Lower Siuslaw
Landscape Management Project

Environmental Assessment

Siuslaw National Forest
South Zone Ranger District
Lane County, Oregon

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

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Why is this project needed, and what evidence established these needs? CHAPTER 1

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.

The Planning Area

The planning area for the Lower Siuslaw Landscape Management Project lies in the Lower Siuslaw fifth-field watershed of the Siuslaw River basin. The planning area is about 40 air miles west of Eugene, Oregon (map 1); it includes 15 subwatersheds and covers about 74,000 acres. About 43% of the planning area is privately owned, 2% is managed by BLM, 1% is managed by the Oregon Department of Forestry, and 54% is managed by the U.S. Forest Service. The project area is located in portions of Township 17 South, Range 9, 10, and 11 West; Township 18 South, Range 9, 10, and 11 West; and Township 19 South, Range 9, 10, and 11 West.

The Proposed Project

The Lower Siuslaw Landscape Management Project is a package of two separate restoration actions. One action focuses on terrestrial restoration by maintaining stand health and growth and enhancing stand structure and diversity in plantations now 25 to 51 years old; the second action focuses on watershed restoration by closing and decommissioning roads, placing large conifer trees--up to 36 inches in diameter at breast height--in streams, and thinning and planting trees in riparian areas.

The Problems To Be Addressed

Based on available information, including the direction from the Northwest Forest Plan (the Plan) and the Lower Siuslaw Watershed Analysis, Forest Supervisor Gloria Brown identified the following problems:

- ✓ The shortage of late-successional habitat in the Pacific Northwest limits recovery of old-growth-dependent species such as the northern spotted owl and the marbled murrelet. Thus, she saw a need to speed development of late-successional habitat in late-successional and riparian reserves.
- ✓ The shortage of properly functioning aquatic habitat in the Oregon Coast Range limits recovery of cold-water species such as coho salmon. Thus, she saw a need to improve watershed function.

The decision to be made by the Forest Supervisor is whether to implement the Lower Siuslaw Landscape Management Project or defer action at this time by selecting the no-action alternative.

Evidence Used by the Forest Supervisor in Deciding to Address These Problems

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

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

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

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

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

The Assessment Report for Federal Lands in and Adjacent to the Oregon Coast Province (USDA 1995) shows the planning area in the southern interior block (block 8). The mature conifer stands in block 8 have been extensively clearcut, and few patches of functional late-successional forest remain. The Report recommends managing to accelerate successional development and to aggregate small patches into larger ones of variable sizes, including one to several seral stages.

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;
- ⇨ Restoring immediate habitat conditions by adding large wood to streams; and
- ⇨ Restoring long-term habitat by reestablishing natural riparian areas through actions such as riparian planting.

For needing late-successional habitat

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

- ⇨ Since the mid-1900s, patch sizes have been reduced.
- ⇨ The number of mature patches has at least doubled over that found in the mid-1900s.
- ⇨ Late-seral vegetation on federal lands has been reduced.

The Lower Siuslaw Watershed Analysis (USDA 1998b) reported that:

- ⇨ Most of the subwatersheds contain less than 45% mature forest.
- ⇨ Fewer than 10% of the mature forest stands function as interior forest habitat in most subwatersheds.
- ⇨ Large diameter coarse woody debris with later decay classes, typically found in mature forest, are lacking in plantations.
- ⇨ About 35% of the planning area is in plantations.
- ⇨ Plantations were intended to be and have been managed for intensive wood-fiber production.
- ⇨ Dense canopy closure in many stands has resulted in little or no understory, reducing structural and species diversity.
- ⇨ Current habitats favor species more closely associated with fragmented landscapes and with early- and mid-seral communities.

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

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

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

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

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

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

- ✓ We involved scientists Jerry Franklin and John Tappeiner in field trips (September 2001) and they reaffirmed our proposal for thinning to different densities so that variable pathways can be established for young managed stands.

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

For needing to restore watershed health

The Plan's Aquatic Conservation Strategy is intended to restore and maintain the health of watersheds and the aquatic ecosystems they contain. The Lower Siuslaw Watershed Analysis identified the following adverse effects on the watershed:

- ⇨ Past actions have substantially reduced the amount of large wood in streams, pool quality and quantity, off-channel habitat, riffle-streambed quality, and water storage in key salmonid production areas.
- ⇨ The amount of large wood in streams is generally low, less than 10 pieces per mile.
- ⇨ Forest and county roads inhibit large wood and coarse sediment transport, disconnect stream channels, may contribute fine sediment to streams, and may act as barriers to aquatic species migration.
- ⇨ Existing and future large wood sources for streams are below natural levels.
- ⇨ Past actions have reduced shading on most streams; large conifers in riparian areas are lacking.
- ⇨ The water quality of the Siuslaw River is considered impaired because it exceeds the surface-temperature standard of 64^{o}F established by the Oregon Department of Environmental Quality (DEQ). Four creeks in the planning area have exceeded the temperature standard, but are currently not listed by DEQ as water-quality impaired: Hoffman, Karnowsky, Knowles, and Walker.

Refer to the Karnowsky Creek Stream Restoration Project Environmental Assessment (USDA 2002b) for proposed actions designed to address the need to restore Karnowsky Creek.

What alternatives were developed to meet the identified needs?

CHAPTER 2

In chapter 2, we considered several alternative proposals that were not fully developed for reasons disclosed. We describe one fully developed alternative proposal for resolving the problems and meeting the needs identified in chapter 1; it is equivalent to the traditional section, "Alternatives Including the Proposed Action". (The "we" in the previous sentence and throughout the document is our interdisciplinary team).

We designed the alternative based in part on priorities and recommendations identified in the Forest's late-successional reserve assessments for LSR RO268 and RO267, and the Lower Siuslaw watershed analysis. We also evaluated the project activities--commercial thinning, in-stream and riparian restoration, and road decommissioning--and their placement, based on the histories and current conditions of those sites. For example, we collected information about past harvesting practices, such as clearcutting trees, broadcast-burning harvested areas, and felling all of the snags; silvicultural practices, such as planting a single tree species at 400 trees per acre; and the age and current attributes of managed stands for the sites where actions are proposed. This collection of site information helped us to identify stands suitable for or in need of thinning and other actions--such as underplanting, adding coarse wood, and creating snags--to help maintain stand health or accelerate developing late-successional characteristics.

We evaluated stream characteristics—such as gradient, connectivity to flood plains, in-stream large wood, shading, and numbers of conifers in the riparian zone—to help identify areas for restoration. Actions for restoring aquatic function and habitat include road decommissioning; placing large wood in streams; and planting trees in the riparian zone to increase future shade and large-wood sources. Several factors helped us identify roads for decommissioning: the need to reduce adverse effects to fish habitat and water quality by reducing reliance on valley-bottom and mid-slope roads, maintaining future access to managed stands, providing public access, providing legal access to private land, and reducing road maintenance or rebuilding costs because funds for maintaining the current road system are lacking.

In addition to meeting the identified needs, the range of alternatives considered reflects concerns raised during public scoping for this EA, public involvement with recent Forest projects such as the Five Rivers Landscape Management Project (USDA 2002a), the Karnowsky Creek Stream Restoration Project (USDA 2002b), the Enchanted Valley Stream Restoration Project (USDA 1998a), and concerns raised during monitoring of District projects. To help identify public concerns about the proposed project, interested citizens, organizations, regulatory agencies, and local governments were informed about these proposals. Public comment on the proposed projects were solicited through the Siuslaw National Forest's quarterly "Project Update" publications, public scoping letters, and the The Siuslaw News in Florence, Oregon. Scoping letters were mailed on June 8, 2001. A news release was published in the Siuslaw News on June 9, 2001. Comments were requested by June 25, 2001. Twelve responses to this request were received. Industrial timber landowners rural residents are concerned about maintaining legal access to their lands, as well as alternate routes to Highway 126 should access be blocked as a result of landslide or fire. Others are concerned about methods for plantation stocking control, cumulative effects of actions, additional clarification of proposed actions, and developing partnerships for watershed restoration. These concerns are addressed in the following section, in the alternative's considered in detail section, in chapter 3, and in appendix A (project design criteria).

Alternatives Considered But Eliminated from Detailed Study

Several alternatives were considered by the Forest Supervisor, largely based on public scoping comments. The following alternatives represent those that were considered, but for various reasons, were eliminated from detailed study.

Commercial harvest of mature timber on matrix lands--The Lower Siuslaw watershed analysis recognized that commercial harvest of mature, natural stands would be consistent with the Northwest Forest Plan. Currently, there are about 30 patches of mature stands in designated matrix areas of the Lower Siuslaw Landscape Management Project averaging about 5 acres in size, ranging from less than 1/10 acre to about 37 acres, and totaling 150 acres. Preliminary evaluation of these stands and experience with similar stands in the watershed indicate that if they were surveyed for marbled murrelets, more than 90% are likely to be identified as occupied. Current standards require that occupied stands, along with all suitable habitat within a one-half mile radius, be designated as late-successional reserve. If any of the remaining matrix lands contained mature stands, the controversy associated with harvesting mature timber--along with required protection measures for other listed species and survey-and-manage species--would likely delay or prevent any proposed timber harvest if the lands were included in a landscape-scale project. Therefore, an alternative that would harvest mature timber in matrix lands was not fully developed.

