114	2.1	2						
504339	39	0											0	0	0							
504343	5	3	3						2		5	6	15	18	0.3						0.6	
504347	73	46		2	2						5	6	230	276	5						2.9	
504347	148	94	89	4	5						5	6	470	564	10.2						5.7	
504353	60	0											0	0	0							
504358	63	41			3						5	6	205	246	4.5							

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
504360	34	22	20		2						5	6	110	132	2.4							
504364	28	0								28			0	0	0							
504365	11	11				11	6	2			5	6	55	66	1.2	2						
504365	27	17									5	6	85	102	1.8							
504367	12	12				12	6	2			5	6	60	72	1.3	2						300
504367	42	32	28	1	1.5						5	6	158	189	3.4			Y	Y	Y	1.5	
504369	69	0								69			0	0	0							
504374	59	37	25		2						5	6	185	222	4			Y	Y	Y		
504375	68	0											0	0	0							
504376	12	8		1		8	4				5	6	40	48	0.9						3.8	
504376	67	44		4							5	6	220	264	4.8						5.7	
504378	50	33		3							5	6	165	198	3.6			Y	Y	Y	2.3	
504379	57	36	34	1	2						5	6	180	216	3.9			Y	Y	Y		
504380	13	0											0	0	0							
504381	55	36		3							5	6	180	216	3.9			Y	Y	Y	1.5	
504382	40	0											0	0	0							
504383	247	161		16							5	6	805	966	17.5						0.8	
504387	78	26		2							5	6	130	156	2.8			Y	Y	Y	4.7	200
506182	47	31		3							5	6	155	186	3.4			Y	Y	Y	0.8	

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Lower Drift Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																11						
200 pieces of large wood would be placed in 2.5 miles of Drift sloughs.																						
Specific Stand Treatments																						
503118	60	0											0	0	0							
503119	20	0											0	0	0							
503120	7	0											0	0	0							
503121	22	14		1							5	6	70	84	1.5							
503126	90	59	45	6							5	6	295	354	6.4							
503128	72	51			4						5	6	255	306	5.5						0.8	
503134	39	0											0	0	0							
503135	4	0											0	0	0							
503136	41	0											0	0	0							
503142	25	0											0	0	0			Y	Y	Y		
503149	46	30	30	3							5	6	150	180	3.3			Y	Y	Y	0.4	
503158	43	28		3							5	6	140	168	3			Y	Y	Y		
503159	33	0											0	0	0							
503160	13	12		1							5	6	60	72	1.3			Y	Y	Y	0.4	
503161	10	0								10			0	0	0			Y	Y	Y		
503162	24	12	12	1							1	1	12	12	1.3			Y	Y	Y	0.7	
503163	34	0											0	0	0						1.1	
503164	10	0											0	0	0							
503165	36	0											0	0	0							
503166	18	12		1							5	6	60	72	1.3			Y	Y	Y	0.2	
503167	46	33		4							5	6	165	198	3.6			Y	Y	Y	1.7	
503168	20	16	8	1							5	6	80	96	1.7			Y	Y	Y	0.4	

Alternative 2 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Through Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control (Acres)	Non Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn (Acres)	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
503169	157	0											0	0	0		5					
503170	42	34				30	15	4	11		5	6	170	204	3.7	4		Y	Y	Y		
503171	78	51		5							2	3	102	153	5.5		7	Y	Y	Y	1.6	
503172	8	4	4								5	6	20	24	0.4			Y	Y	Y		
503173	19	0							31				0	0	0			Y	Y	Y		
504023	10	0											0	0	0		10					
TOTALS	**10,415**	**4,568**	**868**	**163**	**129**	**733**	**367**	**126.5**	**71**	**238**			**26,690**	**22,530**	**497**	**634**	**34**				**97**	**1,700**

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Arnold Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																1						
Specific Stand Treatments																						
504109	73	48		0	0	26	13	5			5	6	240	288	5.2	5						
504111	39	25	12	2							5	6	125	150	2.7						0.8	
504124	46	31	25	0	3						5	6	155	186	3.4							
504156	22	14		1							5	6	70	84	1.5							
504161	6	4		0							5	6	20	24	0.4							
504162	18	12		1							5	6	60	72	1.3							
504170	52	31		0	0	24	12	3			5	6	155	186	3.4							
504171	39	27		0	2	3	2	1			5	6	135	162	2.9	3						500
504172	73	48	22		4						5	6	240	288	5.2	1						
504174	4	2									5	6	10	12	0.2							
504176	8	5									5	6	25	30	0.5							
504194	7	4									5	6	20	24	0.4							
504226	43	28	14	3							5	6	140	168	3							
504227	6	5				4	2	0.5			5	6	25	30	0.5	1						
504229	124	77		1	3	11	6	3	2		5	6	385	462	8.4	3						
504243	30	18		2							5	6	90	108	2							
504408	52	34		3							5	6	170	204	3.7							

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Barclay Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																27						
Specific Stand Treatments																						
503153	38	33				33	17	5			5	6	165	198	3.6	5						
503155	4	4.0				4	2	0.5			5	6	20	24	0.4	1						
503156	33	22				22	14	2			5	6	110	132	2.9	3						
504032	27	13				18	9	2			5	6	65	78	2.1	2						
504035	6	4									5	6	20	24	0.4						0.7	
504037	91	59				43	22	6			5	6	295	354	6.4	6						
504041	38	26				13	7	3			5	6	130	156	2.8	3						
504049	30	0								30			0	0	0							
504050	22	14	11			4	2	1			5	6	70	84	1.5	1						
504060	18	16				16	6	2			5	6	80	96	1.7	2						
504062	11	0											0	0	0							
504063	32	0											0	0	0							
504065	53	0								53			0	0	0							
504069	3	0											0	0	0							
504075	18	0											0	0	0							
504076	12	8	5			3	2	1			5	6	40	48	0.9	1						
504080	42	27	21			9	5	3			5	6	135	162	2.9	3						
504097	55	33		3							5	6	165	198	3.6							
504101	7	0											0	0	0							
504105	31	10		1					2.5		5	6	50	60	1.1							

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
504116	2	0											0	0	0							
504119	14	0											0	0	0							
504129	6	3				3	2	0.5			5	6	15	18	0.4	1						
504132	17	13	13		2						5	6	65	78	1.7							
504137	18	10	10	1							5	6	50	60	1.3							
504138	18	0											0	0	0							
504147	6	4							1		5	6	20	24	0.4							
504151	26	14		1							5	6	70	84	1.5							
504158	111	73	67		6				3		5	6	365	438	7.9	73					3	
504165	35	24		2							5	6	120	144	2.7							300
504180	40	25		2							5	6	125	150	2.8							
504182	27	17			2						5	6	85	102	2							
504183	13	9				6	3	1			5	6	45	54	1	1						
504394	50	29	11			22	11	3			5	6	145	174	3.6	3						
504406	33	0											0	0								
Southworth Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																2						
Specific Stand Treatments																						
504104	23	0											0	0	0							
504110	55	36				3	2	3	11		5	6	180	216	3.9	3					0.6	
504117	31	20											0	0	2.2						1	
504118	49	27				9	6	2			5	6	135	162	3.5	3						
504121	30	0											0	0	0							
504125	99	0											0	0	0							

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
504126	16	10	5	1							5	6	50	60	1.1						0.7	
504131	122	0											0	0	0							
504133	30	16		2							5	6	80	96	2.2						1.5	
504135	24	16		1							5	6	80	96	1.7							
504146	11	7		1	1						5	6	35	42	0.8						0.7	
504198	33	21		2							5	6	105	126	2.3							
504201	3	0											0	0	0							
504213	191	125		5							5	6	625	750	13.6						3.8	
504222	95	62									5	6	310	372	6.7						1.6	
504407	14	9		1							5	6	45	54	1						1.4	
506179	25	22									5	6	110	132	2.4						1.4	
Eckman Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																16						
Specific Stand Treatments																						
													0	0	0							
504127	51	0											0	0	0							
504134	31	20		1							5	6	100	120	2.2							
504140	17	0											0	0	0							
504144	61	37	10		3						5	6	185	222	4.6							
504153	9	6									5	6	30	36	0.7							
504177	25	10	10	1							5	6	50	60	1.1						1.4	
504185	2	0								2			0	0	0							
504192	14	9		1							5	6	45	54	1	9					1.4	
504207	12	8		1							5	6	40	48	0.9						1.4	
504208	44	0			0								0	0	0						1.1	

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
504212	12	0											0	0	0							
504240	13	0											0	0	0							
504280	525	0											0	0	0							
504280A	61	13		2	0						5	6	65	78	2.1							
504280B	24	0									0	0	0	0	0							
504280C	46	10			0	5	3	1			5	6	50	60	1.1	1						
504280D	37	22			2						5	6	110	132	2.4							
504280E	88	24			3								0	0	2.6							
504280F	46	10			0						0		0	0	1.1							
504280G	70	30			5								0	0	3.3							
504280H	10	8			0	8	4	1			5	6	40	48	0.9	1						
504299	35	0											0	0	0							
504320	124	81		8							5	6	405	486	8.8							
504324	44	0								44			0	0	0							
504334	4	3									5	6	15	18	0.3							
504400	9	0											0	0	0							
504404	38	3			3						2	3	6	9	0.7							
504179A	334	222			0	6	3	2		0	5	6	1110	1332	24.1	2						
504179B	167	112			10	4	2	2			5	6	560	672	12.2	2						
504179C	35	23		2							5	6	115	138	2.5							
506005	5	5									5	6	25	30	0.5							

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Lower Alsea River Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																7						
Specific Stand Treatments																						
													0	0	0							
504023	11	0											0	0	0							
504157	11	0											0	0	0							
504159	48	0											0	0	0							
504188	60	39			3						5	6	195	234	4.2	39						
504189	55	21				11	6	2			5	6	105	126	2.3	21						
504191	66	43		4							5	6	215	258	4.7						1.7	
504209	26	18			2						5	6	90	108	2	18						
504211	39	23			1	1	1	1			5	6	115	138	2.8	26						
504218	16	6									5	6	30	36	0.7							
504228	8	5									5	6	25	30	0.5							
504231	42	30			5						5	6	150	180	3.3	30						
504233	43	28		3							5	6	140	168	3						5.7	
505094	9	6									5	6	30	36	0.7	6						
505097	20	0											0	0	0							
505121	19	0											0	0	0							

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Lower Canal Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																20						
About 50 acres of riparian planting and 25 acres of riparian conifer release																						
About 250 pieces of large wood would be placed in 5 miles of streams.																						
Specific Stand Treatments																						
504169	11	0											0	0	0							
504178	22	14			1						5	6	70	84	1.5			Y	Y	Y		
504178	22	15			2						5	6	75	90	1.6							
504195	28	0											0	0	0							
504196	70	45	31		3	11	6	4			5	6	225	270	4.9	4					3.1	
504214	5	3									5	6	15	18	0.3							
504214	40	26	13	2							5	6	130	156	2.8	26						
504215	149	91	40		2	24	12	7			5	6	455	546	9.9	91		Y	Y	Y		
504216	11	7	4	1							5	6	35	42	0.8			Y	Y	Y		
504230	62	37	37	3							5	6	185	222	4			Y	Y	Y		
504234	43	28				22	11	3			5	6	140	168	3	3						
504235	69	41		4							5	6	205	246	4.5			Y	Y	Y	4.6	
504237	133	88				50	25	9			5	6	440	528	9.6	9						
504245	40	26			2						5	6	130	156	2.8			Y	Y	Y		
504247	39	0											0	0	0							
504251	60	0											0	0	0							
504253	36	23	23	2							5	6	115	138	2.5							
504263	78	0											0	0	0							
504269	11	7	3	1							5	6	35	42	0.8							
504272	56	0											0	0	0							
504277	26	18	16		2						5	6	90	108	2							
504282	62	0											0	0	0							

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
504283	12	9		1							5	6	45	54	1							
504288	12	0											0	0	0							
504289	13	10	8		2				2		5	6	50	60	1.1							
504295	76	57	15	1	4						5	6	285	342	6.2							
504296	7	5	5								5	6	25	30	0.5							
504297	55	0											0	0	0							
504302	6	0											0	0	0							
504322	59	0											0	0	0							
504323	58	0											0	0	0							
504325	6	0											0	0	0							
504329	53	35	18	3							5	6	175	210	3.8			Y	Y	Y		
504344	15	10		1					2		5	6	50	60	1.1						1.5	
504345	30	19			1						5	6	95	114	2.1							
504357	51	34	31		3						5	6	170	204	3.7						9.3	
504357	10	7		1							5	6	35	42	0.8						1.1	
504361	23	12	4	1							5	6	60	72	1.3							
506178	71	36				36	18	5			5	6	180	216	3.9	5						
506178	19	19		2							5	6	95	114	2.1							

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Risley Creek Subwatershed																						
Treatments Not Linked to a Specific Road																						
Roads																11						
Specific Stand Treatments																						
504038	40	33				33	17	5			5	6	165	198	3.6	5						
504042	61	31				19	10	4			5	6	155	186	3.4	4						
504047	46	0											0	0	0							
504048	31	19			0	8	4	3			5	6	95	114	2.1	3						
504051	97	78	0		0	78	39	9			5	6	390	468	8.5	78						
504054	44	0											0	0	0							
504055	4	4									5	6	20	24	0.4							
504058	30	18	18	1	0						5	6	90	108	2							
504064	41	8		1							5	6	40	48	0.9							
504066	2	0											0	0	0							
504070	12	0											0	0	0		12					
504071	12	8			1						5	6	40	48	0.9							
504072	8	6									5	6	30	36	0.7						1.1	
504077	14	0											0	0	0							
504078	35	0											0	0	0							
504081	54	4	4								5	6	20	24	0.5						1.7	
504082	18	10	0	1							5	6	50	60	1.2							
504083	19	0											0	0	0							
504084	6	5				5	3	1					0	0	0.7	1						
504099	4	0											0	0	0							
504106	68	26			1	12	6	2			5	6	130	156	5	4						
504123	12	0											0	0	0							

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Upper Canal Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																20						
About 50 acres of riparian planting and 25 acres of riparian conifer release.																						
About 250 pieces of large wood would be placed in 5 miles of streams.																						
Specific Stand Treatments																						
504266	66	0											0	0	0							
504284	100	59		4	2						5	6	295	354	6.7			Y	Y	Y		
504284	48	31		1	2						5	6	155	186	3.4							
504308	47	31	28		3						5	6	155	186	3.4						2.1	
504313	42	0											0	0	0							
504314	20	0											0	0	0							
504316	68	27		1	2						5	6	135	162	4.8			Y	Y	Y		
504317	30	0											0	0	0							
504318	18	13	11		2						5	6	65	78	1.4			Y	Y	Y		
504321	63	40		1	2						5	6	200	240	4.3			Y	Y	Y		
504330	29	15				15	8	2			5	6	75	90	2.7	4						
504330	59	38	19	3							5	6	190	228	4.1			Y	Y	Y		
504335	66	0											0	0	0							
504336	5	0											0	0	0							
504338	41	25		2							5	6	125	150	2.7			Y	Y	Y	4.6	400
504338	29	19				18	9	2			5	6	95	114	2.1	2						
504339	39	0											0	0	0							
504343	5	3	3								5	6	15	18	0.3						0.6	
504347	73	35		2	2						5	6	175	210	5						2.9	
504347	148	94	89	4	5						5	6	470	564	10.2						5.7	
504353	60	0											0	0	0							

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
504358	63	41			3						5	6	205	246	4.5							
504360	34	9	9		1						5	6	45	54	2.4							
504364	28	0								28			0	0	0							
504365	11	11				11	6	2			5	6	55	66	1.2	2						
504365	27	17									5	6	85	102	1.8							
504367	12	12				12	6	2			5	6	60	72	1.3	2		Y	Y	Y		300
504367	42	32	28	1	1.5						5	6	158	189	3.4						1.5	
504369	69	0								69			0	0	0							
504374	59	37	25		2						5	6	185	222	4			Y	Y	Y		
504375	68	0											0	0	0							
504376	12	8		1		8	4				5	6	40	48	0.9						3.8	
504376	67	44		4							5	6	220	264	4.8						5.7	
504378	50	33		3							5	6	165	198	3.6			Y	Y	Y	2.3	
504379	57	36	34	1	2						5	6	180	216	3.9			Y	Y	Y		
504380	13	0											0	0	0							
504381	55	36		3							5	6	180	216	3.9			Y	Y	Y	1.5	
504382	40	0											0	0	0							
504383	247	161		16							5	6	805	966	17.5						0.8	
504387	78	26		2							5	6	130	156	2.8			Y	Y	Y	4.7	200
506182	47	31		3							5	6	155	186	3.4			Y	Y	Y	0.8	