Base resource actions on the location of the primary and secondary road system--The Siuslaw Access and Travel Management Guide (USDA 1994) was developed in response to declining road maintenance funds. The guide identified a network of roads to be maintained open with emphasis on connecting state and county roads or communities. A key component of the guide was a mechanism to establish funding priorities and maintenance levels under which road maintenance funds would be expended. The guide presumed that projects, such as commercial thinning, would generate or provide sufficient funds to maintain roads required to access a given project. Although the guide identified roads on which appropriated road maintenance funds could be expended, it made no decisions about nor was it designed to determine the continued need for roads to be maintained with other funds. Late-successional reserve assessments and watershed analyses were developed to help identify resource management priorities and activities on the landscape. Because the access and travel management guide was prepared before these documents were available, it does not reflect the resource needs identified by those documents. Therefore, an alternative to develop resource actions based solely on the location of the existing primary and secondary road system was not fully developed.

Treatment of the solitary Tilden plantation—The solitary plantation (14 acres) in the Tilden subwatershed was considered for commercial thinning. Because of its isolation (surrounded by private land) and lack of access, this plantation will not be treated. By not treating the plantation, no actions are planned for the Tilden subwatershed under this project. Thus, the subwatershed was not included as part of the project planning area.

Treat 30% of the managed stands to achieve low density or 40 trees per acre—Table 9 from the Late-Successional Reserve Assessment, titled Structure and Composition of the Mature Condition of Late-Successional Stands by Sub-series Environments, contains the best data we have on our existing natural stands in terms of how many trees per acre to target for attaining late-successional old-growth forest conditions. Based on data in table 9 of the Late Successional Reserve Assessment, Oregon Coast Province Southern Portion (USDA, USDI 1997), an average of about 39 medium or larger trees per acre exist in the western hemlock-moist zone (most of Lower Siuslaw planning area). Therefore, an old-growth landscape that averages 39 trees per acre in the planning area is desired. Bringing the prescription immediately down to 40 trees per acre leaves no room for mortality over the next two or three centuries, however. Allowing for 100-year wind events and insect or disease disturbances, 40 trees per acre will not provide sufficient trees for the mature stand we want to develop. Thus, an alternative that proposes to treat 30% of the managed stands using 40 trees per acre as a residual stand target was not fully developed.

Single-entry treatment of managed stands—Considerable thought was given to determine whether a one-time only thinning entry is desirable for 25 to 50 year-old stands. Our team felt strongly that this alternative provided too much risk to stands. In this scenario, managed stands across the landscape would be thinned to about 40 to 50 trees per acre and associated activities such as stand underplanting would be completed. Stands would then be allowed to develop old-growth conditions on their own. A landscape populated by stands with minimum numbers of trees leaves little room for mortality from natural events such as strong winds or insect infestation. In addition, the variability between stands would be limited. Tappeiner et al. (1997) and Oliver and Larson (1996) advocate the use of several prescriptive residual overstory levels across a landscape. Carey et al. (1999) says that diversity in treatment is critical to meeting existing and future needs of wildlife. Variability and diversity are the keys to recapturing many of the forest functions.

Because of the current level of uncertainty with single-entry treatment, the Forest Supervisor decided it was better to take a more conservative approach to stand management and development at this time. As information is obtained about a single-entry treatments through studies such as the Five Rivers Landscape Management Project Final EIS management study (USDA 2002a), it may become a viable silvicultural tool in the future.

Alternatives Considered in Detail

Design criteria (appendix A) outline the practices to be used and their timing and duration when planned actions and activities are implemented. We believe that mitigation measures for all proposed actions are covered by the design criteria.

Alternative 1: Active landscape management (Forest Service’s Preferred Alternative)

Actions included in this alternative are designed to address the problems identified by the Forest Supervisor. The actions incorporate the standards and guides established by the Siuslaw Forest Plan, as amended by the Northwest Forest Plan; the design criteria; and monitoring protocols outlined in appendix A. Selecting this alternative would result in implementing two separate actions with the following management activities:

Terrestrial Restoration Action--To speed the development of late-successional habitat in late-successional and riparian reserves, the following activities are proposed:

Commercial and precommercial thinning and associated activities

- Commercially thin about 3,707 acres of plantations, including about 3,354 acres in riparian reserve, 237 acres in late-successional reserve, and 116 acres in matrix (map 2 and appendix B-3);
- Reopen about 1.0 miles of classified (Forest system) roads in reserves--including about 0.3 mile in riparian reserve--by removing vegetation and minor slides from road surfaces (map 4 and appendix B-3);
- Temporarily reopen about 17.9 miles of unclassified roads (original logging spur roads) in reserves--including about 10.6 miles in riparian reserve--and about 0.6 mile of unclassified road in matrix by removing vegetation and minor slides from road surfaces (map 4 and appendix B-3);
- Build about 0.8 mile of temporary road in reserves--including about 0.53 mile in riparian reserve--and about 0.03 mile in matrix (map 4 and appendix B-3);
- Remove about 4,932 cubic yards of unstable sidecast material from 38 road locations;
- Create about 230 snags (28 to 36 inches in diameter) in natural stands adjacent to commercially thinned plantations, as mitigation for snags that were cut inside plantation boundaries during initial harvest;
- Develop future snags in thinned portions of plantations by inoculating about 3,554 trees with native fungi; 20% of the future snags will serve to mitigate snags that were cut inside plantation boundaries during initial harvest (appendix B-2);
- Increase the coarse wood component in commercially thinned plantations in late-successional reserves by leaving about 11,557 trees on the ground, to mitigate loss associated with past harvest practices (appendix B-2);
- Precommercially thin about 1,854 acres of young plantations in reserves, including about 1,520 acres in riparian reserve and 42 acres in matrix (map 3);
- Create and maintain about 55 acres of early-seral habitat to provide minimum diversity of seral conditions in late-successional reserve; new early-seral habitat will be created in matrix portions of commercially thinned plantations (map 2); and
- Plant a mixture of shade-tolerant conifers and hardwoods in about 711 acres of existing plantations.

> Based on societal needs outlined in the Forest Ecosystem Management Assessment Team's (FEMAT) report (USDA, USDI, et al. 1993), the Northwest Forest Plan designates producing timber and other products to be important objectives for the 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 green trees while producing timber and other products. Outside of riparian reserves, the matrix lands also provide opportunities to maintain some early-seral habitat in the watershed.

The terrestrial restoration activities of Alternative 1 are summarized by subwatershed in Tables 1a and 1b. Most activities would be completed in 10 years, with commercial timber-sale contracts awarded in FY 2003. Refer to appendix B for specific plantation information about stand exams (B-1), silvicultural prescriptions (B-2), and commercial thinning (B-3).

Table 1a. Description of Alternative 1 terrestrial restoration activities by subwatershed

Terrestrial Restoration Activities	Berkshire	Cedar	Divide	Hadsall	Hand	Hoffman	Hood	Knowles
Commercial thinning (acres)								
Total commercial thin	201	879	199	121	649	158	0	0
Commercial thin, skyline	158	629	170	121	578	125	0	0
Commercial thin, helicopter	43	236	24	0	71	33	0	0
Commercial thin, tractor	0	14	5	0	15	0	0	0
Classified (system) roads (miles)								
Reopen roads	0	0.2	0	0	0.3	0	0	0
Unclassified (temporary) roads								
New roads (miles)	0.08	0.24	0.08	0.07	0.03	0.03	0	0
Reopen roads (miles)	1.17	4.19	0.68	0.54	2.00	0.29	0	0
Unstable sidecast removal (number of sites and cubic yards)	0	15/2,237	3/320	0	3/340	3/330	0	0
Snag and coarse wood creation (trees)								
Mature tree topping	0	40	30	10	40	35	0	0
Plantation tree inoculation	160	1,147	26	138	857	14	0	0
Coarse wood	500	2,613	939	138	2,713	511	0	0
Other actions								
Precommercial thinning (acres)	32	441	149	53	717	0	0	0
Early-seral creation and meadow maintenance(acres)	5	0	19	0	0	0	0	0
Upland underplanting (acres)	41	158	30	18	182	38	0	0

Table 1b. Description of Alternative 1 terrestrial restoration activities by subwatershed

Terrestrial Restoration Activities	Lawson	Lower Sweet	Siboco	Thompson	Upper Divide	Upper Knowles	Walker
Commercial thinning (acres)							
Total commercial thin	124	90	55	616	203	0	412
Commercial thin, skyline	124	78	55	379	178	0	368
Commercial thin, helicopter	0	0	0	237	25	0	44
Commercial thin, tractor	0	12	0	0	0	0	0
System (classified) roads (miles)							
Reopen roads	0	0.5	0	0	0	0	0
Temporary (unclassified) roads							
New roads (miles)	0	0.03	0.07	0.11	0	0	0.06
Reopen roads (miles)	1.74	0.22	0.12	3.54	0.49	0	2.90
Unstable-sidecast removal (number of sites and cubic yards)	0	1/70	0	8/1,065	2/150	0	3/420
Snag and coarse wood creation (trees)							
Mature tree topping	0	0	0	35	10	0	30
Plantation tree inoculation	162	90	85	387	262	0	226
Coarse wood	578	560	340	1,338	988	0	339
Other actions							
Precommercial thinning (acres)	0	118	19	249	15	27	35
Early-seral creation and meadow maintenance(acres)	0	0	0	21	0	0	10
Upland underplanting (acres)	15	14	16	94	44	0	61

Map 2, CT and temp roads

Map 2, CT and temp roads

Map 3, PCT and No treatment

Map 3, PCT and No treatment

Watershed Restoration Action--To improve watershed function, the following activities are proposed:

System road activities

- Decommission about 14 miles of road, including about 8.9 miles in riparian reserve (map 4);
- Close about 63 miles of road to vehicular traffic, including about 33 miles in riparian reserve (map 4);

Hydrologic function and water-quality activities

- Place about 395 large conifers (95 trees less than 32 inches diameter at breast height and 300 trees up to 36 inches diameter at breast height) from designated areas and about 230 small conifers from plantations along about 15.5 miles of stream on federal land and about 6 miles of stream adjacent to private land (map 5);
- Plant about 60 acres of shade-tolerant conifers and various hardwoods along alder-, brush-, or meadow-dominated riparian areas (map 5);
- Release existing planted conifers **(**47 acres**)** and natural conifers **(**80 acres**)** from competition with alder and other vegetation **(**map 5**)**;
- Remove about 6,824 cubic yards of fill material from 33 stream crossings on classified and unclassified roads, including those proposed for decommissioning;
- Remove about 12 barriers to fish passage; and
- Riparian thin (noncommercial) 145 acres of plantations in riparian reserves (map 5).

The aquatic restoration activities of Alternative 1 are summarized by subwatershed in Tables 2a and 2b. Activities would begin in FY 2003, with most completed in 5 years.

Table 2a. Description of Alternative 1 aquatic restoration activities by subwatershed

Aquatic Restoration Activities	Berkshire	Cedar	Divide	Hadsall	Hand	Hoffman	Hood	Knowles
Classified (system) roads (miles)								
Close roads	1.7	2.3	5.1	3.3	13.6	4.5	0	0
Decommission roads	0	3.8	1.8	0	4.4	0	0	0.2
Hydrologic function and water quality								
Large wood in streams (miles): Federal	0	4	0	0	0	1.5	0	1.5
Private	0	0	0	0	0	0	3	0.5
Trees required for large wood (number):								
Mature trees	0	100	0	0	0	15	50	50
Plantation trees	0	70	0	0	0	50	0	0
Riparian planting (acres)	0	20	0	0	0	5	0	5
Riparian natural and planted conifer release (acres)	0	20	20	0	12	10	0	10
Culvert and fill removal (number of sites and cubic yards)	0	8/1,371	0	0	21/5,213	0	0	0
Fish passage barrier removal (number)	0	0	1	0	8	0	0	0
Riparian (noncommercial) thinning (acres)	0	49	18	7	0	30	0	0

Table 2b. Description of Alternative 1 aquatic restoration activities by subwatershed

Aquatic Restoration Activities	Lawson	Lower Sweet	Siboco	Thompson	Upper Divide	Upper Knowles	Walker
System (classified) roads (miles)							
Close roads	4.9	5.1	0.5	10.1	6.3	0	5.9
Decommission roads	1.6	0	0	0.1*	0.6	0	1.7
Hydrologic function and water quality							
Large wood in streams (miles): Federal	1	0	0	3	3	0.5	1
Private	0	0	0	0	0	2.5	0
Trees required for large wood (number):							
Mature trees	15	0	0	60	45	40	20
Plantation trees	0	0	0	0	60	0	50
Riparian planting (acres)	0	0	0	15	5	0	10
Riparian natural and planted conifer release (acres)	10	0	0	15	15	5	10
Culvert/fill removal (number of sites and cubic yards)	0	1/50	0	3/190	0	0	0
Fish passage barrier removal (number)	0	0	0	3	0	0	0
Riparian (noncommercial) thinning (acres)	0	0	0	0	22	0	19

* Lane County does not intend to reopen the Thompson Creek road if the recurring landslide occurs again. Should a landslide occur, the U.S. Forest Service will work with Lane County to secure additional funding to decommission 3 miles of the Thompson Creek road.

What alternatives were developed?

Map 4, Road management

Map 4, Road management

Map 5, Stream enhancement

Map 5, Stream enhancement

Alternative 2: No Action

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

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

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

Comparing Likely Effects

Table 3 compares how well the alternatives address the issues.

Table 3. Comparing likely effects of Alternatives 1 and 2, based on the issues, objectives, and outcomes

Issue, objective, and outcome	Alternative 1	Alternative 2
Terrestrial Restoration Action		
Increase late-successional habitat in late successional and riparian reserves	Maintains stand health and accelerates growth of trees in plantations	Stand health and growth will decline
	Increases stand complexity and diversity in plantations	Stands will develop at a rate different from natural stands of comparable age
Increase early-seral habitat in matrix lands	Increases early-seral habitat in the watershed by using matrix lands in plantations	Existing early-seral habitat will decline as trees encroach on meadows
Watershed Restoration Action		
Restore watershed health and associated aquatic ecosystems	Increases effects of road-related fine sediment on streams in the short-term; reduces effects of road-related fine sediments on streams in the long term	Maintains effects of road-related fine sediment on streams in the short term; increases risk of fine-sediment effects on streams from road failures in the long term
	Increases stream and riparian reserve complexity	Slower change
	Reduces effects of roads on large-wood recruitment and debris flows	Rate of change dependent on rate of road-fill failure
	Reconnects stream channels	Rate of change dependent on rate of road-fill failure
Aquatic conservation objectives—All projects	Moves toward historical conditions and meets all objectives	Watershed differs from historical conditions and does not meet all objectives

What environmental effects are predicted for each alternative?

CHAPTER 3

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

One advantage of planning the Lower Siuslaw Landscape Management Project at the landscape scale is an improved analysis of cumulative effects. Knowing the site-specific details of all projects in a large geographic area, allows us to predict cumulative effects with more certainty than if projects were analyzed individually. The analysis of direct and indirect effects in this chapter inherently includes cumulative effects because all foreseeable future federal actions in the watershed are included in the analysis. Cumulative effects are summarized on pages 67, 68, 69, and 70 and include how all actions (including those expected from other landowners) affect each resource.

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

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

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

When the Forest Supervisor chose the members of the interdisciplinary team, she considered possible scenarios for this environmental assessment and determined what disciplines would illuminate decisions about them. Relying on her professional judgment and expertise, she chose the disciplines and formed the team of Forest experts in those disciplines. Team members reviewed areas where actions are proposed, reviewed relevant refereed literature and Forest assessments for this planning area, and consulted disciplinary colleagues in the Forest Service, other agencies, universities, and elsewhere. Often, literature reviewed by team members was deemed incomplete and, though studies of similar environments and similar scenarios were reviewed, the expert's professional judgment was required to determine what information can be appropriately used here--and how strongly it supports predictions about what the environmental effects of proposed actions will be. Although team members benefit from the array of research information and the insights of colleagues, they are valued most highly for their experience in and knowledge about the Lower Siuslaw planning area.

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

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

Terrestrial Restoration Action—Predicted Effects of Activities To Address the Shortage of Late-Successional Habitat

Forest stand conditions

Managing 25 to 50 year-old plantations (Dan Karnes)—Effects on plantations (managed stands) were analyzed based on thinning stands to 90 trees per acre (TPA), 70 TPA, and 50 TPA. (Note: trees per acre reflect the net tree numbers to be retained on each stand after snag and coarse wood prescriptions are met). A fourth treatment strategy--no treatment--was also evaluated. Most of the no-treatment stands may be re-evaluated within 20 years for possible treatment under a future project. All of these strategies are operational, constitute valid silviculture prescriptions, and provide a range of vegetation conditions across the Lower Siuslaw watershed landscape.

To analyze effects, the ORGANON (Oregon growth analysis and projection) model was used to model individual tree growth. This model uses data from permanent plots in western Oregon, Washington, and British Columbia taken by the Stand Management Coop (SMC) (Hann et al. 1997).

Although all proposed treatment stands are young and started as clearcuts, there is still quite a range of ages and current stand conditions (appendix B-1). A sample stand from the central Oregon coast range—stand 224 of the Five Rivers watershed (USDA 2002a)—is also typical of an average stand in the Lower Siuslaw planning area and has been used to model future growth and development. It provides the middle range of conditions that are most common in Lower Siuslaw. A summary of the ORGANON run for stand 224 indicates effects that can be expected from the different thinning treatments (table 4):

- Diameter growth rates will increase, accelerating the development of large-diameter trees. At age 80, the average stand diameter will be about 30 inches in diameter at breast height (DBH), with 40 trees per acre (TPA); trees with 100 residual trees-per-acre will not reach this size until they are about 120 years old. Our treatments in Lower Siuslaw are 50, 70 and 90 TPA with diameters projected to reach 30 inches DBH around ages 90, 105, and 115, respectively.

- Height growth rates are comparable for all treatments. Although stands thinned to 50 TPA are at a higher risk to blowdown for a few years, height-diameter relations are more favorable under this treatment, so trees are less prone to blowdown and breakage over time. In addition, "open-grown" trees will develop more extensive and stronger root systems over time and will be less susceptible to wind damage.

- By creating or allowing an understory to develop, 50-TPA stands will result in multi-aged, two-storied stands earlier. Stands thinned to 90 TPA will continue to be dense and single-storied until further thinning or natural disturbances reduce their density.

- Increased growth rates will accelerate developing high-quality snags and large coarse woody debris. Mortality will increase in the lightly thinned treatment, creating larger amounts of woody debris and snags (28 over the next 80 years). Most of these will be small in size and have rapid rates of decay because of the high percentage of inner bark and sapwood. This physiologically active tree tissue will be the first component of downed trees to decay (Maser and Trappe 1984). Most of the mortality will be in trees less than 20 inches DBH. Stands thinned to 50 TPA will allow larger, longer lasting material to develop for snags and coarse woody debris. Natural mortality will account for about 4 trees in the next 80 years with much higher mortality in root-rot infected stands. The dead material will be relatively large, however--about 20 to 30 inches in diameter.