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
Lower Drift Creek Subwatershed																						
Treatments Not Linked to a Specific Stand																						
Roads																11						
About 200 pieces of large wood would be placed in 2.5 miles of Drift Creek sloughs																						
Specific Stand Treatments																						
503118	60	0											0	0	0							
503119	20	0											0	0	0							
503120	7	0											0	0	0							
503121	22	14		1							5	6	70	84	1.5							
503126	90	59	45	6							5	6	295	354	6.4							
503128	72	51			4						5	6	255	306	5.5						0.8	
503134	39	0											0	0	0							
503135	4	0											0	0	0							
503136	41	0											0	0	0							
503142	25	0											0	0	0							
503149	46	27	27	3							5	6	135	162	3.3						0.4	
503158	43	28		3							5	6	140	168	3							
503159	33	0											0	0	0							
503160	13	12		1							5	6	60	72	1.3						0.4	
503161	10	0								10			0	0	0							
503162	24	12	12	1							1	1	12	12	1.3						0.7	
503163	34	0											0	0	0						1.1	
503164	10	0											0	0	0							
503165	36	0											0	0	0							
503166	18	12		1							5	6	60	72	1.3			Y	Y	Y	0.2	
503167	46	33		4							5	6	165	198	3.6			Y	Y	Y	1.7	
503168	20	16	8	1							5	6	80	96	1.7			Y	Y	Y	0.4	

Alternative 3 Post- Harvest Stand Treatments

Stand Number	Total Stand Acres	Commercial Thinning Acres	Under Plant and Release Acres	Acres of Post Harvest Gaps to Create Thru Snag/CWD Work	Gap Plant and Release Acres	Combined Stand & Meadow Underburn Acres	Stand & Meadow Grass Seeding Following Underburning Acres	Newly Created Meadow Maintenance Acres	Existing Meadow Maintenance Acres	Young Stand Thinning Acres	Down Wood to Create per Acre	Snag Creation/Cavity Development to Create per Acre	Within Stand Down Wood Creation Totals	Within Stand Snag Creation/Cavity Development Totals	Adjacent Stand Mature Tree Snag Creation/Cavity Development Total Trees	Invasive Weed Control Acres	Non-Commercial Thin Acres	Riparian Planting, Animal Control & Release (Y = Yes)	Riparian Release of Existing Conifer (Y = Yes)	Large Wood Placement within 0.25 Miles (Y = Yes)	Handpile and Burn Acres	Cubic yards of culvert fill/sidecast fill to be removed from non-system roads
503169	157	0											0	0	0		5					
503170	42	34				30	15	4	11		5	6	170	204	3.7	4		Y	Y	Y		
503171	78	51		5							2	3	102	153	5.5		7	Y	Y	Y	1.6	
503172	8	4	4								5	6	20	24	0.4			Y	Y	Y		
503173	19	0							31				0	0	0			Y	Y	Y		
504023	10	0											0	0	0		10					
TOTALS	**10,415**	**4,438**	**848**	**163**	**118**	**703**		**120.5**	**66**	**236**			**25,633**	**21,770**	**497**	**634**	**34**				**97**	**1,700**

Alternative 2 Post- Harvest Treatment Costs

Action	Unit of Measure	Unit Number	Cost per Unit	Total Cost
Invasive Plant Control in Meadows (mitigation)	Acres	127.0	$300	$38,100
Invasive Plant Control along Roads and Thinned Stands (mitigation)	Acres	507.0	$60	$30,420
Monitor Invasive Plants (mitigation)	Acres	634.0	$10	$6,340
Road Decommissioning (mitigation)	Miles	11.1	$20,800	$230,880
Cubic yards of culvert fill/sidecast fill to be removed from non-system roads (mitigation)	Cubic Yards	1,700.0	$10	$17,000
Road Closure (mitigation)	Miles	20.6	$3,250	$66,950
Within Stand Snag Creation/Cavity Development (mitigation)	Trees	22,530.0	$46	$1,036,380
Adjacent Stand Mature Tree Cavity Development (mitigation)	Trees	497.0	$100	$49,700
Under Plant and Release (mitigation)	Acres	174.0	$750	$130,500
Gap Plant and Release (mitigation)	Acres	26.0	$1,100	$28,600
Within Stand Down Wood Creation	Trees	26,690.0	$10	$266,900
Under Plant and Release	Acres	694.0	$750	$520,500
Gap Plant and Release	Acres	103.0	$1,100	$113,300
Combined Stand & Meadow Underburn	Acres	733.0	$325	$238,225
Stand & Meadow Grass Seeding Following Underburning	Acres	367.0	$130	$47,710
Newly Created Meadow Maintenance (underburn)	Acres	127.0	$325	$41,275
Existing Meadow Maintenance	Acres	73.0	$120	$8,760
Young Stand Thinning	Acres	238.0	$225	$53,550
Non-commercial Thinning	Acres	34.0	$560	$19,040
Riparian Planting, Animal Control & Release (3x)	Acres	100.0	$1,000	$100,000
Release of Existing Riparian Conifer	Acres	50.0	$600	$30,000

Alternative 2 Post- Harvest Treatment Costs

Action	Unit of Measure	Unit Number	Cost per Unit	Total Cost
Large Wood Placement	Pieces	700.0	$857	$600,000
Monitor snags, down wood, and grass, forb, and shrub habitat	Units	100.0	$70	$7,000
Monitor meadow habitat	Meadows	8.0	$50	$400
Total Costs				$3,681,530
Note: Costs for repairing and maintaining roads and fuel treatments are accounted for in timber sale appraisals.				
Total mitigation costs are estimated at $1,619,570.				
Total enhancement costs are estimated at $2,061,960				

Alternative 3 Post- Harvest Treatment Costs

Action	Unit of Measure	Unit Number	Cost per Unit	Total Cost
Invasive Plant Control in Meadows (mitigation)	Acres	121.0	$300	$36,300
Invasive Plant Control along Roads and Thinned Stands (mitigation)	Acres	507.0	$60	$30,420
Monitor Invasive Plants (mitigation)	Acres	628.0	$10	$6,280
Road Decommissioning (mitigation)	Miles	11.1	$20,800	$230,880
Cubic yards of culvert fill/sidecast fill to be removed from non-system roads (mitigation)	Cubic Yards	1,700.0	$10	$17,000
Road Closure (mitigation)	Miles	20.6	$3,250	$66,950
Within Stand Snag Creation/Cavity Development (mitigation)	Trees	21,770.0	$46	$1,001,420
Adjacent Stand Mature Tree Cavity Development (mitigation)	Trees	497.0	$100	$49,700
Under Plant and Release (mitigation)	Acres	170.0	$750	$127,500
Gap Plant and Release (mitigation)	Acres	24.0	$1,100	$26,400
Within Stand Down Wood Creation	Trees	25,633.0	$10	$256,330
Under Plant and Release	Acres	678.0	$750	$508,500
Gap Plant and Release	Acres	94.0	$1,100	$103,400
Combined Stand & Meadow Underburn	Acres	703.0	$325	$228,475
Stand & Meadow Grass Seeding Following Underburning	Acres	352.0	$130	$45,760
Newly Created Meadow Maintenance (underburn)	Acres	121.0	$325	$39,325
Existing Meadow Maintenance	Acres	66.0	$120	$7,920
Young Stand Thinning	Acres	238.0	$225	$53,550
Non-commercial Thinning	Acres	130.0	$560	$72,800
Riparian Planting, Animal Control & Release (3x)	Acres	100.0	$1,000	$100,000

Alternative 3 Post- Harvest Treatment Costs

Action	Unit of Measure	Unit Number	Cost per Unit	Total Cost
Release of Existing Riparian Conifer	Acres	50.0	$600	$30,000
Large Wood Placement	Pieces	700.0	$857	$599,900
Monitor snags, down wood, and grass, forb, and shrub habitat	Units	100.0	$70	$7,000
Monitor meadow habitat	Meadows	8.0	$50	$400
Total Costs				$3,646,210
Note: Costs for repairing and maintaining roads, and fuel treatments are accounted for in timber sale appraisals.				
Total mitigation costs are estimated at $1,593,340				
Total enhancement costs are estimated at $2,052,870				

Road #	Length	Obj. Maint Lev	Op Maint. Lev	Proposed Maint Level	Key road status	Notes and comments
1045	1.5	2	2	2	Key-SHC	Extends out of planning area, no log haul planned west to HWY 101
1046					Key-SLC	Not in planning area, may be used for alternate haul route though not likely
3446	9.0	2	2	2	Key-SHC	Asphalt to MP 2.5, Aggregate 2.5 to end
3455	0.6	1	2	2	Key-SLC	Open to junction of 3488
3462	4.2	3	3	3	Key-SLC	Paved segment to junction of 5304, just beyond Canal Creek CG
3462	1.7	1	2	2	Non Key	Decom 5.6 to upper switchback,open from upper switchback to 5800 junction, mile points from Hwy 34
3488	1.1	1	2	2	Non Key	Open to junction of 3488
3489	2.6	2	2	2	Non Key	Paved to mile point .9, aggregate to end
3490	3.0	1	2	2	Non Key	
5181	2.6	2	2	2	Non Key	BPA tower access
5200	5.6	2	2	2	Key-SHC	Asphalt, road extends NE out of the planning area
5300	11.3	2	2	2	Key-SHC	Asphalt 10.2 miles, Aggregate 1.1 miles. Earley School TS will convert 1.8 miles of paved to gravel, all gravel segments are on ridge top.
5304	2.5	2	2	2	Key-SHC	
5313	3.3	1	2	2	Non Key	
5359	0.4	1	2	2	Non Key	5381 junction to planning area boundary, 5359 extends to east for BPA/FS/BLM access
5360	3.3	2	2	2	Key-SHC	5360 extends south 6.0 miles to Yachats County road
5381	0.8	2	2	2	Non Key	Connects 5300 and 5359
5390	0.3	1	2	2	Non Key	Open to 414 spur
5800	10.0	2	2	2	Key-SHC	5800 extends south out of the planning area
5850	0.3	1	2	2	Non Key	
5860	2.2	2	2	2	Key-SHC	
3490325	0.8	1	2	2	Non Key	Open to BLM land access point
5181332	0.5	1	2	2	Non Key	BPA tower access
5200350	0.7				Non Key	Open to junction of 5200352
5200352	0.4	2	2	2	Non Key	Private land access
5390414	1.5	1	2	2	Non Key	BLM access
5800410	0.2	1	2	2	Non Key	
5860412	0.5	1	2	2	Non Key	
	70.9					Total open road miles in analysis area

Proposed and Existing Road Closures

Road #	Length in Miles	Objective Maintenance Level	Operational Maintenance Level	Proposed Maintenance Level	Notes and comments
Proposed Closures					
1045412	0.4	1	2	1	
3455416	1.9	1	2	1	
3489314	2.0	1	2	1	
3489315	0.4	1	2	1	
3490325	0.8	1	2	1	Closed near access point to BLM
5200350	0.3	1	2	1	Junction of 5200352 to end of road, current ATV use, resource damage
5300414	0.5	1	2	1	Also accesses Saddlefork timber sale, Yachats EA
5300417	0.4	1	2	1	
5300420	0.7	1	2	1	
5303000	1.8	1	2	1	5300 to start of decommission
5304416	0.2	1	2	1	
5304418	0.9	1	2	1	
5304420	0.1	1	2	1	
5313412	0.6	1	2	1	
5313413	0.7	1	2	1	
5347000	1.2	1	2	1	
5390000	0.5	1	2	1	Junction of 5390414 to decommission segment
5800408	0.7	1	2	1	
5800412	0.1	1	2	1	
5806000	1.1	1	2	1	
5852000	0.2	1	2	1	
5858000	0.6	1	2	1	Closed 58 junction to start of decommission
5860412	0.5	1	2	1	
5860416	0.4	1	2	1	
5862000	1.0	1	2	1	
5864000	1.4	1	2	1	
5870000	1.2	1	2	1	
Total	**20.6**	**miles**			Total new closure miles in analysis area
Existing Closed Roads					
1045414	0.5				
3446316	1.2				Planned extension to west for BPA tower access
3446388	0.7				2.0 miles planned for decommission; 0.8 miles will be re-closed after project
3446390	0.7				Closed with 3484 berm
3484000	2.8				
3484348	0.4				
5300311	0.9				
5300312	0.4				To be closed with Saddlefork Thin TS
5361000	1.1				To be closed with Saddlefork Thin TS
5361411	0.4				To be closed with Saddlefork Thin TS
5361412	0.3				
5860412	0.5				
Total	**9.9**	**miles**			Total existing closed roads, closed by gate or berm

Proposed and Existing Road Decommissions

Road #	Length in Miles	Objective Maintenance Level	Operational Maintenance Level	Proposed Maintenance Level	Notes and comments									
Proposed Decommissions														
3462	0.9	1	2	0	End of existing decom south end up to ridgetop, add to existing decom, live streams									
3462411	0.2	1	2	0	Bermed and stable, no treatment, code to decom with decision									
3462414	0.5	1	2	0	Decom with proposed 3462 decom, ditch relief pipes only									
3484	2.0	1	1	0	3484-348 spur west to 3446 junction									
3487	0.3	1	2	0	North edge stand 504156 to end									
3488	1.7	1	2	0	Junction 3488320 to end									
5303	0.3	1	2	0	NE segment at end of road									
5359	1.0	1	2	0	5381 junction west to 5360									
5390	0.3	1	2	0	NE segment at end of road									
5866	0.6	1	2	0	Junction of 5864 to end of road									
3488-320	0.8	1	2	0	North edge stand 504171 to end									
3488-330	0.4	1	2	0	Entire road									
3499-322	0.3	1	2	0	Entire road									
5856	0.8	1	2	0	Entire road									
5858	1.0	1	2	0	Stand 504165 to end of road									
Total	**11.1**				**Total proposed decommission miles**									
Existing Decommissioned Roads														
3446-317	0.8													
3446-318	0.2													
3455000	3.2													
3455-411	1.7													
3455-414	0.7													
5360410	0.8				Culverts not removed									
5360-412	0.8				Culverts not removed									
5360-411	1.0				Culverts not removed									
3489-312	0.5													
3489-313	0.1													
3462000	1.4				Decommissioned from junction of 5304 to MP 5.6, add 0.9 miles decom w/project									
5181340	0.8				Culverts not removed, fiber optic cable in ditchline									
Total	**12.0**				**Total existing decommissioned roads**									

Effects to Forest Service Goals for Wildlife (District Wildlife Biologist and Silviculturalist, USDA 2007)

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Introduction

This section identifies the direct and indirect effects of proposed actions on Forest Service desired-conditions/goals for wildlife (USDA 1991, Forest Service Manual 2602; USDA 1990, Siuslaw Forest Plan; and USDA, USDI 1994, Northwest Forest Plan). These goals emphasize maintaining ecosystem diversity and productivity by supporting recovery of threatened or endangered species, maintaining species viability, and providing diverse opportunities for esthetic, consumptive, and scientific uses of wildlife. The effects/consequences to these desired conditions from proposed activities are primarily measured by analyzing affects/changes to habitats, because attainment of these goals is ultimately dependant upon the diversity of habitats needed by animals for their survival.

Project actions would change existing conditions, and this change can either affect desired conditions immediately or cause a trend that affects desired conditions in the future. Of the over 200 vertebrate and thousands of invertebrate animals that may occur in the project area, analysis of potential project effects is required for certain categories of species. These species categories are Threatened or Endangered, Survey and Manage, Sensitive, Management Indicators, and certain land birds. Affect to these species are based primarily on affects to important habitats these animals need; secondarily on potential disturbance affects to individuals during breeding season from project implementation.

Effect are based on detailed analysis; primarily using historic and existing conditions, design criteria (appendix A), and the amount of area treated (amounts are described in appendix B). Design criteria include the most current requirements from the US Fish and Wildlife Service (FWS) for federally listed wildlife. These requirements are described in a biological opinion (BO) and a corresponding letter of concurrence (LOC) (Habitat Modification BO and LOC 2006-2007; reference numbers1-7-06-F-0192 and 1-7-06-I-0190). Generally, beneficial effects from actions to habitats and species are long-term, while potential adverse effects are expected to be short-term.

Species analyzed use the following habitats: grass/forb, shrub, sapling/pole forest, small forest, mature forest, old growth forest, caves/burrows, cliffs/rims, talus, down wood, snag, and riparian. Table 1 below has additional information on these habitats and their use by species analyzed.

Table 1: Species analyzed and their habitat associations:

COMMON SPECIES NAME	Endangered Species Act	Sensitive in Region 6 (R6)	Northwest Forest Plan Survey & Manage (S&M) ROD (2001) or Protection Buffer (PB) species	Management Indicator Species (MIS) from Siuslaw LRMP	Neo-Tropical Migratory Bird Focal Species (NTMB)	Grass/Forb	Shrub	Sapling/ Pole	Small Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snag	Talus	Riparian (including bays)	Comments
Oregon Silverspot Butterfly	T			MIS		1												
California Brown Pelican	E			MIS													1	Ocean
Marbled murrelet	T									2	1						1	
Northern spotted owl	T			MIS						2	1				2			
Western Snowy Plover	T			MIS													1	Sandy beaches; large water
Great gray owl			S&M			1				2	2							Willamette Valley only
Bald eagle		R6		MIS		1				2	2				1		1	De-listed in July, 2007; effective in lower 48 states. The provisions of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act will remain in place.
Foothill yellow-legged frog		R6				2	2										1	
Northwestern pond turtle		R6				1	1							1			1	
Southern torrent salamander		R6						2	1	1	1					1	1	very cold water; springs
Aleutian Canada goose		R6		MIS		1											1	winter resident
American peregrine falcon		R6		MIS		2	2			2	2		1		2	2	1	
Bufflehead		R6															1	winter resident; estuary?
Harlequin Duck		R6															1	winter resident rocky coast; possibly breeding in coast range along fast streams.
Streaked Horned Lark		R6				1	2											Willamette Valley
California Wolverine		R6										1		1		1	1	
Pacific Fisher		R6							2	1	1		2	1	1	1	2	
Pacific fringe-tailed myotis		R6	PB			1	1			2	2	1	1		2		1	
Pacific Pallid bat			PB			1		1	2	2	2	1	1		2		1	
Red tree vole		R6							2	2	1							Survey & Manage on Hebo RD
shrew; Pacific		R6				2	2	2	2	2	2			1				
Long-eared myotis			PB					2	2	1	1	2		1	1		1	
Long-legged myotis			PB			2	1	1	2	1	1	1	1		1		1	
Silver-haired bat			PB			2		1	2	2	1	2	2		1		2	
Townsend's big-eared bat			PB				2	1	2			1					2	

COMMON SPECIES NAME	Endangered Species Act	Sensitive in Region 6 (R6)	Northwest Forest Plan Survey & Manage (S&M) ROD (2001) or Protection Buffer (PB) species	Management Indicator Species (MIS) from Siuslaw LRMP	Neo-Tropical Migratory Bird Focal Species (NTMB)	Grass/Forb	Shrub	Sapling/ Pole	Small Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snag	Talus	Riparian (including bays)	Comments
Downy woodpecker				MIS				2	2	2	2				1		1	
Hairy woodpecker				MIS				2	2	2	1			1	1		2	
Pileated woodpecker				MIS	NT MB				2	2	1			1	1		2	
Red-breasted sapsucker				MIS				2	2	2	2				1		1	
Northern flicker				MIS		1	2	2		1	1			1	1		2	
Red-breasted nuthatch				MIS				2	2	1	1			2	1		1	
Ruffed grouse				MIS		1	1	1	1	2	2			1			1	
American Marten				MIS				2	2	1	1	2	2	1	1	2	2	
Roosevelt elk				MIS		1	1	1	1	1	1						1	
Band-tailed pigeon					NT MB	2	2	1	1	1	1							
Black-throated gray warbler					NT MB	1	1	1	1	1	1							
California quail					NT MB	1	1	2										
Hammond's flycatcher					NT MB				2	1	1							
Hermit warbler					NT MB		2	1	1	1	1							
Hutton's vireo					NT MB		1	1	1	1	1							
Pacific-slope flycatcher					NT MB			2	2	1	1				1			
Rufus hummingbird					NT MB	2	1	1	2	2	2							
Vaux's swift					NT MB	2	2	2	2	1	1				1			
Wrentit					NT MB		1	1	2	2	2							
# of TE species use as PRIMARY habitat						1	0	0	0	0	2	0	0	0	0	0	3	
# of TE species use as SECONDARY habitat						0	0	0	0	2	0	0	0	0	1	0	0	
# of Sensitive species use as PRIMARY habitat						5	2	0	1	2	3	2	2	4	2	3	10	
TOTAL # of all Species. Analyzed use as PRIMARY habitat						13	10	12	7	15	21	5	4	10	14	3	21	
TOTAL # of all Species Analyzed use as SECONDARY habitat						8	9	12	19	17	11	3	3	1	4	2	7	

1= primary habitat, 2= secondary habitat

This project, using information from landscape-scale assessments, combined with further analysis, identified habitat conditions well below their historic levels (see Chapter I for details). Therefore, an emphasis of this project is to maintain and restore these habitats of concern. These deficit habitats are late successional and old growth forest, grass/forb, shrub, and large dead wood. Of about 210 endemic vertebrate wildlife species that may occur in the project area, many use these habitats of concern for their primary habitat needs: about 80 species use late successional and old growth forest, 70 use grass/forb, 75 use shrub, 40 use snags, and 50 use down wood.

Many species use more than one habitat type for their primary habitat needs. For example, 50 species use both grass/forb and shrub habitats, about 12 use grass/forb and snags, and about 20 use grass/forb and shrub habitats in riparian areas. The viability of a few species may depend upon grass, forb, or shrub habitats; these species include western pond turtle, Northwestern garter snake, brush rabbit, and quail.

The habitat with greatest restoration emphasis is old growth forest, because of the dependence two threatened species (northern spotted owl and the marbled murrelet) have on this habitat and the requirement to manage for late-successional and old growth forest in Late Successional Reserve (USDA, USDI 1994), the dominant land allocation in the project area.

First described are affects to agency goals for wildlife from the no action alternative. Then the affects from each proposed activity to each habitat type are described. Following are the affects to species analyzed from the no action alternative and from all proposed activities combined. Finally, a summary of effects to agency wildlife goals from all alternatives are explained, which is based on a summary of effects to wildlife habitats and species analyzed.

Effects to Wildlife Habitats from No Action Alternative 1

The No Action Alternative 1 would retard attainment of agency wildlife goals, because habitat biocomplexity would remain low for many years. Retarded would be development of nesting structures for species, such as the northern spotted owl, marbled murrelet, and pileated woodpecker. Retarded would be the improvement of habitat for species such as northern spotted owl, woodpeckers, ruffed grouse, brush rabbit, bats, elk, and American marten.

Plantations (or habitat) would continue to develop, mostly as dense single-storied Douglas-fir monocultures. Trees would continue to grow over time, but attributes of old growth forest habitat - such as large trees and canopy gaps - would develop at rates slower than natural stands historically achieved old-growth characteristics. (Tappeiner et al. 1997).

Individual trees will continue to compete for limited resources, especially light. Trees will grow taller as they strive to obtain sufficient sunlight, but diameter growth will continue to slow in

response to loss of crown and thus reduced photosynthesis. The trees will remain susceptible to insects, disease, and windthrow, as inter-tree competition remains keen.

Inter-tree competition will result in the mortality of the most severely suppressed conifers and provide snags and eventually down wood. The majority of this dead wood will be small; less than 10” in diameter and 60-70 feet tall in 25-45 year-old plantations.

Because the stands are predominantly uniform monocultures; minus a major disturbance; opportunities for establishing biocomplexity through natural processes will remain low for many years. Eventually through mortality and natural disturbances, openings will be created allowing other conifers and brush species to become established in the understory.

The effects of the no action alternative are likely to be similar to those 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 Lower Alsea watershed, it does provide a basis for comparing the development of overstocked stands over 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 due to limited light conditions. Although individual tree diameter growth has remained small, height growth has continued, producing tall, spindly trees prone to windthrow. Crown widths and lengths have receded making the trees less vigorous and more prone to effects of insects and disease.

Similar results are predicted when overstocked plantations are modeled with ORGANON (Oregon Growth Analysis and Projection). When a modeled stand reached an age of 117: (1) the average crown ratio fell below 30%, (2) over 50% of the trees died, (3) the average diameter of codominants was 26 inches, (an average diameter growth rate of 2.2 inches per decade), and (4) the height of the 40 tallest trees per acre would be 208 feet.

Additionally, the Siuslaw Thinning and Under-planting Diversity Study provides information from un-thinned stands: (1) live crown to bole length and crown ratios are continually dropping, (2) diameters are still increasing but at progressively much slower rates (less than 2.0 inches of DBH growth/decade) than adjacent thinned plots, (3), available understory light remains less than 5% and (4), understory brush and shrub stocking remain very low (Chen 2006; personal communication with Stu Johnston, Forest Silviculturalist).

In summary, the No Action Alternative provides no opportunities to improve conditions for agency wildlife goals by accelerating the development of complex, old growth forest conditions in young overstocked monoculture stands. Restoration objectives for habitats of concern will likely be delayed for many decades in these stands and may never be reached before a natural

disturbance resets the vegetation succession cycle. Under this alternative, no gap creation, meadow creation, underburning, underplanting, roadside hazard tree removal, roadside clearing, roadside salvage, or roadside thinning activities along key Forest roads would be completed.

Effects to Wildlife Habitats from Plantation Treatments and Associated Actions in Alternatives 2 and 3

Plantation treatments and associated actions are described and quantified in chapter 2. Actions that affect wildlife habitat include commercial and non-commercial thinning in plantations, temporary road construction, temporarily reopening existing roads, maintain roads, maintaining meadows, increasing the amount of early seral habitat (grass/forb/shrub), tree planting and associated brush control (cutting competing brush near planted trees), and dead wood creation.

Plantation Treatments

Grass/forb, shrub, and seedling/sapling habitats

Plantation treatments would generally have similar effects to these habitat types; therefore, the effects are grouped together in the following section.

Grass/forb habitat is in meadows and forest under-stories. Meadows are dominated by grasses or forbs, and the abundance of grasses or forbs in forest under-stories could vary from one to over fifty percent groundcover. These habitats were historically more abundant than now, because people burned areas until this practice was stopped around 1940.

Shrub and sapling/pole habitats are dominated by deciduous shrubs and often contain some grass/forb habitat. Natural sapling/pole habitat is dominated by trees between 1 and 10 inches in diameter at breast height (DBH) and has some grass/forb habitat, but is generally dominated by shrubs for 2 to 15 years, which is when hardwoods and then conifers establish dominance, usually when hardwoods grow into pole or small-sized trees and conifers grow taller than hardwoods.

These grass, forb, and shrub habitats were once very common on the Forest; however, they are declining rapidly on Federal lands due to changes of forest management affected by the Northwest Forest Plan. Forested areas recently thinned near the project area exhibit some shrub recovery; however, the distribution and abundance of shrub species probably remains below historic levels. Therefore, grass/forb, shrub, and seedling/sapling habitats are considered deficit, or habitats of concern on lands administered by the Siuslaw Forest.

Thinning, as well as creating dead wood, would have beneficial effects on these habitats, by increasing the amount of light reaching the forest floor and stimulating development of grass/forb, shrub, and seedling/sapling habitats. Heavy thinning (retain < 40 trees per acre - tpa) would have greatest benefit; followed by moderate (retain 40-60 tpa) and then light thinning (retain > 60 tpa). Heavy and moderate thinning would have greatest benefit because grass, forb, shrub, and sapling habitats would persist longer where more sunlight can flow between overstory

trees. Light thinning would have less short and long term benefits than heavy or moderate thinning, because less sunlight would flow to the ground immediately after thinning and overstory canopy closure would block most light within about ten-fifteen years after thinning (Chan 2006).

Temporary road construction, re-opening and then closing existing roads, and maintaining existing roads would have minimal adverse effects to these habitats, because of the relatively small amount of area affected by these treatments (less than 1% of existing meadow, shrub, or sapling/pole acres in the watershed). Temporary road construction and reopening then closing existing roads could benefit these habitats, because these habitats could develop on the closed roads.

Burning would have beneficial effects on these habitats, because it would kill undesirable small woody plants in meadows and improve the potential for grasses, forbs, and shrubs to grow in the seedbed prepared by burning. Burning would also have minimal adverse direct effects and beneficial indirect effects to shrub and sapling/pole habitat, because the limited adverse effects would be very short-term (less than one year), and beneficial effects would be longer-term. Limited adverse effects could occur when burning kills above-ground portions of shrubs and some seedlings and saplings. However, longer term beneficial effects result because most shrubs re-sprout after burning and natural seeding or planting (where needed) would restore seedlings/saplings, thus improving the amount and quality of these habitats.

Seeding would have direct beneficial effects to grass/forb habitats and minimal indirect effects to shrub or sapling habitats in forested areas; because seeding would increase the amount of grasses or forbs, and low application rates of seed in forested areas should not adversely affect establishment or growth of shrub or sapling habitats. Seeding to create meadows and to restore areas in meadow boundaries - after reducing encroachment of competing vegetation - would benefit grass/forb habitats and have direct adverse effect to shrub and sapling habitats, because high application rates should create dense stands of grass, which resist establishment of shrubs and saplings. In addition, creation or restoration of meadows with seeding could have indirect adverse effects to shrub and sapling habitats, because these areas would be managed for meadow habitat, and encroaching shrubs or saplings could be eliminated in the future to maintain meadow habitat.

Planting and associated brush control in forested habitats of plantations would have minimal effects to these habitats, if planting is implemented after burning. However, if planting is implemented before burning can occur, then planting could prevent burning and the beneficial effects of burning; thus planting could adversely affect these habitats.

Young/small forest habitat

Small forest is habitat dominated by trees between 10 and 21" DBH with canopy cover greater than 40 percent. This habitat comprises about 45 percent of about 25,000 Federal acres in the Lower West Alsea watershed. Reference condition for this habitat is 15-31%; therefore this habitat is more abundant than desired, thus not considered a habitat of concern.

Thinning, as well as dead wood creation would have beneficial effects on this habitat, because it would increase the health of trees and increase biocomplexity by reducing the amount of competition among remaining trees for light and nutrients and increasing the amount of structural and species diversity. Biocomplexity would increase with creation of gaps (small openings), dead wood, and meadows, as well as development of hardwood trees. Skips/clumps (dense untreated areas) would also benefit biocomplexity by providing refugia for certain species.

Over the short-term, a few stands thinned below 40 trees per acre (heavy thinning) would have less than 40% canopy cover; however, canopy cover should recover to above 40% within a decade, and this heavy-thinning prescription adds biocomplexity at the stand and landscape scale. Heavy and moderate thinning increases the risk of windthrow; however, project design criteria (Appendix A, p. 9) minimize this risk. This risk is acceptable because heavy and moderate thinning is better than light thinning for development of large trees, grasses, forbs, shrubs, saplings, and hardwoods (Chen 2006), and because if windthrow occurs it would reduce the amount of an overabundant habitat, young/small forest, by a few acres.

Over the long-term, thinning of young/small forest would benefit late-successional and old growth forest habitat, because these smaller forests should develop important characteristics (especially large trees), sooner than with no treatment. See Silviculture report for details about growth rates of trees with and without thinning.

Temporary road construction, temporarily re-opening existing roads, maintaining existing roads, and burning would have essentially have no direct or indirect effects to this habitat, because the relatively small amount of trees potentially affected would not reduce overall canopy cover enough to eliminate any of this habitat.