- Live-crown ratios will increase for all treatments before beginning to decline, but there may be an initial period where crown size remains relatively constant. Conifers go through a replacement period within their crowns whereby needles maintained under low light conditions (shade needles) will be replaced by needles that are adapted for higher light levels (sun needles). Once that replacement has happened, crown growth will accelerate until crowns grow together and light again limits growth. Crown growth can be maintained by occasional thinning. Larger crown ratios will be maintained longer under the heaviest thinning. Crown ratios will remain above 30% until age 90 in the stands thinned to 50 TPA, compared to about ages 70 to 75 in the 90-TPA stands. Live-crown ratio can be considered an index of individual tree vigor (Oliver and Larson 1996). Trees with large crown ratios will not only grow faster, but will be more resistant to insects, diseases, and other environmental hazards.

Additional analysis indicates that:

- In a study on 10 sites in the Oregon Coast Range, Tappeiner et al. (1997) found that trees in old-growth stands had little competition from one another because of the low numbers of trees per acre. Young plantations, such as those in the Lower Siuslaw watershed, were planted--after logging--at 400 to 680 TPA. About half of the stands were thinned to about 200 trees per acre. Currently, some of the stands have 300 or more TPA (appendix B-1). Therefore, we expect that stands thinned to 50 TPA will allow residual trees in those stands to develop on a trajectory more consistent with natural old-growth stand development.

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

- A density-management study conducted on the Waldport and Mapleton Ranger Districts (Emmingham 1996) indicated that canopy cover varied from 30 to 70% immediately after commercial thinning when stands were thinned to 30 to 100 TPA. Unpublished data 5 years after thinning showed that crown cover had increased to 47 to 82% at the same sites (Chan, pers. comm.). Chan also indicated that most native tree species require a minimum of 30 to 60% open light (canopy openings) to allow for successful establishment and growth. Stands thinned to 50 TPA will increase the amount of light reaching the forest floor and provide a more suitable environment for understory development. Thus thinning, combined with further residual stand reductions stemming from implementing prescriptions for snags and coarse woody debris, will continue to provide additional light and allow multistoried stands to develop.

- Thies and Sturrock (1995) compiled information from research findings and observations by forest pathologists and resource managers in the Pacific Northwest on the susceptibility of tree species to laminated root rot. Susceptibility ratings representing a near consensus of pathologists working in western North America were presented. They found Douglas-fir highly susceptible, western hemlock intermediately susceptible, western redcedar resistant, and hardwoods immune. They recommended planting tree species immune or with low susceptibility to the disease (tolerant or resistant). Therefore, underplanting with immune hardwoods (bigleaf maple and red alder) and resistant species (western redcedar) are expected to reduce inoculum and spread of the disease. Because the level of laminated root rot in the Lower Siuslaw stands is relatively low--compared to neighboring drainages to the north--the prescriptive intent is not to eliminate this root disease from stands. Low levels of root rot are important natural processes that create diversity across the landscape and therefore, small disease pockets will remain in stands; heavier infestations will be treated to reduce spread of disease, however.

- Understory planting of native conifers and hardwoods in openings will increase both the stand diversity and structure that provide the framework for developing multistoried stands. Plantings in Lower Siuslaw will be concentrated in openings such as root-rot pockets, corridors, landings, and under canopies with 30 to 60% open light. It is estimated that 50% of the stands with 50 TPA, 15% of stands with 70 TPA, and 5% of stands with 90 TPA will be underplanted. Only the larger holes will have follow-up release treatments because the objective is to attain a variable distribution pattern for these understory trees.

After all commercial thinning and associated actions are completed in existing plantations, we expect the following treatment effects on stocking:

- About 593 acres under Alternative 1 will be thinned to 50 trees per acre. About 297 of these acres will be underplanted with a variety of conifer and hardwood species to develop a two-storied canopy structure and increase species diversity.

- About 2,588 acres will be thinned to 70 trees per acre. About 388 of these acres will be underplanted to develop a two-storied canopy structure and increase species diversity. Most stands may need additional treatment within 20 years to continue development of these stand characteristics.

- About 526 acres will be thinned to 90 trees per acre, with 26 acres underplanted. These stands will continue to develop as dense single-storied stands unless additional treatments are applied within 20 years.

- About 3,551 acres of stands older than 1976 will not be treated at this time because of lower initial stocking, and sporadic and variable spacing. Some of these stands will continue to develop and may be ready for thinning 10 to 20 years from now. Other stands in this group will never need treatment under current objectives.

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

Table 4. ORGANON growth and yield projections for stand 224

Age	TPA	DBH	Height (HT40)	Mortality	Crown ratio %
40 TPA					
37	210	13.1	97	0	32
*37	40	17.0	97	0	36
47	40	20.5	116	0	46
57	39	24.0	136	1	47
67	39	27.0	153	0	41
77	39	29.4	167	0	37
87	38	31.5	180	1	34
97	38	33.3	191	0	31
107	38	34.9	201	0	29
117	37	36.2	210	1	27
45 TPA					
37	210	13.1	97	0	32
*37	45	16.8	97	0	36
47	45	20.2	116	0	46
57	44	23.6	136	1	45
67	43	26.4	152	1	39
77	43	28.8	167	0	35
87	43	30.7	179	0	32
97	42	32.4	191	1	29
107	42	33.9	201	0	27
117	41	35.2	209	1	25
60 TPA					
37	210	13.1	97	0	32
*37	60	16.3	97	0	35
47	59	19.5	116	1	45
57	58	22.5	136	1	40
67	57	25.0	153	1	35
77	56	27.0	167	1	31
87	55	28.8	179	1	28
97	54	30.3	190	1	26
107	53	31.6	200	1	24
117	52	32.8	208	1	23
80 TPA					
37	210	13.1	97	0	32
*37	80	15.8	97	0	34
47	78	18.7	117	2	42
57	76	21.3	136	2	36
67	74	23.5	153	2	31
77	72	25.2	167	2	28
87	70	26.8	179	2	25
97	68	28.2	191	2	23
107	66	29.4	199	2	22
117	63	30.6	208	3	20
100 TPA					
37	210	13.1	97	0	32
*37	100	15.3	97	0	35
47	97	18.1	117	3	39
57	94	20.4	136	3	33
67	90	22.3	153	4	29
77	87	23.9	167	3	26
87	83	25.4	179	4	23
97	80	26.7	190	3	22
107	76	27.9	200	4	20
117	72	29.1	208	4	20
No Action					
37	210	13.1	97	0	32
47	188	15.2	119	22	30
57	168	17.0	138	20	26
67	149	18.8	154	19	23
77	132	20.4	169	17	22
87	118	21.9	181	14	20
97	107	23.4	192	11	19
107	97	24.8	200	10	19
117	89	26.2	208	8	18

* = after thinning; TPA = trees per acre; DBH = diameter at breast height; Height (HT40) = height of 40 tallest trees.

Timber-sale economics (Bruce Buckley)--Commercial thinning under Alternative 1 in late-successional and riparian reserves will produce about 42,000 thousand board feet (MBF) or 88,200 hundred cubic feet (CCF). Thinning in matrix lands will produce about 1,300 MBF or 2,730 CCF. A MBF to CCF conversion factor of 2.1 was used for this analysis.

The economic analysis used the transaction-evidence appraisal (TEAECON) program developed by the Mount Hood National Forest. This program--developed for planners in Oregon and Washington--is used to analyze basic gross timber values and develop estimated advertisement rates for sales greater than 250 thousand board feet (MBF). The advertised rate reflects recent market conditions for thinning sales in Region 6 and is the minimum amount needed to cover Forest Service expenses associated with planning, sale preparation, and sale administration; logging and associated costs; the required minimum collection (0.30 x total CCF volume) for the National Forest Fund (NFF); 10% of gross receipts for Forest roads and trails (a NFF collection); and costs for essential KV projects.

Based on recent (April 2002) market rates in Oregon and Washington, the advertised rate for the sale of timber under Alternative 1 would be $102.36 per CCF. At this rate, Alternative 1 would generate sufficient revenue to cover all KV mitigation projects such as snag and down wood creation, and all KV non-mitigation projects such as precommercial thinning and early-seral creation. Table 5 summarizes the sale value, collections, KV project costs, and the balance for Alternative 1, based on CCF dollars. Depending on future market values for small wood, the balance could be increased or decreased (appendix A, table 1, provides a list of KV projects and estimated costs**)**.

Most of the costs for adding large wood to streams (about $304,400) will likely be funded by Forest Service appropriated dollars, KV dollars from previous sales, and cooperative grants with other entities; therefore, these costs were not included in this analysis. Some the costs associated with road decommissioning activities (about $8,600) were not included in this analysis because activity sites are located outside of areas that qualify for KV funds (areas greater than ¼-mile from commercial thinning unit boundaries). Likely funding sources for road decommissioning include funds from flood supplemental, road maintenance, and soil and water dollars.

Table 5**.** Estimated sale value, collections, KV project costs, and balance of Alternative 1, based on CCF dollars

Total sale value	NFF collections	Essential KV and KV mitigation projects	SSF collections	KV non-mitigation projects	Balance
$9,312,300	$2,793,690	$737,820	$3,061,250	$1,061,010	$1,658,530

Managing 5 to 20 year-old plantations (Dan Karnes)--About 2,106 acres between the ages of 5 and 20 years old have been precommercially thinned during the winter of 2001-2002 in the Lower Siuslaw planning area. In addition, about 1,854 acres will be precommercially thinned with this project. Based on stocking surveys, about 1,080 acres will not require thinning. Although many research projects have been initiated to study how stand management activities affect the development of late-successional forest conditions in older plantations, younger plantations have received little or no study. Anecdotal evidence suggests that initiating management activities that maintain species diversity and growth rates at a younger age will allow plantations to develop late-successional forest characteristics similar to older thinned stands, but more effectively and at earlier ages. Therefore, early silvicultural intervention in young plantations is expected to allow them to develop late-successional characteristics at earlier ages than older plantations.