Planting and associated brush control as well as seeding would not directly affect this habitat, because it would not affect trees 10 to 21" DBH. Indirectly, these treatments could benefit this habitat, because planting and brush control would improve species and structural diversity over time.

Late-successional and old growth forest habitat

A major emphasis of this project is hastening development of late successional and old growth forest, and the definition of this habitat is important for understanding many aspects of this project.

“Late-successional forests are those forest seral stages that include mature (21 to 32 inches DBH or 80 to 200 years of age) and old-growth (>32 inches DBH or >180 to 200 years old) age classes” (USDA, USDI 1994a, Vol. 1, p. 3, 4 to26, and Glossary, p. 9; and USDA, USDI 1994b, p. B-1). “Although the processes that created the current late-successional and old-growth ecosystems are not completely understood, they include: (1) tree growth and maturation, (2) death and decay of large trees, (3) low-to-moderate intensity disturbances (e.g., fire, wind, insects, and diseases) that create canopy openings or gaps in the various strata of vegetation, (4) establishment of trees beneath the maturing overstory trees either in gaps or under the canopy, and (5) closing of canopy gaps by lateral canopy growth or growth of understory trees” (USDA, USDI 1994b, p. B-2). Because this habitat is considered to be below historic levels, it is a habitat of concern.

Although there are a number of other important characteristics, definitions used to quantify this habitat generally utilize a combination of diameters (described above) and canopy closure (generally greater than 50 percent). Diameter and canopy closure are used because they are 1) easily measured and 2) these are the types of stands where the characteristics of late-successional and old growth forest begin developing or may already occur.

These easily measured characteristics do not represent the quality of late-successional and old growth forest. For example, a stand that was clear-cut 60 years ago and managed for production of optimum timber yields could be classified as late-successional forest, because it is dominated by 21 to 32 inches dbh trees with canopy closure greater than 50%, but this stand is not likely to contain other important characteristics for quality late-successional and old growth forest habitat. Lacking would be giant live and dead trees, canopy gaps, and hardwood trees. Conversely, in natural stands where a fire killed most of the larger trees 60 to 100 years ago, there could be few giant (greater than 45” dbh) live and dead trees that are surrounded by 21 to 32 inches dbh conifers and hardwood trees. Although this stand could be suitable for nesting northern spotted owls or marbled murrelets because of the few giant trees, it would also be defined as late successional forest because the predominant tree size of conifer trees is 21 to 32 inches dbh.

The point is that the average size of live trees is important for species dependant upon late-successional and old growth forest, but other characteristics that increase biocomplexity, such as giant live and dead trees, hardwoods, canopy gaps, and smaller live and dead trees are very important elements of high quality late successional and old growth forest habitat (NFP ROD, p. B1-B4).

Thinning, as well as dead wood creation, would have negligible short-term adverse effects on this habitat, because these treatments are not proposed in this habitat. However, about 200 mature trees in this habitat could be used as guyline anchors in logging operations, and, based on past experience by Central Coast Ranger District timber sale administrators, about one to five percent of these trees (3 to 12 trees) may be felled to protect worker safety. In addition, based on past

experience, about 20 to 25 mature trees along roads may be felled to eliminate safety hazards. Priority for felled trees would be to leave trees on site, use trees for fish structures for another project, remove trees through timber-sale contracts, remove trees through firewood permits, or remove trees through service contracts (appendix A). Felled trees would not eliminate any late-successional forest habitat, because the trees would be scattered throughout the watershed. Inoculation or tree topping in this habitat should benefit the quality of late-successional forest habitat for species that nest or den in large tree cavities, because this would hasten development of these cavities.

Temporary road construction, re-opening and then closing existing roads, and maintaining existing roads would have minimal direct or indirect effects to this habitat, because of the relatively small amount of area affected by these treatments. Some large trees, determined to be road-side danger trees, could be felled adjacent to these roads. However, these treatments would indirectly benefit late-successional forest over the long term, because roads allow access for commercial thinning of plantations, which accelerates restoration of this habitat.

Burning is not proposed in this habitat and, therefore, would have no effect.

Planting and associated brush control, as well as seeding, are not proposed in this habitat and, therefore, would have no direct effect. These treatments would indirectly benefit this habitat component in the watershed by accelerating the development of late-successional forest habitat components, such as species and structural diversity, in plantations.

Caves and burrows, cliffs and rims, and talus habitats

Caves and burrows are holes in the ground. Cliffs and rims are nearly vertical land, usually made of rock. Talus habitat consists of areas dominated by loose rocks, with essentially no soil in the spaces between the rocks; rocks range in size from small gravel to large boulders.

Caves, cliffs, and rims are not known to occur in the watershed, and they are not likely to occur in majority of the watershed because the local geology, sandstone, is not conducive to these habitat types. However, much of Eckman Creek is basalt where these habitats are more likely. Talus is also very uncommon in sandstone and more likely in basalt geology. Talus occurs primarily along streams, and proposed actions are not expected to impact talus habitat. Burrow habitat is likely to occur in the project area. However, actions are designed to avoid or minimize soil disturbance and compaction and, therefore, should have little effect on burrows. Therefore, proposed actions are not expected to have measurable effects to these habitats.

Large dead wood habitat

Large dead wood is greater than 20 inches in diameter and includes dead wood in live trees, snags, and down wood. However, larger sizes are important for some animals, such as amphibians, because larger down wood remains moist during dry periods longer than smaller

pieces. Dead wood in larger live trees is particularly important to northern spotted owls, because these are sites where cavities develop that are large enough to brood and raise young. The majority of nests used by northern spotted owls in coastal forests are within cavities inside trees greater than 50” dbh (Forsman and Giese, 1997).

At the watershed scale, nearly 40 percent of Forest Service lands contain plantations, which have very small amounts of large dead wood, especially recently dead or larger than 30” dbh. Historically, these plantations were mature or old growth forest that contained large and very large dead wood. In other words, about 40 percent of Forest Service lands in the watershed no longer have historic or adequate amounts of large dead wood. Therefore, this is a habitat of concern.

About 45 percent of the Lower West Alsea watershed has natural levels of snags and down wood in late-successional forest habitat in this watershed; however, there appears to be very few large cavities – probably due to the age of nearly all late successional forest habitat (about 160 years of age).

The deadwood prescription for plantations (Appendix A) would provide dead wood in live trees, snags, and down wood. Levels after thinning would be minimums, because this prescription would emphasize speeding development of larger trees that would provide better future conditions for dead wood dependent species (USDA, USDI 1997; p. 68, CWD Alt. #3 prescription).

Created dead wood would be clumped or scattered, as described in Appendix A, which should provide for the many species needing high densities and the few species that need scattered densities of dead wood (Mellen et al, 2003).

The amounts of existing plus created dead wood in untreated and treated areas of plantations would provide quantities nearer the average minimum recommended by the LSR Assessment. Existing down wood should persist in all areas of plantations. Future dead wood in untreated and treated areas will be created through inter-tree competition or possible future treatments in about 10 to 20 years. Should these areas be treated in the future, some of the existing snags would need to be felled for safety reasons before thinning operations could begin, adding to the down wood component.

Although some large snags and large live trees with dead wood might be felled adjacent to roads and thinning would directly and indirectly have adverse affects to the amount of small snags, the long-term benefit to large dead wood habitat from thinning would outweigh losses. Thinning promotes the development of many more large trees, thus potential future large snags and cavities than would be felled to protect workers. Additionally, smaller snags (16-22” dbh) would be

created and cavity development promoted in plantations, partially compensating for the loss of dead wood from thinning and associated actions in this project.

Temporary road construction, re-opening existing roads, and maintaining existing roads would have minimal effects to this habitat, because of the relatively small amount—less than 1 percent of these habitats in the watershed—affected by these treatments.

Burning would have minimal effect on this habitat, because burning prescriptions would be governed by fuel moisture levels that minimize potential loss of large dead wood. Burning, however, can consume portions of large dead wood pieces, especially where pitch is present.

Planting and associated brush control, as well as seeding, would not directly affect this habitat, because it would not affect large dead wood. Indirectly, planting and brush control could benefit this habitat, because planting and brush control would improve structural diversity, including dead wood, over time, because planted trees could someday become large dead wood.

Key and Non-key Road Actions

Key and non-key road actions include repairing and maintaining existing roads, replacing culverts, closing roads, and decommissioning roads (including removing culverts).

Maintaining existing roads, culvert replacement or removal, and road decommissioning, would have minimal adverse direct or indirect effects to grass/forb, shrub, sapling/pole, small or mature forest, caves/burrows, cliffs/rims, talus, or down wood habitats, because of the relatively small amount of area affected by these treatments (less than 1 percent of existing acres of these habitats in the watershed). Road closures can reduce the potential for maintaining meadows by making access more difficult and increasing the cost of treatments. However, overall, the value of wildlife habitat is improved by road closures, because of reduced disruption from vehicle traffic and the development of vegetation on the road-bed.

These treatments would have minimal direct adverse effects to late-successional forest habitat, because some road-side danger trees may be felled. Although this would degrade the quality of this habitat, no late-successional forest habitat would be removed by these treatments. In addition, these treatments would indirectly benefit late-successional forest over the long term, because most roads would be retained for future stand treatments that are designed to accelerate the development of this habitat.

Although some large snags and large live trees with dead wood might be felled adjacent to roads used as access to worksites for safety reasons, the long-term benefit to dead wood from thinning (which is facilitated by roads) would outweigh these losses. Thinning promotes the development of many more large trees and vertical dead wood than would be felled to protect workers.

Water quality and the quality of aquatic habitat needed by some species, such as the southern torrent salamander, would be improved over the long term by road actions, especially where culverts are removed or replaced.

Road closing and decommissioning would have both beneficial and adverse affects to agency wildlife goals, such as reducing disturbance, maintaining access for future restoration treatments, and maintaining opportunities for use of wildlife resources. Beneficial effects would result from closing roads, because of reduced disruption from people associated with driving. Actions that reduce the potential for driving to areas would have slight adverse effects, because closing or decommissioning roads could decrease access for future restoration treatments and decrease opportunities for people to use wildlife resources. The amount of open roads would be reduced, but access would remain to all major drainages in the planning area. However, these adverse effects would be minor, because the highest priority restoration treatment (thinning) would be completed before roads are closed, roads can be reopened when needed in the future, closed roads can be used by people, and remaining open roads would continue to provide road access to drainages in the project area;.

Stand Treatments in Matrix

Stand treatments in Matrix would have the same effects to wildlife habitats as those previously described for plantation treatments and associated actions.

Effects to Wildlife Habitats from additional restoration actions

Restoration actions not previously discussed include adding large wood to streams, riparian planting, and releasing riparian conifers.

Adding large wood to streams would directly and indirectly benefit aquatic wildlife habitat, because this would increase biocomplexity in or adjacent to streams by improving pool complexity, storing sediment and organic material, connecting floodplains to streams, and increasing the amount of large down wood on land and water. Felling large trees to place in streams would have direct adverse affects to late successional or old growth forest habitat, because removing large trees would degrade 100-150 acres of this habitat. However, this adverse affect is minimized by design criteria (Appendix A) that protect trees with important characteristics - such as diameters greater than 36” or with potential nesting structure for the marbled murrelet.

Riparian planting or conifer release in meadows or hardwood dominated areas near streams would have direct and indirect adverse affects to meadow and hardwood forest habitats. Conifer release from non-commercial thinning would have similar effects as commercial thinning described above. Adverse effects to meadow or hardwood dominated areas occur because this

treatment would eliminate areas of meadow, especially unique streamside-meadow habitat, and possibly degrade common streamside-hardwood habitat.

Design criteria would minimize the loss of meadow habitat from riparian planting and release by only emphasizing restoration of forest vegetation directly adjacent to the stream and developing a few large trees farther from the stream but would retain meadow habitat. Meadow loss would only occur adjacent to the stream in a narrow band where forest vegetation is restored. The width of this forested band would vary depending upon the width of the meadow; wider meadows could have wider bands – up to about 75 feet, and narrower meadows would have bands about 20-50 feet wide. Site-specific prescriptions would be developed with a wildlife biologist.

Cumulatively, most lowland meadow areas adjacent to streams in the project area have been or are planned to be planted (with other projects). The results are loss of meadow to blackberry where meadow maintenance treatment is no longer feasible, but retention of meadow habitat where maintenance is feasible. Eventually, successful planting and release would result in loss of some meadow habitat, but where tree densities are low and meadow maintenance is feasible, meadow habitat should remain around planted trees.

The magnitude of cumulative adverse effects to meadows overall is small from riparian planting and release, because this affects a small percentage (less than about 10%) of the total existing meadow area (about 100 acres) on Forest Service lands in the planning area, because design criteria retains meadows in all areas where meadow maintenance is feasible – including near streams, and because this project proposes to create more meadow acres (about 130 acres) than would be affected by riparian planting and release.

The magnitude of adverse affects to hardwood habitat is very small, because no hardwood forest would be eliminated and only a small amount (up to 50 acres) of hardwood forest would be impacted. Impacts occur where a few hardwood trees (usually alder) would be felled in a scattered pattern in nearly pure hardwood areas adjacent to streams.

Effects to Wildlife Habitat Summary

Effects from all actions on habitats are considered in aggregate and summarized below. Appendix B quantifies the effects described above for plantation treatments and associated actions as well as for key and non-key road actions. Table 2 summarizes the effects to habitats of concern, based on qualitative and quantitative information.

Under Alternative 2, about 4,566 acres will be commercially thinned: 3% will be thinned to densities between 35 and 40 trees per acre, 37% will be thinned to between 40 and 50 trees per acre, 30% will be thinned to between 50 and 60 trees per acre, and 30% thinned to 60 or more trees per acre.

Under Alternative 3, 4,438 acres will be commercially thinned with similar ratios of thinning densities as Alternative 2.

Determination of effects to wildlife Habitats of Concern

The greatest difference between the action alternatives is economics. Alternative 2 is expected to have more funding available for restoration work beyond commercial thinning. Also, some of the stands in Alternative 3 have less potential to be thinned, because the timber in some stands have low economic value compared to the cost of helicopter harvest; however, this value/cost ratio is market dependant. Thus, the intent of both action alternatives is similar for wildlife habitat restoration, but the potential for implementation of all restoration actions is higher with Alternative 2 because it has a better timber value-to-harvest cost ratio.

Table 2 summarizes the beneficial effects to habitats of concern for each alternative.

Table 2: Summary of beneficial effects to wildlife habitats of concern by alternative

Habitat objective	Alternative			
	1	2	3	
Acclerate restoration of late successional and old growth forest, especially large live conifer and hardwood trees	L	H	H/M	Reducing the density of small trees and creation of gaps and dead wood are beneficial
Restoration of grasses, forbs and shrubs in forest under-story.	L	H	M/H	Reducing the density of small trees, creation of gaps and dead wood, seeding, and under-burning are beneficial
Creation, maintenance and restoration of meadows	L	H	M/H	Encroachment reduction, burning, and seeding are beneficial
Maintenance of Large Dead Wood	H	M	M	Some large snags may need felled for human safety during implementation of treatments
Restoration of Large Dead Wood	L	H	M	Accelerating restoration of large trees is beneficial. Creation of cavities in large trees is beneficial
Overall ranking for wildlife habitats of concern Comparative ranking of alternatives, summarizing effects to habitats. 0 = no beneficial affect; L=low potential for beneficial effects; H = high potential for beneficial effects	L	H	H to M	Over time, the no action alternative could have adverse effects to many of these habitats; and therefore, to agency

Habitat objective	Alternative			
	1	2	3	
				wildlife goals

Effects to Wildlife Species Analyzed from Alternatives 1, 2, and 3

For all species, the determination for Alternative 1 (No Action) is No Effect, No Impact, or Neutral because no actions would occur; therefore, no short-term (direct) effects. However, long-term (indirect) effects from the no-action alternative could be adverse to all species associated with late-successional and old growth forest, large dead wood, and grass/forb/shrub habitats, because it would take longer to restore large trees and large dead wood in plantations, and the abundance of grass/forb/shrub habitats would continue to decline.

Long-term effects from action alternatives to habitats, and thus to species, are expected to generally be neutral or beneficial as described in the habitats section. However, there may be short-term adverse effects to habitats (previously described) or species. The following section discloses potential adverse effects to species.

Although there may be differences between action alternatives in the degree of a specific effect on a species, any adverse effect, regardless how minor, automatically triggers an adverse effects determination. The degree of affect to each species is directly related to the amount of effect to its habitat. Effects also result from the potential for disturbing nesting individuals.

Effects to species rely heavily on effects described for habitats and information in Table 1. This table contains a complete list of species-analyzed that may occur on the Siuslaw National Forest, their special status (Threatened, Endangered, Sensitive, etc.), and their habitat associations.

For Alternatives 2 and 3, determinations are typically the same for both alternatives. This is in part due to the applications of the design criteria in appendix A, which minimize the adverse effects to species and habitats, and the fact that any effect results in a determination, regardless of magnitude. For example, one acre or 100 acres of disturbance during breeding season each results in an adverse effect determination for marbled murrelets.

Table 3 displays the determinations of effects to each species analyzed. Some species are found elsewhere on the Siuslaw National Forest, but are not expected to occur in the project area. These species include the Oregon Silverspot butterfly, evening field slug, Columbia torrent salamander, brown pelican, snowy plover, Aleutian Canada goose, Bufflehead, streaked horned lark, wolverine, and Baird's shrew, and therefore, are not included in this table.

Table 3: Effects determination for wildlife species in the project area

	Alternative
Species	

	1	2	3	Comments
Threatened and Endangered wildlife				
Northern spotted owl*	NE	LAA	LAA	Disturbance (NLAA); and habitat degradation from thinning in dispersal habitat (NLAA & LAA) and from individual tree removal—hazard, guyline, tailhold—in nesting/roosting habitat (LAA)
Northern spotted owl critical habitat (CHU OR-46)	NE	LAA	LAA	Habitat degradation; (LAA heavy thinning) (LAA or NLAA individual tree removal—hazard guyline, tailhold)
Marbled murrelet	NE	LAA	LAA	Disturbance and habitat degradation from individual tree removal—hazard, guyline, tailhold—in suitable habitat (both are LAA)
Marbled murrelet critical habitat (CHU OR-04-a)	NE	LAA	LAA	Habitat degradation; (LAA or NLAA individual tree removal—hazard guyline, tailhold)—in suitable habitat (MA)
Survey and Manage or Protection Buffer Species				
Bats (fringed, long-eared, and long-legged myotis; silver-haired, pallid, and Townsend's big-eared bats)	Nt	M	M	Minimal effects to these species, but some adverse impacts to existing snags or trees with cavities
Sensitive Species – Forest Service R6				
Foothill yellow-legged frog	NI	MIIH	MIIH	Minimal impacts for all treatments due to some habitat degradation and disturbance could occur for these species
Northwestern pond turtle	NI	MIIH	MIIH	
Southern torrent salamander	NI	MIIH	MIIH	
Bald eagle	NI	MIIH	MIIH	No known active nests on FS lands, but foraging birds could be disturbed by project activities (MIIH) and habitat could be degraded (MIIH) from individual tree removal—hazard, guyline, tailhold.
American peregrine falcon	NI	MIIH	MIIH	No nesting habitat, but foraging birds could be disturbed by project activities.
Harlequin duck	NI	MIIH	MIIH	Possible nesting along fast streams. Minimal, but some disturbance could occur.
Fisher	NI	MIIH	MIIH	Minimal impacts, but some habitat degradation and disturbance could occur for these species.
Pacific fringe-tailed myotis	NI	MIIH	MIIH	
Pacific Pallid bat	NI	MIIH	MIIH	
Red tree vole	NI	MIIH	MIIH	
Pacific shrew	NI	MIIH	MIIH	Minimal impacts, but some habitat degradation and disturbance could occur.

*Although thinning would degrade dispersal habitat, trees retained after thinning would maintain at least a 40 percent canopy cover in about 90% of stands thinned and 30% canopy cover on remaining, resulting in no removal of dispersal habitat.

Table 3: Effects determination for wildlife species in the project area (cont.)

Species	Alternative			Comments
	1	2	3	
Management Indicator Species				
Bald eagle, northern spotted owl, and peregrine falcon	Covered above			
Pileated woodpecker	Nt	M/B	M/B	Minimal effects to these species, but some adverse impacts to existing snags or trees with cavities
Woodpeckers (Downy, Hairy, Northern flicker, and Red-breasted sapsucker)	Nt	M/B	M/B	
Red-breasted nuthatch	Nt	M/B	M/B	
Ruffed grouse	Nt	B	B	Beneficial effects from improvement of hardwoods and forage; i.e., more grasses, forbs, and shrubs.
American marten	Nt	M	M	Minimal effects, but canopy reduction may reduce habitat suitability until forest under-story shrubs and over-story trees grow and restore over-head cover.
Roosevelt elk	Nt	B	B	Beneficial impacts from improvement of forage; i.e., more grasses, forbs, and shrubs.
Neotropical Migratory Birds/Landbirds				
Band-tailed pigeon	Nt	M	M	Variable effects, but no more than M for any species, because the scale of impacts is small, compared to the range of these species. The project also emphasizes restoration of important habitats for declining species, habitats such as late-successional forest and grasses/forbs and shrubs.
Black-throated gray warbler	Nt	M	M	
California quail	Nt	M	M	
Hammond's flycatcher	Nt	M	M	
Hermit warbler	Nt	M	M	
Hutton's vireo	Nt	M	M	
Pacific-slope flycatcher	Nt	M	M	
Rufus hummingbird	Nt	M	M	
Vaux's swift	Nt	M	M	
Wrentit	Nt	M	M	

Threatened & Endangered Species: NE = No Effect BE = Beneficial Effect NLAA = May Affect, Not Likely to Adversely Affect LAA = May Affect, Likely to Adversely Affect CHU = Critical Habitat Unit; MA = May Affect	**Sensitive species**: BI = Beneficial Impact NI = No Impact MIIH = 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 WIFV = Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species
All other categories of species **Nt**—neutral effect **M—**may affect some individuals or some habitat but effect is minimal **Ng**—negative effect to habitat and species **B**—beneficial effect	

Note: Some species are on more than one list.

Threatened Wildlife Species

Two species listed as threatened under the Endangered Species Act are found on federal lands in the project area: northern spotted owl, and marbled murrelet.

There are seven known spotted owl activity centers in the project area. The majority of spotted owl habitat in the project area has not been surveyed; however, this project assumes all suitable habitat is occupied. The majority of the project area is in a spotted owl Critical Habitat Unit (CHU OR-46).

About twenty marbled murrelet occupied sites are known in the project area. The majority of suitable habitat in the project area has not been surveyed. However, this project assumes all suitable habitat is occupied, because over 80% of murrelet surveys detected occupied behaviors (Mack et al., 2003). Most of the project area is in marbled murrelet critical habitat: Critical Habitat Unit (CHU) OR-04-a.

Consultation is required for species listed through the Endangered Species Act. The Siuslaw National Forest submitted to the USDI Fish and Wildlife Service (FWS) a Biological Assessment (BA)(USDA, 2006) for 2007 and 2008 activities that may affect the northern spotted owl or the marbled murrelet. The FWS responded to this BA with a Biological Opinion (BO) and a Letter of Concurrence (LOC).

The Siuslaw National Forest's 2007 and 2008 activities that may affect listed species are limited to the amounts and types of activities included in this consultation process. This consultation process dealt with proposed West Alsea project activities identified in the BA, and the FWS's BO and LOC documented the affects to listed species from proposed project activities and provided information required in this project's design criteria (see Appendix A for details).

The effects determination for the northern spotted owl is May Affect and Likely to Adversely Affect (LAA) and May Affect but Not Likely to Adversely Affect (NLAA) because of habitat removal and degradation (LAA or NLAA) and disturbance during breeding season (NLAA). Habitat removal occurs when canopy cover is reduced below 60 percent for nesting and roosting habitat or below 40 percent for dispersal habitat, and habitat degradation occurs when a few trees are felled or removed, (Habitat BO 2007-2008, p. 80 & 81). None of the alternatives would remove suitable habitat; however, both alternatives would remove some dispersal habitat and degrade suitable habitat.

Nesting and roosting habitat would be degraded (LAA or NLAA) (Habitat BO 2007-2008, p. 78-79) and dispersal habitat would be removed and degraded (LAA or NLAA) (Habitat BO 2007-2008, p. 77). Suitable habitat would be degraded by hazard-tree felling and by felling trees that

would be used as guyline anchors during logging operations: LAA if suitable nesting structure felled (3-5 trees), and NLAA if felled trees are not suitable nesting structure (25-40 trees).

Dispersal habitat would be removed in about 3% (140 acres) of commercially thinned stands, where stands are thinned to about 35% canopy cover, which temporarily - for about 10 years - removes dispersal habitat (LAA in Critical Habitat, NLAA elsewhere). Dispersal habitat would be degraded (NLAA) by about 97% (4,400 acres) of commercial thinning, because at least 40 percent of the tree canopy cover would be maintained. The determination for northern spotted owl Critical Habitat is LAA, because of dispersal habitat removal in CHU OR-46.

"Although these actions are considered to have adverse effects on spotted owls, it is not believed that the severity of the adverse nature of these actions will rise to a sufficient level as to cause harassment or harm to individual owls" (Habitat BO 2007-2008, p.79).

The effects determination for marbled murrelet is LAA and NLAA because of habitat degradation (LAA and NLAA) (Habitat BO 2007-2008, p. 92) and disturbance during breeding season (NLAA) (Habitat BO 2007-2008, p. 75). Suitable habitat would be degraded by hazard-tree felling and by felling trees that would be used as guyline anchors during logging operations: LAA if suitable nesting structure felled, and NLAA if felled trees are not suitable nesting structure. The determination for marbled murrelet critical habitat is LAA and NLAA because of habitat degradation; LAA in critical habitat (CHU's OR-04-a).

Operating seasons are established to control the amount of potential adverse effect to listed species from disturbance, and, based on past experience, this project will likely have less effect than the amount described in the consultation process.

For spotted owl and marbled murrelet, and for critical habitat for these species, the amount and type of potential adverse effects determinations from this project are consistent with the current BO and LOC from the FWS (Habitat BO 2007-2008). This project is consistent with this BO, because implementation of the design criteria in Appendix A ensures that no suitable habitat would be removed and potential adverse effects to these species from project-related disturbance or habitat degradation would be within the limits consulted for the Central Coast Ranger District – ODNRA of the Siuslaw National Forest (Habitat Biological Assessment for 2007-2008).

Habitat BO 2007-2008, p.98, states:

> Of the … dispersal removed through heavy thinning, all are part of thinning projects that will help develop late successional conditions. Modeling of forest conditions has shown that stands with low density of trees will develop late successional conditions quicker than stand with a high density of trees. Therefore, even though there will be adverse

> affects, these projects may be beneficial in the long term by promoting late successional conditions.
>
> Removal of … trees for hazard reduction, (or possibly their use as guyline or tailhold trees) may set back the development of the stand, but at the same time this should open the stand up to allow development of other trees, potentially allowing some development of a multi-layer canopy and improving the forest by improving the health of the forest.
>
> Even when combined these adverse impacts to both spotted owl and murrelet critical habitat are very slight, and by no way approach adverse modification of critical habitat.

"It is the Service's biological opinion that the activities, as proposed, are not likely to jeopardize the continued existence of the spotted owl or the marbled murrelet and are not likely to adversely modify spotted owl critical habitat or marbled murrelet critical habitat" (Habitat BO 2007-2008, p. 99).

Survey and Manage or Protection Buffer species

All alternatives were evaluated for their effects to survey and manage species following The Record of Decision (ROD) dated January 2001, entitled "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines" and includes any amendments or modifications to the 2001 ROD that were in effect as of March 21, 2004. Therefore, this project is not affected by the court injunction from *Northwest Ecosystem Alliance et al v. Mark Rey et al, Civ. No. 04-844, Western District of Washington.*

No species with current Survey and Manage status were identified that could be affected by this project. Analysis identified the Puget Oregonian snail, evening field slug, and red tree vole as currently having Survey and Manage status on the Siuslaw National Forest, but this status only applies to the Hebo Ranger District. The great gray owl also has Survey and Manage status in the Oregon Coast physiographic province; however, this status only applies east of the crest of the Oregon Coast Range (USDI, USDA 2004d, p. 5), and lies outside the project area.

The effects determination for protection-buffer bats (fringed, long-eared, and long-legged myotis; silver-haired, pallid, and Townsend's big-eared) is minimal (M), because some potential habitat would be removed. Some large snags, which are habitat for these bats, may be felled during treatments under both action alternatives. Other protection-buffer species identified in the Northwest Forest Plan are not expected to occur in the project area. These species are the white-headed and black-backed woodpeckers, pygmy nuthatch, flammulated owl, and Canadian lynx.

Sensitive Species

Under Alternatives 2 and 3, the effects determination for sensitive species that are likely to occur in the project area is “May Impact Individuals or Habitat, but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species” (MIIH). The determination is MIIH because of potential disturbance to individuals and limited negative effects to habitat from treatments. Negative effects are limited because of design criteria (Appendix A) or the scale of impacts is very small compared to amount of habitat available and the scale of the distribution of these species.

Riparian planting and release adversely affects species associated with aquatic and meadow habitats in close proximity, such as the western pond turtle. Western pond turtles were once common, bur are currently uncommon in the Oregon Coast range. In the Willamette Valley pond turtle populations are about three percent of what they were historically; declines are due to habitat loss and predation by non-native species, such as bull-frogs and bass (Holland 1994; Western Pond Turtle Habitat and History). Pond turtles have been seen recently by local residents at Eckman Lake (private land) and Drift Creek oxbow (federal land); however, young turtles have not been observed; therefore, these two areas may not have viable populations. No viable populations are known to exist in the central coast area. Pond turtles need direct sunlight for basking and open areas with direct sunlight for nesting; typical habitat is lakes, ponds, slow moving rivers, or large streams with suitable nesting habitat within about 50 meters (Holland 1994). If riparian planting and release is limited to narrow bands and tree densities are low in meadows near suitable streams, then these activities should have minimal impact to the western pond turtle.

The determinations are No Impact (NI) for Sensitive species that are *not* likely to occur in the project area. These species include the Columbia torrent salamander, Aleutian Canada goose, Bufflehead, streaked horned lark, wolverine, and Baird’s shrew.

Five bald eagle nest sites are known within the planning area, and foraging birds are frequently observed in the Alsea Bay and along the Alsea River. All commercial thinning would occur greater than one mile from known nesting sites.

Under Alternatives 2 and 3, the effects determination for bald eagle is MIIH, because of habitat degradation from hazard-tree felling and the potential for mortality of a few mature trees that could be used for anchors during logging operations, and because there would also be potential for disturbance of foraging bald eagles. Habitat degradation could occur if potential roost or nest trees are felled in areas that bald eagles may use now or in the future. Impacts would be very minimal, because there is an abundance of possible nest or roost trees in the project area that would not be affected.

The Pacific fisher is a candidate for listing as a threatened or endangered species in Washington, Oregon, and northern California; (USDI 2004a) and is included on the Region 6 Regional Forester's Sensitive Species List. The Pacific Fisher has not been observed on the Siuslaw National Forest for several years. However, this species could occur in the project area, because existing populations are known in the central to southern Cascade Mountains and southwestern Oregon - including along the Oregon coast - and the Pacific Fisher has the ability to disperse long distances and can occupy large home ranges (USDA 2002a).

Determination of effects from all proposed actions to the Pacific fisher is MIIH. This determination was made because, although both action alternatives would avoid removing suitable habitat (late-successional forest), actions associated with harvesting or smoke from prescribed burning could disturb individuals. Seasonal restrictions for marbled murrelets and northern spotted owls would indirectly benefit fishers, because they could reduce the amount of potential disturbance to fishers.