About 15 to 20 feet is normally prescribed for spacing in this age class. Some trials have been done using wider spacing and may hold promise for the future. Sites thinned to very wide spacing (up to 30 feet) will generate dense brush development that may preclude future efforts to develop multiple canopies through underplanting. Across the landscape, however, widely spaced young plantations will add more diversity, and therefore, should be prescribed for occasionally.

Under Alternative 1, effects of managing stocking on young plantations are expected to:

- ⇨ Reduce stand densities to more closely mimic natural stand development in the project area.
- ⇨ Maintain or enhance growth rates for several decades, with effects lasting longer in the stands proposed for heavy thinning.
- ⇨ Increase species diversity because existing native hardwoods will be retained and shade-tolerant conifers will be emphasized over shade-intolerant species. Retaining a wide variety of species will also help accelerate the development of multistoried stands.
- ⇨ Enhance spatial diversity by retaining untreated clumps and stand openings. Variable distribution patterns will allow additional understory vegetation and structure to develop.
- ⇨ Develop high-quality snags and large woody debris sooner because high growth rates can be maintained for long periods, providing early recruitment of large-diameter material.
- ⇨ Increase stand resistance to major disturbances from insects, diseases, or other environmental factors by enhancing stand diversity.

When all actions are completed, the following effects of treatments on stocking can be expected:

- ⇨ The 1,854 acres of young stands, currently 5 to 20 years old, will contain about 80 to 200 trees per acre. These stands are primarily of Douglas-fir, but they will also contain a component of western hemlock, western redcedar, Sitka spruce and native hardwoods.

- ⇨ The 1,080 acres will not be thinned and will continue to develop as clumpy, understocked to dense stands. Although dominated by Douglas-fir, they contain a component of western hemlock, western redcedar, and native hardwoods.

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

Under Alternative 2 (no action), no commercial thinning will occur on 116 acres designated as matrix. About 4,951 acres will continue to develop as dense, single-storied Douglas-fir stands.

Plantations will continue to grow over time, but they will develop differently from existing stands that have achieved old-growth dimensions (Tappeiner et al. 1997). Trees will have less opportunity to express dominance because they all have equal growing space as a result of past vegetation management and some prior precommercial thinning. Competition will continue to increase between individuals as trees compete for limited resources, especially light. Trees will grow taller as they strive to obtain sufficient sunlight, but diameter growth will slow in response to loss of crown. As these trees become more dependent on neighboring trees for support they will become less stable. Trees will become more susceptible to insects, disease, and windthrow, and stand health will decline. When these trees fully occupy the available growing space, they will begin the stem-exclusion phase, which effectively prevents other trees from becoming established and starts killing the weaker trees in the stand (Oliver and Larson 1996). Mortality will increase dramatically as the intermediate and suppressed trees lose their ability to compete and die. These dead trees will increase snags and coarse woody debris, but they will be too small to be of high quality and are expected to decay rapidly. As understory vegetation continues to decline, bare mineral soil will become more prominent and some additional soil movement may be expected on steep slopes.

Because stands are fairly uniform, opportunities for establishing species or structural diversity through natural processes will remain low for many years, without major disturbance events. Eventually, over long periods, natural disturbance events will create openings in stands, allowing shade-tolerant species to become established in the understory, gradually creating additional structure and diversity. This alternative provides no opportunity to accelerate development of complex, mature forest conditions. Late-successional reserve objectives will likely be delayed for many decades in these stands and likely may never be reached until natural disturbance resets the vegetation succession cycle.

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

Similar results are predicted with the sample stand we analyzed previously with the ORGANON model **(**table 4). Those results indicate that:

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

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

Younger stands, 5 to 20 years of age, will continue to develop into dense, single-storied stands dominated by Douglas-fir. Many of these stands will enter the stem-exclusion phase at a much earlier age than do thinned stands. As these stands age, their development can be traced along the same pathway as the stand modeled and described above.

Terrestrial species (*Doug Middlebrook*)

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

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

Because the amount of existing mature forest will remain the same under Alternatives 1 and 2, we concluded that natural processes and functions will be the dominant forces in creating the structure and composition of late-successional habitat for wildlife in existing natural stands under both alternatives. Current levels of interior-forest habitat will also remain unchanged under Alternative 1 since removal of mature trees as hazards will be limited to areas along road corridors and adjacent to openings such as plantations. Based on the conclusions reached in the section discussing forest stand conditions, Alternative 1 will provide more acres with the tree sizes, densities, and stand characteristics associated with mature forests sooner than will Alternative 2. Alternative 1 will increase the amount of coarse wood, snags, and tree species diversity in plantations and hardwood-dominated riparian areas, resulting in attributes more like the structure and composition found in natural stands. However, the degree of utilization and function of these attributes remains uncertain in such young stands. Species responses are expected to vary, with potential increases in species richness and diversity, and a low potential for negative impacts to local wildlife populations.

Listed species--As required by the Endangered Species Act of 1973, as amended, a biological assessment (a project-file document) has been prepared for this project. This assessment evaluates and describes the potential effects of proposed actions on species listed--under the Endangered Species Act--that may be found on the Siuslaw National Forest. Formal consultation with the U.S. Fish and Wildlife Service (FWS) has been completed for activities that potentially remove habitat and cause nesting disturbance. (FWS reference 1-7-00-F-649, as extended; and FWS reference 1-7-02-F-422). Because the planning area is outside the range or contains no suitable habitat for the Oregon silverspot butterfly, brown pelican, Nelson’s sidalcea, western lily, or western snowy plover, none of the alternatives affect these species.

Bald eagle—Under Alternative 1, two known active nest sites occur in the project area. No project activities will occur within ¼-mile (½-mile line-of-sight) of known nests. Thus, project activities will have no effect due to disturbance of known nesting eagles. Since no suitable habitat will be removed, the project will have no effect on bald eagle suitable habitat.

Thinning operations will occur on about 1,000 acres within ¼-mile of suitable unsurveyed habitat (suitable habitat is described as mature stands occurring within 1 mile of a major river or ½-mile of a major tributary) during the nesting season, but the potential for undetected nest sites in the project area is low. Therefore, the noise associated with management activities related to commercial thinning within ¼-mile (½-mile line-of-sight) of suitable habitat may affect, but is not likely to adversely affect bald eagles.

Alternative 2 would not implement any of the proposed actions listed under Alternative 1. This alternative would not affect nesting eagles due to disturbance. Short-term disturbance impacts to eagles would be avoided. Long-term benefits, including accelerating growth and development of 1,000 acres of future nesting habitat, (stands within 1 mile of major rivers or ½-mile from major tributaries), would not occur.

Northern spotted owl—Under Alternative 1, changing canopy cover, or altering snag or coarse wood composition has the potential to modify forest habitats that support spotted owls. The plantations evaluated for thinning are not considered suitable nesting, roosting, or foraging habitat for northern spotted owls. Thus, commercial thinning will have no effect on spotted owl suitable habitat. Commercial thinning may affect critical habitat, but since no loss of primary constituent elements is expected to occur, impacts are expected to be relatively minor.
Stands proposed for commercial thinning are considered dispersal habitat. Treatments that reduce canopy closures to less than 40% over an entire stand where trees average greater than 11 inches diameter at breast height (DBH) are expected to remove owl dispersal habitat. Currently, all quarter townships in the analysis area maintain at least a minimum of 50% federal acres in dispersal habitat.

Based on data obtained from stands thinned in the Oregon Coast Range (Forest Vegetation Simulator model), post-treatment canopy cover for stands 30 to 50 years old remains above 40% until trees per acre (TPA) densities fall below 45, 40, and 35 TPA for 30, 40, and 50 year-old stands, respectively. Since the action alternative proposes 50, 70, and 90 TPA prescriptions for tree density retention and all treatments will retain more trees and canopy closure than the lower thresholds described above, no loss of dispersal habitat is expected. Several stands proposed for treatment are less than 30 years old, but treatments are still expected to retain dispersal habitat in these stands due to the time lag between completion of this report and implementation of thinning. Thus, Alternative 1 is expected to have no effect on spotted owl dispersal habitat, and dispersal habitat in all quarter townships is expected to remain above 50% after thinning.

Mature stands occur adjacent to plantations proposed for commercial thinning and along open roads, thereby creating the potential for cutting some mature trees that become hazard trees when used for anchoring a log-yarder tower or to secure open roads. Occupational Safety and Health Administration (OSHA) standards require that an overhead hazard must be removed, which means felling a tree if it is tall enough to reach the yarder if the tree were to be pulled over. An estimated 65 landings associated with commercial thinning are adjacent to mature trees which may require use as guy-line trees since there may be no alternative guy-line trees available (i.e. adequate-sized plantation trees) are available. An estimated 95 mature trees may be felled to meet safety requirements at landings, of which an estimated 3 to 5 trees may have suitable owl nesting structure.

Project design criteria will be applied to minimize felling of mature trees and suitable nest trees, including no felling of known nest trees, felling of suitable nest trees as a last resort, and no felling of suitable nest trees during the nesting season. Due to the location of guy-line and other hazard trees (along an edge, adjacent to road corridors) use of such trees for spotted owl nesting is less likely. However, the possibility exists that a potential active nest tree not known to be active could be felled outside the nesting season. Therefore, felling of mature guy-line trees and other hazard trees may affect, and is likely to adversely affect spotted owls. Felling hazard trees may affect critical habitat; however, since these trees are scattered throughout the watershed, felling these trees is not expected to alter the function of critical habitat. Short-term effects of Alternative 1 on spotted owl suitable and designated critical habitat are summarized in table 6.