Management Indicator Species

Management Indicator Species (MIS) species are animals that represent a larger group or guild of species and are used as indicators of conditions for agency wildlife goals. The MIS species on the Siuslaw National Forest include certain species as indicators of habitat for 1) threatened and endangered species in 1990, which are Aleutian Canada goose, bald eagle, brown pelican, Oregon Silverspot butterfly, and peregrine falcon; 2) for mature or older aged stands, which is the American marten; 3) for old-growth conifer communities, the northern spotted owl; 4) for large snags and defective trees the pileated woodpecker; 5) for primary cavity nesters and for small to medium size dead and defective trees the downy and hairy woodpeckers, red-breasted sapsucker, flicker, and red-breasted nuthatch; 6) for hardwood and deciduous mixed habitats, the ruffed grouse; 7) for a mix of forage and cover areas, the Roosevelt elk, and 8) for open sand near estuaries, the western snowy plover.

The effects on the northern spotted owl are addressed under threatened species effects. The effects on the bald eagle and peregrine falcon are addressed under sensitive species effects.

The determinations for woodpeckers (pileated, downy, hairy, acorn, northern flicker, red-breasted sapsucker) and red-breasted nutchatch would be minimal (M) adverse as well as beneficial (B) effects under both action alternatives, because although some dead wood habitat would be removed, adequate amounts would be created or sustained in the watershed to attain habitat productivity goals for woodpeckers. However, the amount of large dead wood in the project area would remain well below historic levels.

The determinations for Roosevelt elk and ruffed grouse are beneficial (B) for both action alternatives, because these species benefit from thinning, meadow restoration, and other

treatments that increase the amount of grasses, forbs, and deciduous shrubs. In addition, for ruffed grouse, the quality and amount of hardwoods should increase in commercially thinned areas, because existing hardwoods would be released and new hardwoods planted.

The determination for American marten would be minimal (M) adverse direct effects, because late-successional habitat would not be removed, but disturbance could adversely affect some individuals and canopy cover reduction could reduce habitat quality until canopy cover increases. However, the scale of impacts is small, compared to the amount of habitat in the watershed and the range of this species.

Neotropical Migrant Birds

The effects to neotropical migratory birds are variable depending on the habitat associations of the individual species, but no more than minimal (M) for any species.

It is expected that commercial thinning would remove some snags, resulting in a potential negative effect on cavity nesting birds in certain areas. However, analysis has shown that all alternatives leave or create amounts of dead wood sufficient for the needs of cavity-dependent species.

Overall, potential population numbers for birds that use grass and shrub habitats are expected to increase, which is important for those species dependant on these habitats for local viability. These species include California quail, Rufus hummingbird, and wrentit.

Summary of Effects to Forest Service Goals for Wildlife

Over the long-term, all alternatives are consistent with Forest Service goals for wildlife. However, Alternatives 2 and 3 provide better support than the no-action alternative for these goals, which are: recovery of threatened or endangered species, for maintaining species viability, and for providing diverse opportunities for esthetic, consumptive, and scientific uses of wildlife. Alternatives 2 and 3 increase the restoration rate or maintain and restore habitats that are below their natural range of variability in the project area. These habitats (in terrestrial and aquatic areas) are late-successional and old growth forest, grass/forb or shrub, and large dead wood.

Alternatives 2 and 3 are designed to maximize long-term benefit and minimize short-term detrimental effects to wildlife goals. Both action alternatives accomplish these goals, primarily through application of the design criteria in appendix A.

Both action alternatives hasten recovery of or restore similar amounts of late-successional forest, grass, forb, shrub, and dead wood habitats, although Alternative 2 would have slightly more acres of benefit to these habitats (refer to Appendix B2 and B4 for relative differences between Alternative 2 and 3). These habitats, especially late-successional and old growth forest, are below their historic abundance, and two animals listed as threatened (northern spotted owl and marbled

murrelet) and a number of other species are dependant upon late-successional and old growth forest for survival. In addition, maintenance and restoration of grass, forb, and shrub habitats are important for species dependant on these habitats for local viability, including the California quail, Rufus hummingbird, and wrentit; and these habitats are important to agency goal of providing recreation opportunities for people with wildlife, esp. hunting of deer and elk.

Both action alternatives would have similar amounts of short-term, adverse effects to habitats and species, because they have similar amounts of treatments. Adverse effects are minor, especially compared to the long-term beneficial effects to species and ecosystem sustainability.

Plantation treatments and associated actions are designed to emulate characteristics of quality late-successional and old growth forest habitat, especially biocomplexity. Treatments attempt to create as many of these characteristics as possible for nearly immediate benefit, and to hasten development of others for anticipated future benefits. Characteristics expected almost immediately after treatments are canopy gaps, under-story development, increased structural and species diversity (especially grasses/forbs, and shrubs), and dead wood. Characteristics expected to develop faster, due to these treatments, include larger patches of contiguous late-successional forest on the landscape, large and giant trees (conifers and hardwoods), large dead wood, large limbs, and large cavities in trees.

Some species that use forest habitat should benefit from the nearly immediate improvements of within-stand biocomplexity. Species associated with grass, forb, shrub, or dead wood habitat should begin benefiting within two to five years after treatments. These species include a number of bird and bat species, brush rabbits, chipmunks, mice, and voles. Animals, such as the northern spotted owl, which prey on some of these species, should benefit from the increase of available prey.

Species that depend upon late-successional forest habitat for nesting, such as the northern spotted owl or marbled murrelet, are not expected to have suitable nesting conditions in treated plantations for decades after treatments. However, hastening development of giant trees, large limbs, and large cavities should improve the potential for these rare animals to find suitable nesting structures earlier in treated stands, compared to no treatment (Alternative 1).

Road actions that maintain open roads help provide access for restoration treatments and easy access for people to use wildlife resources. Actions that close roads could limit these benefits; however, the current highest priority restoration treatments would be completed before roads are closed, roads can be reopened when needed in the future, closed roads can be used by people, and remaining open roads would continue to provide access to all major drainages in the project area. In addition, road actions that improve water quality, thus the quality of aquatic habitat, would improve viability of aquatic wildlife species.

Alternatives 2 and 3 differ mostly in the amount of temporary roads built or existing roads temporarily reopened to facilitate commercial thinning. Alternative 3 proposes no new temporary roads or temporarily reopening existing roads. However, these roads, as proposed under Alternative 2, would only have minor direct adverse effects to wildlife habitats or species. Therefore, the amount of these roads in Alternative 2 would have essentially no direct effect on agency goals for wildlife. Indirectly, these roads would benefit wildlife goals, because the major difference between the action alternatives is economics. By using temporary roads or reopening then closing some roads, Alternative 2 is able to depend more on skyline harvest systems than Alternative 3. Skyline harvest is much less costly than helicopter harvest. Consequently, Alternative 2 would generate more revenue from the sale of timber, which results in more funds available for treatments that benefit wildlife. These beneficial treatments include dead wood creation, under-burning forests, and improving meadows.

Considering all the agency goals for wildlife, Alternative 2 is better than Alternative 3 for attaining these goals.

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Appendix E

West Alsea Landscape Management Project

Aquatic Conservation Strategy Objectives

Consistency Assessment

Introduction

Alternatives 1, 2, and 3 have been evaluated to determine how consistent they are with the nine aquatic conservation strategy objectives of the Northwest Forest Plan. The West Alsea Landscape Management Project Environmental Analysis (EA) and appendix A, Lower Alsea Water Quality Restoration Plan (WQRP), and the Lower Alsea and Drift Creek (Alsea) Watershed Analyses (WA's), provide the context for the responses to the Aquatic Conservation Strategy objectives.

Objective 1—Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.

Alternative 1 (no action)

The existing distribution, diversity, and complexity of watershed and landscape-scale aquatic features would remain on their current restoration trajectory; which can be either towards or away from desired features, depending on which characteristic is assessed. Desired restoration opportunities would be postponed indefinitely. For example, the desire to increase habitat complexity in Canal Creek by adding large wood would not occur until stands adjacent to the creek mature and naturally enter the channel; a process that is likely to take many decades.

Alternatives 2 and 3

Actions—including commercial, pre-commercial, and non-commercial thinning, road decommissioning, understory and riparian planting, meadow creation and maintenance, and wood additions to streams—are designed to accelerate development of late-successional forest, increase terrestrial and aquatic bio-complexity, and increase the diversity of landscape features to maintain or restore upland, riparian, and landscape communities.

Commercial and non-commercial thinning projects are expected to increase the rate of development of large conifers in riparian and upslope areas, understory complexity, and species diversity.

Understory and riparian planting projects are expected to increase vegetation species diversity and accelerate the development of multiple stand layers; increasing the complexity of these landscape scale features.

Meadow creation and maintenance projects are expected to add to the diversity of habitat types at the stand and landscape scales.

Adding wood to streams is expected to increase the diversity and complexity of habitat types in streams.

No-cut riparian buffers, where vegetative complexity is high, would maintain this complexity. Riparian buffer widths would vary, depending on fish presence, stream size, slope stability, shade cover, sediment delivery potential and other water quality considerations.

Objective 2—Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life- history requirements of aquatic and riparian-dependent species.

Alternative 1 (no action)

The existing spatial and temporal connectivity within and between watersheds would be maintained. As evidenced in the WA's and EA, these conditions are currently less than ideal. Eventually, connectivity would be restored in the project area, as road-stream crossings age, decay, and fail, producing a large influx of sediment and debris. As long as poorly functioning road-stream crossings remain in their current state, they would remain a chronic source of fine sediment and continue to block the flow of wood and sediment needed for properly functioning streams.

Alternatives 2 and 3

Spatial and temporal connectivity within and between watersheds would be improved by implementing projects recommended in Alternatives 2 and 3. Specific activities that would achieve this objective include decommissioning roads (especially removing stream crossings), improving road-stream crossings, and riparian thinning. Design criteria (appendix A) are intended to maintain or restore connectivity, particularly in riparian areas.

Road decommissioning activities include restoring compacted road surfaces and removing road-stream crossings. Removing road-stream crossings directly reconnects stream channels above and below the road, allowing the natural processes of transport (e.g., water, sediment, and large wood) to naturally occur. Reconnected water ways would provide unobstructed passage for aquatic and riparian-dependent terrestrial species. Restoring compacted road surfaces reconnects altered surface and subsurface flow pathways such that water and chemicals are routed naturally from headwaters to lowlands.

Thinning would accelerate the rate at which plantations become mature stands, increasing the connectivity among existing mature stands within and between watersheds.

No-cut buffers along all streamcourses are designed to protect riparian areas from disturbance and maintain a high level of connectivity along these corridors. In addition, temporary road construction is limited to ridges, and no new stream crossings are planned; both of which serve to minimize the disturbance of intact riparian areas.

Objective 3—Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Alternative 1 (no action)

The existing physical integrity of shorelines, banks, and stream bottoms would be maintained. No actions to improve these conditions would occur. For instance, no riparian planting would occur to protect stream banks from continued erosion. Natural re-growth of riparian vegetation may or may not occur in desired locations.

Alternatives 2 and 3

Road decommissioning and large-wood placement is intended to restore the physical integrity of shorelines, banks, and stream bottoms. Design criteria are intended to maintain the condition of these features.

In the long term, road decommissioning would reduce management-related sediment inputs due to road-stream crossing failures and chronic erosion of the road prism. At project completion, road decommissioning would restore natural functions that deliver sediment and wood.

Large-wood additions to stream channels would restore sediment routing and sorting processes that restore naturally functioning bed and bank configurations.

The physical integrity of the aquatic system would be maintained by no-cut buffers along all stream channels. Additionally, road construction, reconstruction, and decommissioning activities are designed to minimize impacts at the project sites.

New temporary road construction (Alternative 2 only) is limited to ridges, and no temporary road construction involves stream crossings. These actions maintain physical integrity of riparian areas by conducting these activities outside of (or away from) riparian areas.

Removal of failed culverts in fish-bearing streams, removal or replacement of failed culverts in non fish-bearing streams, and road decommissioning would start the process of streambank and streambed restoration.

Objective 4—Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Alternative 1 (no action)

No actions to maintain or restore water quality, as recommended in the Lower Alsea/Drift Creek Water Quality Restoration Plan, would occur under this alternative. Riparian areas adjacent to temperature-limited streams would not be treated (i.e., planted with conifers, or thinned to increase growth) to improve streamside shading (which would decrease solar radiation to streams). Also, large wood would not be added to streams, resulting in continued decrease in channel complexity to support optimal stream temperatures and dissolved oxygen.

Alternatives 2 and 3

Water quality parameters of particular concern for the West Alsea planning area are stream temperature, dissolved oxygen, and coliform bacteria, due to Clean Water Act Section 303(d) listings for water quality limitations on the Alsea River and Drift Creek (WQRP). Although no stream in the area is listed as water quality limited for sediment or turbidity, these parameters are also of interest since planned actions can potentially benefit or affect them. These parameters may be affected by planned commercial and non-commercial thinning; culvert removal and road decommissioning; meadow management and creation; and large wood placement. Actions are designed to maintain or restore water quality.

Temperature, dissolved oxygen, and sediment conditions would be maintained, in the near term, by implementing design criteria such as variable-width, no-harvest buffers adjacent to all stream channels and wetlands in thinned stands.

Similarly, these conditions would be maintained in the near term, by vegetative buffers for meadow maintenance and creation.

Placing large wood in streams and decommissioning roads, with concurrent culvert removal, would have minor, short-term impacts of increased sediment load and turbidity until newly exposed stream banks and streambeds revegetate and stabilize. Based on past observations of culvert removal and replacement projects, culvert work is likely to create turbidity pulses that last for a few minutes to a few hours before water clarity returns to background levels. Construction sites may continue to produce small amounts of sediment and turbidity throughout the first winter until the sites are fully revegetated and stable. Any short-term increases in sediment production or turbidity are expected to be well within normal range typical of high winter flows, or as a result of natural streambank erosion. At the watershed scale, changes in the overall sediment rates would not be detectable.

In the long term, thinning, decommissioning roads, removing culverts, and adding wood to streams are expected to improve water quality faster than would the no-action alternative. Thinning increases the rate of growth of vegetation within and adjacent to streams, increasing the canopy cover and shaded area, thereby decreasing in-stream heating due to direct incident solar radiation. Adding large wood to streams directly shades the stream and increases retention of in-stream gravels. Water flowing through

gravel is subject to decreased exposure to solar radiation, thereby reducing the rate at which water is heated.

No planned temporary road construction crosses surface water, so this action would not affect stream temperature, sediment production, or turbidity.

Yarding systems were designed to minimize stream crossings, minimizing or eliminating potential effects to temperature, sediment production, and turbidity. Where yarding across streams is planned, implementing design criteria (e.g., limiting the extent of canopy disturbance by having designated yarding corridors, and requiring full-suspension of logs as they are yarded across streams) would protect shade, preventing undue increases in stream temperature; and reduce delivery of fine sediments, preventing undue increases in stream turbidity.

No planned action is expected to affect the level of coliform bacteria in surface or subsurface water in the planning area.

Upon completion of proposed actions, some roads would be decommissioned, reducing the road network within the drainage, relative to current conditions. These actions would maintain or improve water quality by reducing the area of exposed, compacted soils, which typically deliver substantial quantities of fine sediments, thus reducing anthropogenic sources of turbidity.

Objective 5—Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

Alternative 1 (no action)

Existing conditions, impeding restoration of the sediment regime under which aquatic ecosystems evolved, would remain. For instance, road-stream crossings, affecting the timing, volume, and character of sediment input, storage, and transport would remain; thereby maintaining the existing conditions that have produced adversely altered watershed functions and processes.

Alternatives 2 and 3

All elements of the sediment regime were considered in the design of the West Alsea project. Many road-related actions were chosen specifically to restore the sediment regime under which aquatic ecosystems evolved.

Frequency of landslides, rates of bank erosion, and sediment input volumes are affected by factors, such as vegetative conditions in riparian or landslide-prone areas and concentration of flow from roads and landings. Thinning in managed stands is intended to improve vegetative conditions in riparian and landslide-prone areas.

Road decommissioning is intended, in part, to remove or minimize concentration of water flow from roads and to restore connections between surface and subsurface flow between inter-fluvial and fluvial areas. Road treatments and decommissioning, in particular, decrease effects of past actions on the sediment regime.

Road-stream crossings usually change the character of sediment input, storage, and transport. Road decommissioning (especially removal of road-stream crossings) and culvert replacement projects are designed to eliminate or minimize the effects of past actions. These activities would also reduce the rate and volume of sediment delivery due to chronic surface erosion. By locating new temporary roads on ridges and minimizing the number of new road-stream crossings, and the risk of sediment delivery from these sources is greatly reduced.

Addition of wood to stream channels is intended, in part, to increase the storage of sediment in channels, improving conditions for fish that evolved in the aquatic ecosystem found in the West Alsea project area.

Short-term increases in fine-sediment production associated with road work and wood additions to streams are expected to be minor. Based on observations of previous projects, sediment inputs to streams from culvert work are likely to create turbidity pulses for a few minutes to a few hours before water clarity returns to background levels. Work sites may continue to produce small amounts of sediment throughout the first winter until the sites are revegetated and stable. Any short-term increases in sediment production or turbidity are expected to be well within the range typical of high winter flows or natural streambank erosion.

Based on observations of past thinning sales with similar prescriptions, riparian buffers, soils, and landforms, there is no evidence that the project would increase rates of shallow or deep seated landslides.

Objective 6—Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

Alternative 1 (no action)

Current, adversely degraded conditions that affect in-stream flows would be maintained. The opportunity to add large wood to Canal Creek, improving connectivity to its floodplain would be postponed. The opportunity to rehabilitate road-stream crossings to “retain patterns of sediment, nutrient, and wood routing” would be delayed until natural processes produce failures at these crossings.

Alternatives 2 and 3

Road decommissioning, culvert repair/removal/replacement, and large wood placement are the actions most likely to affect in-stream flows. There is high natural variability in discharge that is related directly to annual or seasonal precipitation. As such, it is difficult to predict how, when, and where proposed activities would affect the timing, magnitude, duration, and spatial distribution of peak, high, and low flows. However, it is expected that the effects described below are likely to occur if proposed actions are implemented.

Road-stream crossings can alter the timing, magnitude, duration, and spatial distribution of peak, high, and low flows in a watershed. Road decommissioning and culvert repair/removal/replacement are designed to restore natural processes of streamflow regulation at both the local and watershed scale.

Plantation thinning is not expected to result in measurable changes in streamflow at both the project and the watershed scales due to the amount of remaining vegetation (which results in minor changes in evapo-transpiration rates), low elevation of the project area (because the area receives minimal snow, patterns of snow interception and retention would not be altered), and the small portions of the watersheds that would be affected.

Decommissioned roads minimize or eliminate concentrated flow of water, restoring sub-surface and in-stream flow regimes.

Large wood placement is intended, in part, to reconnect channels to their floodplains.

Objective 7—Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Alternative 1 (no action)

Current, adversely degraded conditions affecting floodplain inundation would be maintained. For example, the opportunity to add large wood to Canal Creek, improving connectivity to its floodplain, would be postponed.

Alternatives 2 and 3

Design criteria, such as no-cut riparian buffers and full-log suspension requirements over streams would protect floodplains.

In the short term, large wood additions on floodplains would restore the timing, variability, and duration of floodplain inundation and water-table elevation. In the long term, plantation thinning and under-planting would increase the rate that large conifers are developed in riparian areas, which would increase the future supply of large wood to floodplains and stream channels, restoring floodplain function.

Objective 8—Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Alternative 1 (no action)

Existing plant communities in riparian areas would be maintained. These conditions are less than ideal. For example, the water quality restoration plan recommends riparian planting and thinning to increase future canopy closure to reduce solar radiation and optimize stream temperature. Without these efforts, less-desirable species (e.g., blackberry) would continue to impede the colonization of desirable riparian species (e.g., big-leaf maple, western redcedar), resulting in continued degradation of thermal regimes and distribution and supply of coarse woody debris.

Alternatives 2 and 3

Plantation thinning, understory planting, snag and coarse woody debris creation, and riparian planting and release are intended to restore species composition and structural diversity of plant communities in riparian areas. Habitat elements such as large standing conifers and downed wood, multi-layered canopies, and species diversity would be improved by these activities.

Silvicultural prescriptions include retention of larger diameter trees and favor less common tree species in stands. Hardwoods are typically retained, except where a few alder would be removed to allow conifer to develop in riparian areas. Variation of species composition would be promoted within stands, with the retention of the hardwood components being emphasized.

Design criteria, such as no-cut riparian buffers and yarding restrictions, are intended to maintain species composition and structural diversity of plant communities.

Objective 9—Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

Alternative 1 (no action)

Existing, degraded habitat conditions for riparian-dependent species would be maintained. Opportunities to improve habitat conditions would be postponed; relying completely on natural processes to reverse the current trend and to produce a trend towards recovery of populations of native plant, invertebrate, and vertebrate riparian-dependent species.

Alternatives 2 and 3

All activities are designed to restore natural processes or accelerate development of habitat for native riparian-dependent species. Design criteria such as no-cut riparian buffers and placing temporary roads on ridges to avoid stream crossings are intended to maintain habitat for riparian-dependent species. Restoring or maintaining habitat for riparian-dependent species is promoted by speeding the

development of late-successional forest characteristics in plantations and by maintaining meadows within and adjacent to riparian areas.

Summary

Alternative 1

In the short term, roads not maintained to standard provide the greatest risk to meeting the nine the Aquatic Conservation Strategy objectives. Roads would deteriorate and eventually fail, especially at stream crossings. When roads fail, aquatic resources are often substantially, detrimentally affected, at least for a short term. As such, degraded water quality would continue, until natural processes have removed sediments associated with road fills; a process which could take decades. This alternative is not expected to meet the objectives of the Northwest Forest Plan's aquatic conservation strategy, because current watershed conditions would not be maintained or improved.

In the long term, restoration of complex aquatic and terrestrial elements—such as large wood in streams and uplands, and stands with diverse tree species and sizes—would depend on natural processes and take much longer to develop than under Alternatives 2 and 3.

Therefore, this alternative is not expected to meet the objectives of the Northwest Forest Plan's aquatic conservation strategy, because current watershed conditions would not be maintained or improved.

Alternatives 2 and 3

The West Alsea project includes some actions that would result in short-term increases in sediment production at specific sites. For example, culvert removal or replacement and large-wood placement have the potential to increase fine sediment delivery and transport. Any stream channel disturbances or adverse water quality impacts are anticipated to be small, short-term, and localized. At the watershed scale, changes in water quality, turbidity or sediment production would not be detectable. Design criteria were developed to minimize short-term adverse impacts aquatic resources and to retain desirable watershed conditions (appendix A).

Overall, proposed actions would maintain or restore riparian vegetation and aquatic conditions and processes by decommissioning (including culvert removal), closing, repairing (including culvert replacement), and maintaining roads; promoting the development of late-successional forest characteristics in plantations (e.g., thinning, under-planting, and creating dead wood), and maintaining meadows, both within and outside of riparian areas; planting trees in riparian areas; and adding large wood to streams.

Therefore, actions proposed by Alternatives 2 and 3 are expected to meet the nine objectives of the Aquatic Conservation strategy.

Appendix F

Contributions from Others

1. Proposed Project (scoping) Comment Summary and Forest Service Responses

Reference to the West Alsea Landscape Management Project preliminary analysis (PA) is included in the response column, where applicable.

Table D-1. Access and travel management

Person or Organization-Letter Number	Comment Summary	Response
Kelly Hockema-1	Will plans prevent human intervention up Drift Creek, including boat traffic?	This is outside the scope of the project, because there are no plans to prevent human use of Drift Creek.
Chandra LeGue, Oregon Wild-3	Supports the proposal to close and decommission identified roads in the watershed.	
Joe Rohleder-4	Repair deteriorated culverts and road surfaces; close or decommission roads not needed for forest management.	Refer to the PA, chapters 1 to 3; and appendix A.
Dave Sandersfeld-5	Supports extending road 3446-316. Are you connecting Forest roads 5100 to 5181 and roads 3489-418 to 3490?	The map was in error—Forest roads 5100 and 5181 are connected. Thank you for bringing this to our attention. There is no proposal to connect roads 3489 to 3490, as the connection would have to cross steep ground and several streams.
Andy Kittle-6	Include a temporary road access (about 200 yards in length) from the Red Creek road to my woodland as part of the project proposal. It would go through a 45-year old plantation and would eliminate a year-around water crossing on the main stem of Canal Creek.	Our evaluations of the existing conditions indicate that not building a temporary road through the plantation would result in less overall impact to natural resources. Therefore, building a temporary road will not be included as part of the project.

Person or Organization-Letter Number	Comment Summary	Response
	Remove the road waste material from Bear Creek and the Robnett Homestead. I may be willing to work with you in identifying other waste sites that meets all the aquatic rules we must follow.	Road waste sites were recently identified and are located primarily near the Red Creek road. Road waste on Robnett homestead will be removed to provide access to the meadow.
Jacob Groves, American Forest Resource Council-7	We do not support decommissioning of any permanent roads, because permanent roads improve access to fuel reduction treatments and initial response to wildfires. Improve roads to provide for winter harvesting.	Refer to the PA, chapter 1, chapter 3 (fire, and public and management access sections), and appendix A. A number of improvements are planned Refer to the PA, chapters 1, 2, and 3 (public and management access).

Table D-2. Silviculture treatments and associated actions

Person or Organization	Comment Summary	Response
Chandra LeGue, Oregon Wild-3	No road construction in late-successional reserves. Enter (commercial thin) riparian reserves only once. Apply similar variable-thinning methods in matrix stands. Consider alternative ways of thinning units that include no new roads to minimize soil disturbance and other impacts to the watershed—temporary roads channel water, cause erosion, and conduct invasive weeds. The EA must identify which roads proposed for construction and reconstruction are in riparian reserves and any stream crossings. Identify how many acres are accessed by each road segment [new and reopened roads].	Refer to the PA, chapters 2 and 3, appendix A, and appendix B-3. Refer to the PA, chapters 2 and 3; and appendices A and B-3. Refer to the PA, chapters 2 and 3; and appendix A. No new roads would cross streams. Only two stands have existing, non-system roads that cross streams (stands 504191 and 504379). Refer to appendix B-3.

Person or Organization	Comment Summary	Response
	Identify cross drains (culverts) needed, approximate flow of new ditching, feet of cutbank, and volume of excavation.	New temporary roads would be located on flat ground or ridges, with no stream crossings or ditches being required (PA, chapter 3; and appendix E)
Joe Rohleder-4	Diversify the structure and composition of plantations.	Refer to the PA, chapters 1 to 3; appendix B-2, and appendix A.
Jacob Groves, American Forest Resource Council-7	We support thinning treatments in riparian reserves to provide late seral habitat faster.	Refer to the PA, chapters 1 to 3, and appendix A.

Table D-3. Fuel loading and invasive weeds

Person or Organization	Comment Summary	Response
Doug Shaller-2, Lincoln County Public Works	Concerned about lack of information on invasive species projects, especially invasive weeds.	Refer to appendix A, Post Harvest Mitigation Actions section; and the PA, chapter 3, Invasive Plants section.
Andy Kittle-6	Where are the areas you propose for underburning? How will this be used to control fire in the urban-rural interface? Consider upgrading the fire suppression plan for the Alsea basin, increase buffers (200 feet) adjacent to small woodland and farming communities, widen the Telco and power utility buffers and burn these areas for habitat and fire suppression, and create vegetation buffers (50 to 100 feet) on all major traffic roads. How much carbon are we currently storing?	Refer to maps 2 and 3, appendix A, and appendix B-2 of the PA for information about stands proposed for underburning. Refer to the EA, chapter 3, and appendix A for discussions on fuel treatments. Fuel treatment areas on each side of key forest roads will range from 25 to 100 feet. Current carbon storage is unknown.

Table D-4. Water quality and fish habitat

Person or Organization	Comment Summary	Response
Kelly Hockema-1	What was the historical fish count in Drift Creek by decade, beginning in 1920?	We do not have that information, but Oregon Department of Fish and Wildlife may have it.

Person or Organization	Comment Summary	Response
	What are you planning to do about the seal and flounder populations at the mouth of Drift Creek?	This is outside the scope of the project. The National Marine Fisheries Service and ODF&W are responsible for managing these populations.
Chandra LeGue, ONRC-3	Analysis should discuss each of the Aquatic Conservation Strategy objectives. Avoid harvesting or building roads in key watersheds or municipal watersheds to protect water quality.	Refer to the PA, Aquatic Conservation Strategy (ACS) section for a summary of effects. Appendix E addresses the nine ACS objectives. Refer to the PA, chapters 1 and 3; and appendices A and E.
Joe Rohleder-4	Place large wood in the lower portions of Drift Creek and Canal Creek. Create new freshwater wetlands in lower Drift Creek to replace western pond turtle habitat displaced by saltwater marsh restoration. The USFS should work with Oregon Department of Fish and Wildlife to restore the function of lower Lint Creek.	Refer to the PA, chapters 2 and 3. Refer to the PA, chapters 2 and 3; and appendix A. The US Forest Service has been working with ODF&W on an ongoing basis since the late 1990's to restore lower Lint Creek.
Andy Kittle-6	Include my two properties on Canal Creek for large woody debris placement as part of the project proposal. The West Creek and Skinner Creek drainages are narrow and contain an abundance of natural large wood debris. Funds may be better spent elsewhere in the planning area to improve aquatic habitat. Remove the culvert at the West and Skinner Creek crossing and increase the size of the water crossing by installing a longer and elevated bridge. This would allow better debris flow into Canal Creek.	Refer to the PA, chapters 2 and 3. No large wood is proposed where creeks pass through private land. We will consider this in the final design of the project. The culvert was recently installed to reduce the potential for causing a debris-flow dam and for improving fish passage.

Table D-5. Wildlife and plants

Person or Organization	Comment Summary	Response
Kelly Hockema-1	Is the ID Team involved in propagating (hatching and raising) spotted owls; if not, why not?	The US Fish and Wildlife Service has the responsibility to establish and manage a captive breeding program. The US Forest Service has the responsibility to protect and restore habitat under its jurisdiction.
	What has the FS done to save the spotted owl from extinction?	The Northwest Forest Plan is the federal contribution to the recovery of the northern spotted owl.
	What is the current number of known murrelet and spotted owl nest sites and has anything changed?	Refer to the 10-year Northwest Forest Plan monitoring report concerning the marbled murrelet and northern spotted owl.
Chandra LeGue, Oregon Wild-3	Special status species surveys must be done prior to developing alternatives and before a decision is determined. Special status and old-growth species should be discussed in the EA.	Refer to the PA, chapter 3, wildlife section, and proposed endangered, threatened, and sensitive plants section.
	Implement effectiveness monitoring for snag and down-wood creation.	Refer to appendix A, monitoring section.
	Higher priority should be given to maintaining existing meadows over creation of new openings.	Refer to the PA, chapter 3. Most existing meadows are located in riparian areas. There is a need to distribute this habitat type in upland areas as well.
	Consider thinning stands more heavily to provide early seral habitat, as opposed to creating 1 to 5-acre openings; the small gaps in plantations would provide a lot of early seral habitat; is there private land in the project area that is functioning as early seral habitat?; is there an opportunity to work with private landowners to improve this habitat instead of sacrificing late-seral habitat?	Openings would not exceed one acre (appendix A). Some species require meadow habitat (dominated by grasses and forbs) and meadow habitat was historically more abundant. Early seral habitat (shrub-dominated) abundance would be increased and dispersed with thinning and gap

		creation on federal land. Late-seral habitat would not be sacrificed, because some late-seral species also use meadows or eat species that live in meadows.
Joe Rohleder-4	Provide nesting structures; and provide terrestrial/aquatic habitat for wildlife such as pond turtles, red legged frogs, banana slugs, and Pacific salamanders. Reduce the population of invasive nutria in lower Alsea, and Eckman and Drift Creeks.	Refer to the PA, chapters 2 and 3; and appendix A**.** The Oregon Department of Fish and Wildlife would be responsible for such a program. The US Forest Service is responsible for managing habitat.
Andy Kittle-6	I see a need for creating snags, but the quantities are too high. Funding needs are many; is there a quantifiable value to the habitat resource in this forest ecosystem? Are we lacking in this habitat type in the planning area? What is the evidence?	Prescriptions for creating snags and down wood are based on the minimum quantities required to meet the objectives of the Late-Successional Reserve Assessment**.**
Jacob Groves, American Forest Resource Council-7	Consider using 3- to 5-acre patch cuts to provide early successional habitat for species such as deer and elk, because proposed gaps are small, and this habitat is not provided by thinning treatments. Quantity and quality of forage to sustain wild ungulate populations is important and is mentioned in the Northwest Forest Plan.	Refer to the PA, chapter 3, wildlife section; and appendices A, B-2, and D**.**

Table D-6. NEPA

Person or Organization	**Comment Summary**	**Response**
Chandra LeGue, Oregon Wild-3	A full range of alternatives should be considered—building less temporary roads, and considering a different approach to meadow restoration/creation.	Refer to the PA, chapter 2. The quantity of new temporary roads and the size of meadows in plantations have been reduced, compared to what was identified in the scoping letter.