Actions implemented during the critical portion of the owl nesting season (March 1 through July 7) may affect, and are likely to adversely affect nesting owls due to disturbance if they create noise above ambient levels within 0.25 mile (depending on the type of action) of known nest sites, activity centers, or suitable habitat that has not been surveyed. Activities generating noise above ambient levels and occurring within 0.25 mile of unsurveyed suitable habitat or an active nest site during the non-critical portion of the nesting season (July 8 through September 30) may affect, but are not likely to adversely affect nesting owls. Activities occurring outside the owl nesting period (October 1 through February 28) will have no effect on nesting owls. Thinning and associated actions as well as other project actions were considered in making these evaluations.

No thinning or associated actions (including road reopening and building and log hauling) are scheduled to occur during the critical portion of the owl-nesting season (March 1 through July 7). About 1,876 acres of commercial thinning and associated actions (including road reopening and building and log hauling) are scheduled during the latter portion of the nesting season (July 8 through September 30). Actions during this period may affect, but are not likely to adversely affect nesting owls due to noise-associated disturbances. The remainder of proposed commercial thinning (1,831 acres) will occur outside the owl-nesting period, and therefore, will have no effect on nesting owls. The effects on owls from noise-associated disturbance during management activities associated with the proposed action are summarized in table 7.

Under Alternative 2, managed stands in the project area would develop much more slowly without further silvicultural management (Bailey and Tappenier 1998). Typical attributes of spotted owl critical habitat, such as a multi-layered, multi-species canopy with large overstory trees, large trees with deformities, large snags, accumulations of coarse woody debris, and open flying space below the canopy, are absent in these stands and development of such characteristics would be delayed without treatment. Without treatment, managed stands would continue to provide some dispersal cover and marginal foraging habitat; however, the above-mentioned attributes typical of nesting and roosting habitat would take much longer to develop than under Alternative 1.

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

Marbled murrelet—Under Alternative 1, all plantations proposed for commercial thinning contain trees less than one-half the height of a potential site tree (less than 130 feet). Therefore, all plantations proposed for commercial thinning are outside the definition of critical murrelet habitat and proposed thinning treatments are expected to have no effect on marbled murrelet critical habitat.

Suitable habitat for murrelets is described as conifer and mixed mature conifer/alder habitats that are 80 years old or older and generally have trees greater than or equal to 18 inches dbh. All stands proposed for commercial thinning are less than 80 years old and 18 inches dbh, and do not meet the definition of suitable habitat. Therefore, proposed commercial thinning treatments will have no effect on murrelet suitable habitat.

Eliminating the hazards associated with using mature trees as guy-line anchors, has the potential to remove suitable habitat. An estimated 95 mature trees will be removed to provide safety adjacent to log-yarder towers. Of these, an estimated 10 trees containing suitable habitat may be removed. Project design criteria, such as involving a wildlife biologist in tree selection and avoiding the use of trees with suitable nesting structure where possible would be applied. However, there is potential for suitable nest trees to be felled outside the nesting season. Therefore, this activity may affect, and is likely to adversely affect, murrelet suitable habitat.

Noise from project actions could disturb nesting activities on adjacent occupied habitat if conducted during the nesting season. No road-related activities, commercial thinning, or log hauling—where these activities are considered above ambient noise levels—will occur within ¼-mile of known occupied murrelet sites during the critical portion of the nesting season (April 1 through August 5). About 1,277 acres of commercial thinning will occur within ¼-mile of unsurveyed suitable habitat during the critical portion of the nesting season. These activities may affect, and are likely to adversely affect nesting murrelets due to noise-associated disturbance. Thinning and associated activities scheduled to occur on about 599 acres during the non-critical portion of the nesting season (August 6 through September 15) may affect, but are not likely to adversely affect nesting murrelets. The remainder of commercial thinning (1,831 acres) occurs outside the nesting season, and thus, will have no effect on nesting murrelets. Effects on marbled murrelet suitable and designated critical habitat are summarized in table 6. The effects on marbled murrelets from noise-associated disturbance associated with Alternative 1 are shown in table 7.

Under Alternative 2, large trees with old-growth structural characteristics, such as large diameter mossy limbs in the lower 2/3 of trees, are not likely to develop under dense stocking conditions (Franklin et al. 2001). Stands not thinned will continue on current developmental trajectories that are highly likely to delay transition to suitable habitat, thereby delaying recovery of local populations. Since no actions would be implemented, there would be no noise-associated disturbance to nesting murrelets.

Table 6. Effects of Alternative 1 commercial thinning on northern spotted owl and marbled murrelet habitat

Activity	Effects to suitable habitat	Effects to critical habitat
Commercial thinning (3,707 acres)		
Spotted owl	NE	NE
Murrelet	NE	NE
Felling hazard trees without nesting structure (estimated at 85 mature trees)		
Spotted owl	MA-NLAA	MA
Murrelet	MA-NLAA	MA
Felling hazard trees with nesting structure (estimated at 3 to 5 trees for owls, 10 trees for murrelets)		
Spotted owl	MA-LAA	MA
Murrelet	MA-LAA	MA

MA-NLAA: May affect, but not likely to adversely affect. NE: No effect
MA-LAA: May affect and likely to adversely affect. MA: May affect

Table 7. Effects on northern spotted owls and marbled murrelets from noise disturbance associated with Alternative 1 commercial thinning

Breeding period*	Oct 1-Feb 28	March 1 to July 7	July 8 to August 5	August 6 to Sept. 30
Combined thinning actions (acres)	1831	0	1277	599
Spotted owl	NE	MA-LAA	MA-NLAA	MA-NLAA
Murrelet	NE	MA-LAA	MA-LAA	MA-NLAA

MA-NLAA: May affect, but not likely to adversely affect. NE: No effect.
MA-LAA: May affect and likely to adversely affect.

*Although nesting dates for murrelets and spotted owls differ, season dates were combined to simplify effects determinations

A summary of estimated noise-associated disturbance effects on owls and murrelets for proposed actions under Alternative 1 are shown in table 8 along with activity quantities.

Table 8. Effects on northern spotted owls and marbled murrelets from noise disturbance associated with other activities under Alternative 1

Activity	Operating period and effects determination for disturbance			
	March 1 to July 7	July 8 to August 5	August 6 to Sept. 30	Oct. 1 to Feb. 28
Spotted Owl	MA-LAA	MA-NLAA	MA-NLAA	NE
Marbled Murrelet	MA-LAA	MA-LAA	MA-NLAA	NE
Precommercial thinning (acres)	0	0	0	1,854
Felling mature hazard trees, without nesting structure (tree number)	0	25	30	30
Felling mature hazard trees, with murrelet structure (tree number)	0	0	0	10
Felling mature hazard trees, with owl structure (tree number)	0	0	0	3 to 5
Upland tree planting and release (acres)	185	0	0	284
Upland tree planting (acres)	0	0	0	242
Noxious weed control (acres)	0	100	297	0
Snag creation, plantation trees (number)	0	0	0	3,554
Snag creation, mature trees (number)	0	0	0	230
Coarse wood creation (tree number)	0	0	0	11,557
Early seral creation and maintenance (acres)	0	0	55	0
Sidecast pullback (cubic yards)	0	0	4,932	0
Fuels reduction treatments (acres)	39	0	0	144
Plantation underburning (acres)	64	0	0	0

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

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

Pacific shrew—This species is known to occur on the Forest and habitat elements appear to be suitable in the project area. Habitats include riparian habitat adjacent to or in forested areas. Important habitat elements include large down logs. By adding coarse wood (down logs) and not removing existing down logs in commercially thinned plantations, Alternative 1 is expected to enhance habitat for Pacific shrews. No adverse effects on local populations of Pacific shrews are expected under Alternative 1. Alternative 2 will have no effects on Pacific shrews or their habitat.

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

Actions that remove habitat, alter microclimates, and introduce siltation to streams are detrimental to this salamander. By extending no-cut buffers adjacent to streams beyond the expected distribution of this species (within 10 feet of streams), maintaining existing habitat, and avoiding siltation of streams, no adverse effects on torrent salamanders are expected. Alternative 2 will have no effect on this species.

Pacific fringe-tailed bat--Christy and West (1993) describe fringe-tailed bats as using caves, mines, and buildings for hibernation, maternity, and solitary roosts. None of these structures will be affected by either alternative. They feed predominately on moths along forest edges, roads, or open areas in the forest. Guenther and Kucera (1978) stated this species uses, but is not dependent upon snags and down material. Under Alternative 1, proposed thinning treatments are expected to benefit this species by opening canopies, thereby improving forage habitat. Creating snags in plantations and adjacent mature stands is also expected to benefit fringe-tailed bats. Alternative 2 will have no effect on this species.

Land birds--Land birds, including migrant and resident species such as warblers, thrushes, and flycatchers, are those that generally use terrestrial and wetland habitats. The project area contains habitats these species use such as forest canopies, snags, understory vegetation and structure, and existing openings.

When comparing land-bird use in thinned versus unthinned young stands, studies have shown a variety of responses, ranging from dramatic increases for some species to decreases for others (Hayes 2001, Hagar 1999, Hagar and Howlin 2001). According to research, no bird species endemic to the Oregon Coast Range is unique to closed-canopy stands with limited understory development (Hayes et al. 1997). In a study exploring the effects of thinning on wildlife in the Oregon Cascades, Hagar and Howlin (2001) report that songbird species richness and diversity increased after thinning relative to controls, and no species were “lost” after treatment. Thus, we expect thinning to increase the numbers and kinds of land-birds that use managed stands.