Table D-7. Project purpose

Person or Organization	Comment Summary	Response
Kelly Hockema-1	What are you going to restore? What is the rationale behind this project?	Refer to the PA, chapters 1, 2, and 3.

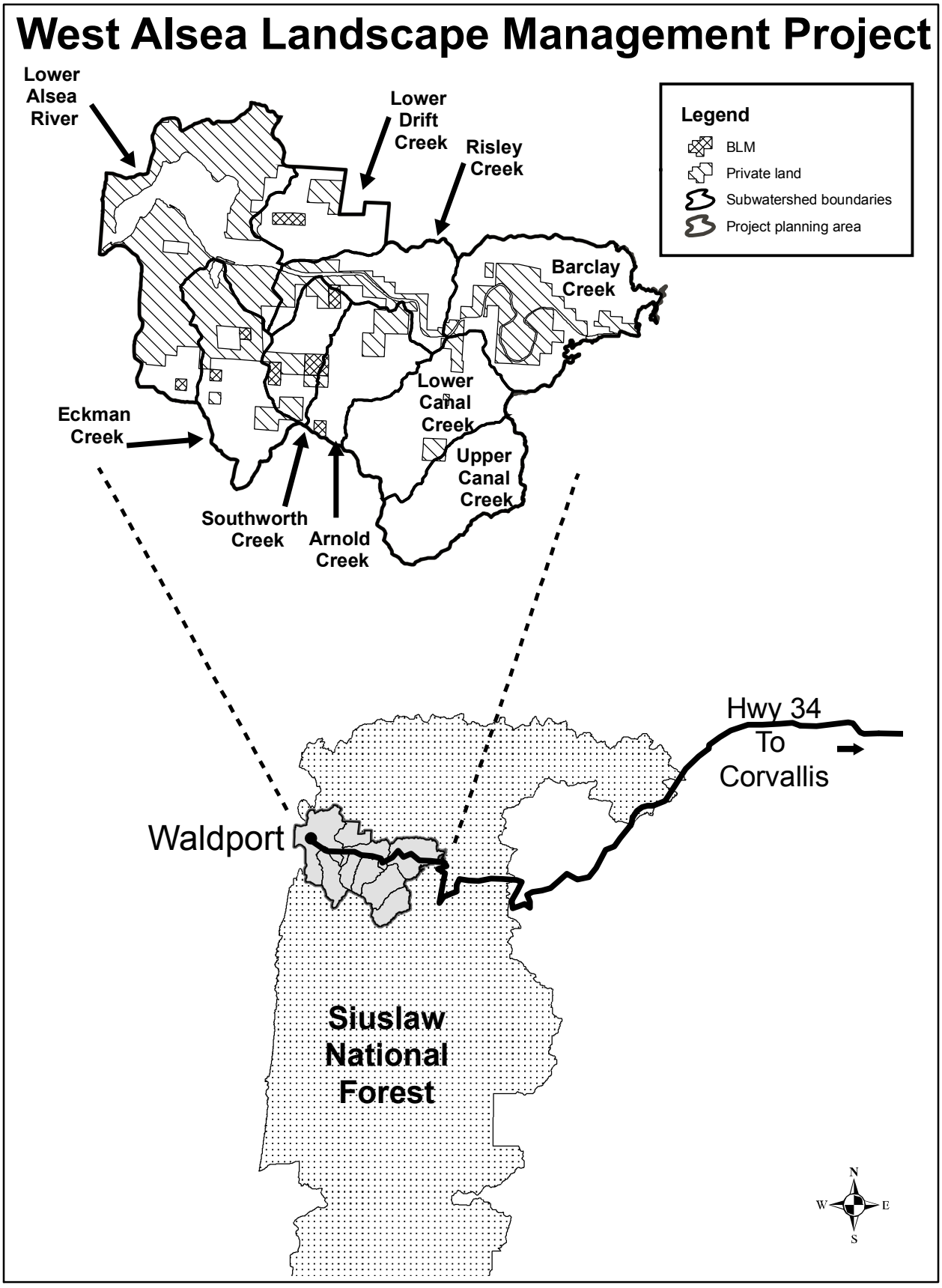
Table D-8. Disposal sites

Person or Organization	Comment Summary	Response
Andy Kittle-6	Secure funding for removing garbage and abandoned vehicles in the project planning area.	This is included as part of the project. Refer to the PA, appendix A.

Table D-9. Timber harvest economics

Person or Organization	Comment Summary	Response
Jacob Groves, American Forest Resource Council-7	All timber sales should be economically viable and include use of ground-based or skyline harvesting systems.	Refer to the PA, chapter 3 economic section; refer to PA, appendix B-3.
	Aerial yarding is extremely costly. Leaving tops attached when using helicopter yarding is an expensive option.	To maximize net return of timber receipts, helicopter yarding is used as a last resort. We prefer to leave tops in plantations, so helicopter yarding with tops attached is not an issue.
	Helicopter yarding in the summer is more costly because of reduced payloads during warmer air temperatures. Seasonal operating restrictions make it difficult to complete helicopter logging.	Helicopter yarding is basically restricted to no earlier than August 6 or October 1, because of listed wildlife species (refer to appendix A). Rock used to prepare roads for winter log haul can also be a major expense and has to be considered.
	Fire season restrictions and seasonal wildlife restrictions often limit workdays to 4 to 5 hours and lowers bid for the stumpage.	When fire season restrictions and wildlife restrictions occur concurrently, the 2-hour rule restriction after sunrise can be waived.

Map 1
Project Vicinity



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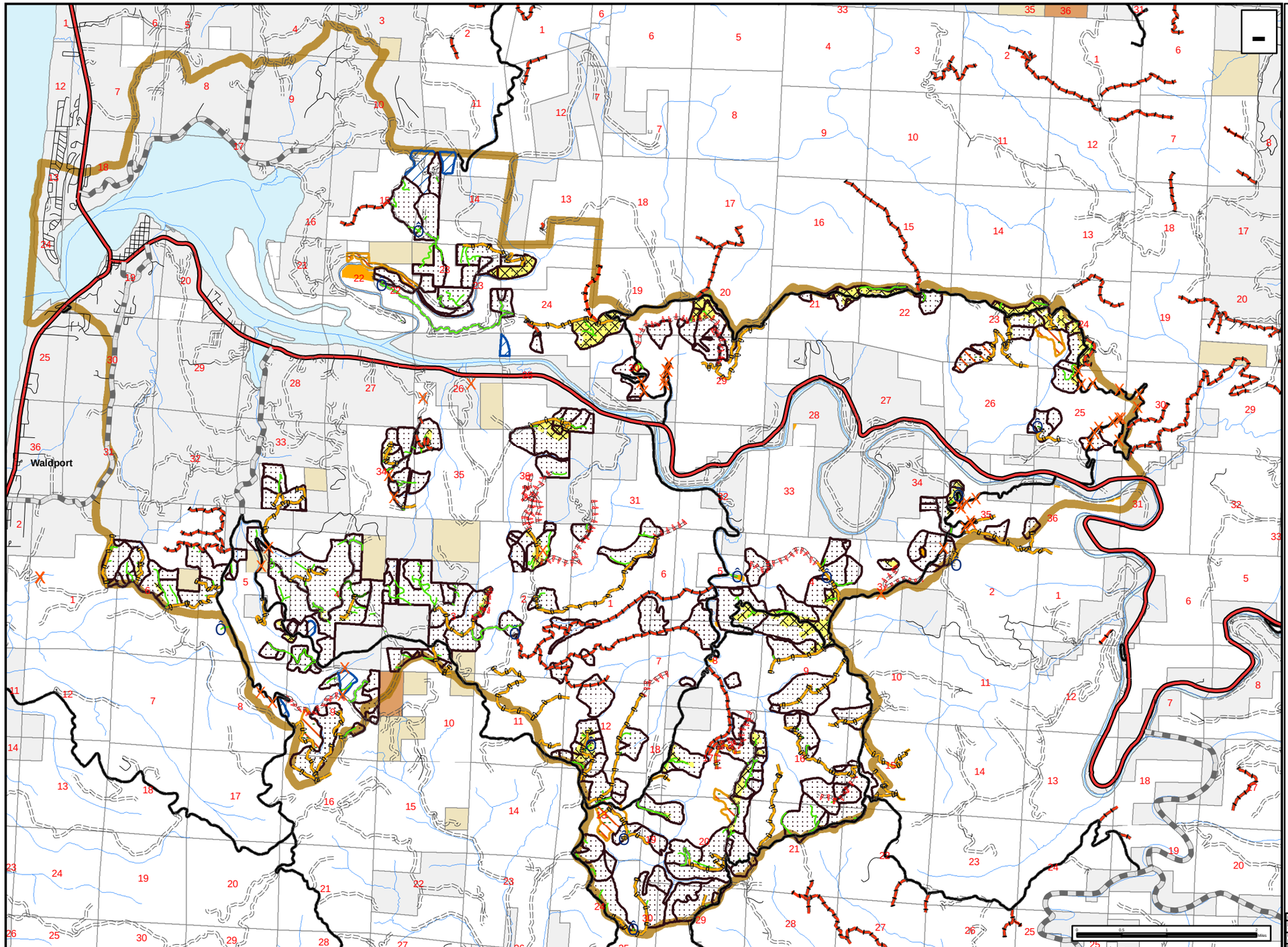

Map 2
Alternative 2
West Alsea
Landscape Management
Project

Legend

Road Types

- Highway
- County
- City/Paved
- Gravel/Other
- KEY Forest Road
- Previous Decommission
- Non-Commercial Thin

Ownership

- Siuslaw NF
- BLM
- County
- State
- Private
- Water

Alternative 2 Proposed Activities

- Planning Area Boundary

Stand Treatments

- Commercial Thin
- No Treatment
- Non-Commercial Thin

Other Proposed Treatments

- Under-burning Opportunities
- Meadow Creation Opportunities
- Meadow Maintenance Opportunities
- Helicopter Landing

Proposed Roadwork

- Temporary, NEW
- Temporary Re-Open
- Proposed Decommission
- Proposed Closure
- Culvert_Replacements

Project Name: *West Alsea Basin Landscape Management Project: Alternative 2*
Project Location: State: *OR* County: *Lincoln* Baseline & Meridian: *Willamette B&M*
Township(s): *16 S* Range(s): *11 W* Section(s): *multiple*
Projection: *Albers Conformal 1983* Nominal Map Scale: *1:63,000*
Drawn By: *W. Gaeros, District Hydrologist* Date Drawn: *November 16, 2007*
File Location: *X:\CCRD_Projects\Alsea_Issue_need\Planning\Final\pdf_maps_final\wAlsea_alt2_16nov2007.mxd*

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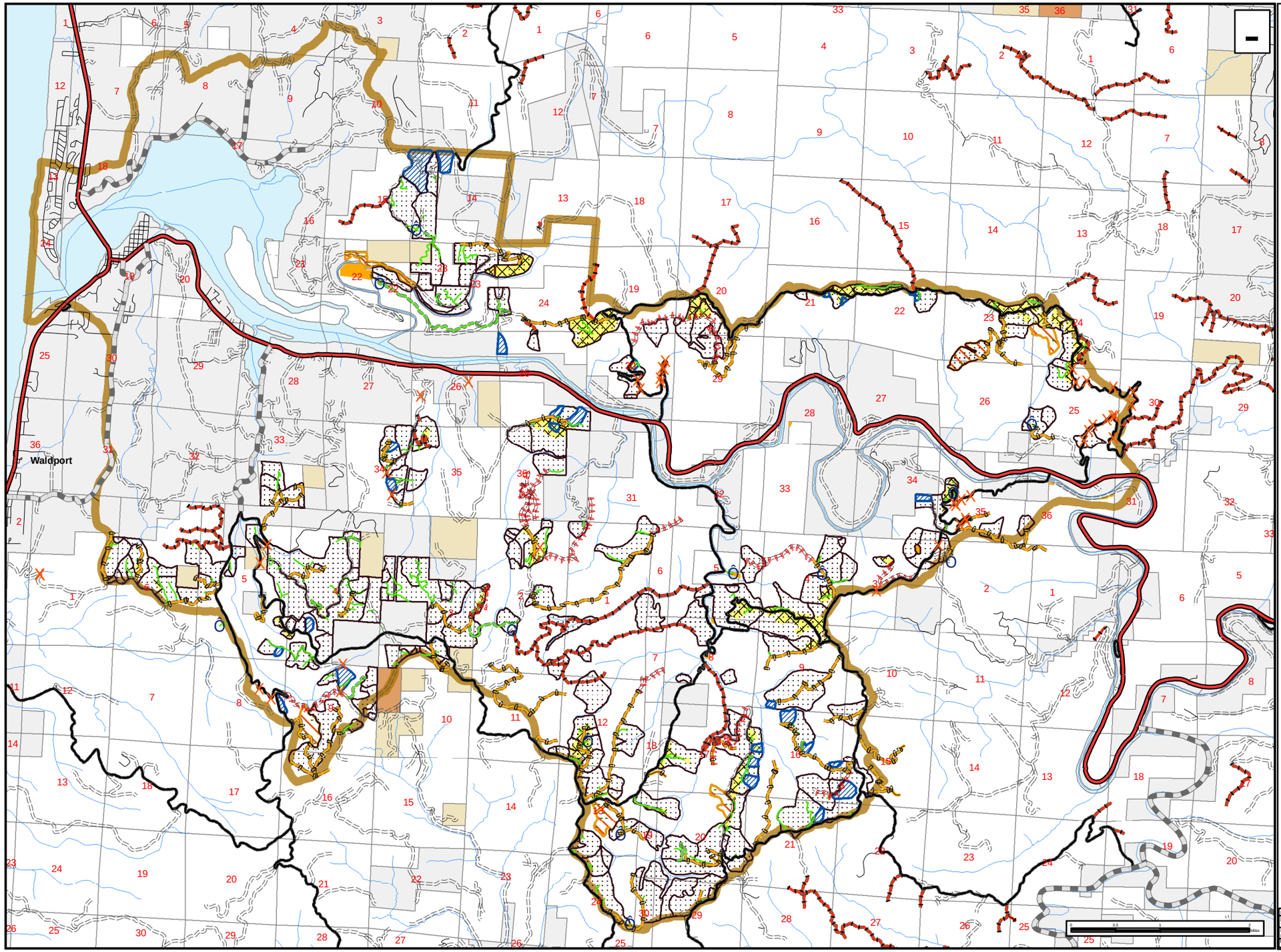

Map 3
Alternative 3
West Alsea
Landscape Management
Project

Legend

Road Types
- Highway
- County
- City/Paved
- Gravel/Other
- KEY Forest Road
- Previous Decommission
- Non-Commercial Thin

Ownership
- Siuslaw NF
- BLM
- County
- State
- Private
- Water

Alternative 3 Proposed Activities
- Planning Area Boundary

Stand Treatments
- Commercial Thin
- No Treatment
- Non-Commercial Thin

Other Proposed Treatments
- Under-burning Opportunities
- Meadow Creation Opportunities
- Meadow Maintenance Opportunities
- Helicopter Landing

Proposed Roadwork
- Temporary Re-Open
- Proposed Decommission
- Proposed Closure
- Culvert_Replacements

Project Name: *West Alsea Basin Landscape Management Project: Alternative 2*
Project Location: State: *OR* County: *Lincoln* Baseline & Meridian: *Willamette B&M*
Township(s): *16 S* Range(s): *11 W* Section(s): *multiple*
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