There is potential for physical disruption of land-bird nesting by commercial thinning operations conducted during the breeding season. By scheduling thinning operations to the period after July 7, a large portion of the land-bird nesting season will be avoided, and a majority of thinning (67%) will occur after nesting is completed (August) or outside the nesting season for most species (USDA 1992). For these reasons, the project is not expected to adversely affect local populations of land birds through nesting disturbance.

Opening young, dense stands in close proximity to pasture and farmlands may increase the incidence of nest parasitism from brown-headed cowbirds (Hagar and Howlin 2001). Commercial thinning prescriptions for plantation stands 134 and 226 will bring residual tree densities down to 50 trees per acre. Since these would be the most open stands closest to pasture lands, treatments may increase the potential for cowbird parasitism. Because the affected areas only total 56 acres and tree crowns will close relatively rapidly, minor, adverse effects on local populations may occur, but are expected to be short-lived.

Because no species are expected to be completely displaced from stands by thinning, the amount of habitat affected is relatively small, and thinning operations will be scheduled late in the nesting season or outside the nesting season, local populations of land birds are not expected to be adversely affected by Alternative 1 and no intentional take of migratory birds is expected.

Proposed treatments under Alternative 1 are expected to benefit species dependent upon more open stands as well as stands with more developed understories. Thinning will increase these habitat conditions on about 3,700 acres of plantations now ranging from 25 to 51 years old. Foraging opportunities for cavity nesters are expected to benefit by creating over 3,700 snags in the project area. Long-term benefits for species relying on mature conifer habitat are expected since treatments will lessen the time it takes for stands to acquire mature characteristics.

Under Alternative 2, dense young forests will continue to limit the number and species of land birds that use them.

Survey-and-manage animal species--Standards and guidelines in the Northwest Forest Plan (USDA, USDI 1994) require surveys for certain species of rare plants and animals before ground disturbing activities are conducted. Wildlife subject to survey-and-manage status on the Mapleton Ranger District portion of the Siuslaw National Forest, is limited to the red tree vole (*Phenacomys longicaudus*).

According to the Survey Protocol for the Red Tree Vole, Version 2.0 (USDA, USDI 2000), surveys must be conducted for this species before ground-disturbing activities can occur if the average stand diameter is greater than 16 inches or the average stand diameter is between 10 and 16 inches and contains any remnant conifers greater than or equal to 21 inches. Only stand 103 contains an average stand diameter greater than 16 inches. This stand was surveyed to protocol and no active or inactive red tree vole nests were found.

By not thinning under Alternative 2, no effects on these species are expected.

Management-indicator species—Management-indicator species on the Siuslaw National Forest were primarily selected to monitor the effects of annually harvesting 4,500 acres of natural, mature stands through regeneration harvests. This reflected the projected activities described by the Siuslaw Forest Plan (1990) prior to it being amended by the Northwest Forest Plan in 1994. Between 1990 and 1994, an average of about 1,300 acres of natural stands were harvested per year. Since 1994, no natural conifer stands have been harvested. There were no species selected to monitor the effects of commercial thinning.

Marten, spotted owl, pileated woodpecker, and the primary cavity nesters were selected as indicator species because they are associated with habitat conditions of late-successional and mature forests, such as multiple-storied stands containing large mature trees, defective trees, large snags, and down wood. Ruffed grouse were selected as indicator species because they are associated with the habitat conditions of hardwood and conifer-hardwood mixed stands. On the Siuslaw, these habitat conditions are found in natural, mature stands throughout the Forest. In the Lower Siuslaw planning area, there are about 20,950 acres of mature conifer stands and about

8,460 acres of hardwood and conifer-hardwood mixed stands. Plantations proposed for commercial thinning contain relatively small trees, are single-storied stands, and have few snags or down wood. They are composed primarily of Douglas-fir and western hemlock. Hardwoods are primarily associated with the adjacent riparian areas.

With the exception of felling large trees to remove hazards from roadsides or logging operations (guy-line trees), activities under Alternative 1 occur outside suitable habitat for martens, spotted owls, and pileated woodpeckers, and are not expected to have adverse effects on local populations or habitats. Thinning is expected to benefit these species in the long-term by speeding the development of mature forest conditions.

Felling roadside hazard and guy-line trees for safety will occur along edges of mature stands, but since most logs will remain onsite, the additional down coarse wood created by Alternative 1 is expected to benefit martens as potential den habitat and pileated woodpeckers as forage habitat. Loss of potential pileated woodpecker nest trees may occur, but creation of snags in mature stands is expected to mitigate this loss. Impacts to spotted owls are discussed under the *Listed Species* section.

Thinning would remove stems that would otherwise become snags through the stem-exclusion process. Such snags, however, would be very small in diameter, thereby minimizing the potential for nesting use by primary cavity nesters. Snag creation in plantations and adjacent mature stands will increase the number of available larger snags. Commercial thinning is expected to accelerate tree growth and long-term development of larger snags for primary cavity nesters.

Under Alternative 2, no short-term adverse effects will occur. However, it will take longer to develop mature forest characteristics in plantations, thereby delaying the development of habitat that is preferred by all MIS species except ruffed grouse. Alternative 2 is expected to have no effects on ruffed grouse.

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

The botanist also evaluated the effects of proposed activities to survey-and-manage fungi, lichens, bryophytes and vascular plant species. There are eight known sites of current survey-and manage-species (USDA, USDI 2001) in the project area, one fungi, one bryophyte, and six lichens. One lichen site for *Ramalina thrausta* (category A) is recorded in a CVS plot immediately adjacent to stand 155 in the Hadsall subwatershed which is proposed for commercial thinning. Design criteria requiring a 300-foot buffer from the plot perimeter is expected to provide sufficient protection for the species and retain options for future management of the site. All other previously recorded sites in the project area are located far from proposed activities and will not require any protective measures.

Potential habitat exists in the project area for eight survey-and-manage species requiring pre-disturbance surveys (categories A and C). Surveys were conducted for these species during the fall of 2001. None of these species were found in areas affected by terrestrial restoration actions.

Noxious and undesirable weeds (*Forest Botanist*)--Ground disturbing activities which result in exposed mineral soil on sites with moderate to full sunlight exposure, greatly increase the potential for noxious or undesirable weed colonization and establishment. Thinning prescriptions that leave residual stand densities of 60 to 100 trees per acre generally provide adequate canopy cover to prevent most noxious and undesirable weeds from colonizing. Under Alternative 1, building new temporary roads, reopening temporary roads, removing and depositing sidecast waste material, using landings with fan-shaped settings, creating early-seral areas, using ground-based yarding systems, and prescribing 50 trees per acre for some commercial thinning stands, increase the potential for weed colonization and establishment. Stands accessed by road systems that support moderate to high weed populations are at greater risk of weed colonization and establishment.

Based on information gathered from a summer 2001 noxious weed survey for the Lower Siuslaw watershed, the Forest noxious weed coordinator evaluated the potential for weed colonization of disturbed sites as a result of project actions. The proximity of known weed infestations and seed sources for each commercial thinning unit were also evaluated. Fifty-four (54) proposed harvest units were rated at low risk to weed colonization, 36 units rated moderate risk, and 12 units rated as a high risk. Established weed species in the project vicinity that are expected to colonize at least some of the areas include Scot's broom (*Cytisus scoparius*), Himalaya berry (*Rubus procerus*), evergreen blackberry (*Rubus lacinatus*), bull thistle (*Circium vulgare*), and tansy ragwort (*Senecio jacobaea*).

Preventive measures in appendix A are expected to provide adequate resistance to noxious weed colonization over the majority of the project area. Colonization of disturbed sites by noxious weeds is anticipated in some specific areas of the project, primarily in moderate and high risk units located in subwatersheds with well-established weed populations adjacent to roads. As a result of project activities, weed colonization and establishment is likely to occur on about 397 acres unless remedial action is taken. The KV plan includes high-priority funding for controlling the spread of weeds onto these acres because noxious weed control is deemed to be mitigation. An "early treatment" vegetation management strategy will be implemented, using a single application of manual, mechanical, or biological control methods to provide sufficient control of weeds to allow desirable species to occupy disturbed areas.

In summary, by following preventive measures in the appendix A, the risk of noxious weed infestation on disturbed areas should be reduced to acceptable levels over most of the project area. By monitoring the effectiveness of preventative 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, we expect noxious weed infestation to decline in the project area as tree-crown cover increases.

Sediment production (*Johan Hogervorst*)

In a study of sediment production from forest roads in western Washington, Reid and Dunne (1984) found that road-use intensity directly affected the volume of fine sediment eroded from road surfaces. Road use is compared to sediment production in table 9 (modified from Reid and Dunne's table 4). These authors attribute the sediment yield associated with paved roads to cut bank and ditch erosion. Soils in the Lower Siuslaw watershed are generally similar to those of Reid and Dunne's study area, as are road conditions.

Table 9. Average sediment yields from road use

Road type and amount of use	Sediment yield, tons/mile/year
Heavy use (more than 4 log trucks per day)	887.4
Moderate use (1-4 log trucks per day)	74.6
Light use (no log trucks)	6.8
Paved	3.5
Abandoned (no vehicle use)	0.90

Luce and Black (1999) reported that sediment production from forest roads in the Oregon Coast Range varies with foundation soil characteristics. They also found that vegetated drainage ditches and cut slopes reduced sediment production by about 7 times compared with cut slopes and ditches cleared of vegetation by road maintenance. Their findings indicate that actual sediment yields are likely to vary from yields estimated by predictive models such as used in table 9 (Reid and Dunne 1984).

Duncan et al. (1987) cite studies of road-surface sediment routing in large western Oregon and Washington watersheds that determined 20% of the road runoff points (ditch relief culverts) discharged onto the forest floor, and 80% emptied into stream systems. Of those stream-entry drainage points, 88% entered first- or second-order channels, and 13% emptied into year-round watercourses. Duncan et al. also found that at least 55% of all road surface erosion was deposited between 311 and 410 feet from the entry point. They found that the finer sediment fraction tended to move farther from the entry point than did coarse sediment, and that lower stream gradients and large woody material in the channel more effectively trapped and held sediments than did other configurations.

About 85 percent of roads in the project area were built before 1975 when sidecast road-building techniques were used. Road assessments (USDA 1997b) and general reconnaissance in the project area reveal that these outside fills have settled, cracked, and often have slid into streams below after being saturated during large storms, especially where woody debris was incorporated into the original fill. Many other locations have settled to a position that may or may not fail over time. Sidecast-built roads on mid-slopes and crossing headwall areas at the tops of stream channels have the highest risk of settling, cracking, and failure directly into streams (USDA 1980).

In response to excessive road failures on the Mapleton District in the 1970s, both Forest Service and research personnel conducted several landslide assessments and studies. The Smith River Watershed Analysis (USDA 1997c) gives a good summary of slides mapped on the Mapleton District between 1972 and 1984, including the work of Swanson et al. (1977), Ketcheson and Froehlich (1978), and a staff report on the Mapleton District (USDA 1980)--all documenting the effect of road-related slides. Based on the surveys from 1972 to 1984, road-related slides on the Mapleton District ranged from 200 to 900 cubic yards per slide, and when these slides result in a debris torrent, the volume of materials may increase from five to 10 times as slide material scours the channel for the length of its run-out track (USDA 1980).

Table 10 provides unstable sidecast information (number of sites and associated fill volume) by subwatershed based on road reconnaissance in the project area. Based on a five to 10 times increase in this volume during failure, these sites could deliver 25,000 to 50,000 cubic yards of fine sediment to streams. This equates to about 2,500 to 5,000 10-yard dump truck loads that could enter streams in the next 15 to 20 years.

Table 10. Temporary road unstable sidecast with high failure potential

Subwatershed	Number of sites and cubic yards
Berkshire	0
Cedar	(15) 2,237
Divide	(3) 320
Hadsall	0
Hand	(3) 340
Hoffman	(3) 330
Hood	0
Knowles	0
Lawson	0
Lower Sweet	(1) 70
Siboco	0
Thompson	(8) 1,065
Upper Divide	(2) 150
Upper Knowles	0
Walker	(3) 420
Total	**(38) 4,932**

Alternative 1 effects on sediment production

The potential sources of sediment that would affect watersheds include log hauling on existing and reopened roads, reopening unclassified roads that are cracking and settling, and logging operations that occur near sensitive headwalls and slumps. Sediment created by these activities has potential to impact fish-bearing streams. Design criteria (appendix A) for these activities avoid or substantially reduce sediment. Therefore, we expect sediment and turbidity produced by these activities to be minor and short-term.

Road reopening and temporary road building—About 0.8 miles of new temporary road construction is planned under Alternative 1. Based on past observations, soil erodes for 2 or 3 years after roads are built, transporting small volumes of sediment beyond the construction limits, particularly during rainstorms. This material usually stops moving within 50 to 100 feet of the fill-slope. Beyond that point, the transporting water disappears into the porous forest floor (Bilby et al. 1989). Thus, because all proposed new temporary roads are on ridge tops more than 100 feet from stream channels, no road-building sediment is expected to reach a stream.

About 17.9 miles of unclassified road would be temporarily reopened to access plantations for commercial thinning. There are risks to both reopening these roads and leaving them in their current state. Reopening some of these old roads would allow us to identify and repair residual road-related problems that could cause landslides. However, when roads are cleared and reopened, existing cracks are bladed over with machinery making them difficult to monitor. In addition, tree removal in the road prism may decrease root strength in sidecast areas and increase direct rainfall onto unstable sites. Thus, there is a risk that some areas may become unstable after temporary use, while other potential failures can be avoided through repair.

At this time, we do not know the difference in sediment yield between leaving unstable sites and reopening and repairing the apparent problems. Specialists have made on-the-ground decisions case-by-case, choosing the options with lowest risk to aquatic resources.

To mitigate effects from road reopening, waste from mid-slope roadbeds would be removed from portions of roads to be reopened in units to avoid failure into streams below. This would be accomplished under the timber-sale contract provision called “critical construction” (map 2). In addition, KV funds would be collected to treat potentially unstable sidecast areas in units after the sale is completed (see table 10 for quantities of material to be removed by subwatershed). These mitigations are expected to reduce the existing risks of slides associated with past sidecast road building.

Unclassified roads not used—In the no-treatment and pre-commercial thinning units of the project area, there are about 8.3 miles of existing unclassified road that will not be reopened for use (map 3). Table 11 provides a summary of these roads. In addition, there are 6.2 miles of existing unclassified roads identified in commercial thinning units that are too unstable to risk reopening. Where these roads occur, harvesting will either be limited to helicopter or the roads will not be needed for skyline harvest systems.

Of the 14.5 miles of unclassified road that will not be reopened in the project area, an estimated 5.6 miles could be considered highly unstable, containing either stream crossings or sidecast that could fail over the next few decades. Actual field assessment and measurement of unstable road segments in the project area revealed that these highly unstable roads average 12 unstable sites per mile, including an average of 1,425 cubic yards of sediment per mile that could affect streams. We currently do not have the ability to predict how many of these sites will fail but can only describe them as high-risk sites left over from the past 40 years of management in the watershed. Based on a 10% site-failure rate, highly unstable roads that will not be reopened under Alternative 1 would contribute an estimated 803 cubic yards to streams in the next decade. However, most unstable sites have already failed over the last 40 years, and many others have slumped and cracked to a stable position. Consequently, a 10% failure rate may be an overestimate for the next decade.

Research has clearly shown that failure rates from unstable roads are highly correlated to storm intensity in the Oregon Coast Range (Skaugset et al. 1996, Wong 1991, and USDA 1980). A study of landslides after the flood of February 1996 revealed that 51 of 200 slides (25%) found in this watershed were road-related (USDA, 1997a). Subwatersheds with the most miles of highly unstable road include Cedar (4.0), Hand (0.6), Hoffman (0.4), and Divide (0.4). Cedar, Hand, and Hoffman have the bulk of the Frieda Storm (1962) salvage areas, which contain both higher road densities and roads that were built quickly to accommodate large-scale salvage efforts. As a result, there is a concentration of road problems in these subwatersheds and consequently, sediment entering streams is higher here than in other subwatersheds.

Table 11. Miles of unclassified roads in managed stands that will not be reopened

Management type	Total unclassified miles not reopened	Miles of highly unstable road	Unstable percent of total	Estimated unstable material (cu yds.)*	Estimated delivery next decade (10%)+
Non-commercial thinning	1.4	0	0%	0	0
Late noncom. thinning	4.1	2.1	51%	2,995	300
No treatment	2.8	0.6	21%	885	89
Commercial thin stands, helicopter	4.5	2.4	52%	3,420	342
Roads unneeded in commercial thin stands	1.7	0.5	29%	715	72
Totals	**14.5**	**5.6**	**37%**	**8,015**	**803**

*Based on average of 1,425 cubic yards/mile taken from sample of high-risk roads in project area.
+Highly dependent on storms received during next decade.

Log hauling adjacent to streams--Hauling logs on existing and temporary roads can potentially add fine sediment to the road drainage network that can in turn make its way into the natural watershed drainage if culverts are connected to natural stream courses. Two of the biggest factors causing sediment production from log hauling include hauling during the wet season, and hauling adjacent to streams (e.g., mid-slope and valley-bottom roads). Along with these factors, poorly maintained road surfaces (aggregate or native surface), and the number of truckloads on a given road per day—especially more than four per day (table 9)—can add sediment to streams.

Roads with high risk of sediment production were identified for this project and season of haul will be limited to the summer or late summer (from July 8 to October 15) operating seasons. Sediment production will also be mitigated by adding rock to road surfaces, monitoring road conditions, temporarily suspending log hauling operations if needed to avoid sedimentation, and placing sediment-containment devices in ditches if sediment continues (appendix A). Because of these mitigating actions, sedimentation of streams is expected to be in the moderate-use level shown in table 9.

County Road 5110 (Thompson Creek Road) and the south end of road 4800-831 both lie adjacent to fish bearing streams. Hauling on these roads has high potential to introduce fine sediment during winter haul. Consequently, winter haul will not be allowed on County Road 5110, and if winter haul occurs on 4800-831, stream crossings will be rocked on either side to prevent sediment from entering the stream. By incorporating these measures into the project design, haul-related sediment delivered to streams will not likely exceed the moderate-use level shown in table 9.

Commercial thinning in plantations--Based on past observations in plantations that were commercially thinned, Siuslaw National Forest geologists, hydrologists, and fish biologists found that stream buffers, logging slash accumulation on the ground, and the lack of overland flow in the Oregon Coast Range, are effective in keeping sediment from commercially thinned plantations from measurably affecting streams. Steep slopes at the top of stream channels (headwalls) are by far the largest sediment risk due to the potential for slope failure at these sites.

Siuslaw National Forest resource staff conducted field reviews in March 2002 on plantations that were commercially thinned on the Siuslaw National Forest—some in the 1980's, most in the 1990's. The review focused on slopes that exceed 70% to determine if commercial thinning causes any landslides. Using a geographical information systems (GIS) topographical overlay, 44 out of 144 plantations were determined to contain slopes greater than 70%. Based on the reviews of these plantations, one landslide was detected inside a plantation (Cataract Thin) that appeared to originate from a road. Another slide was found in a plantation (Blue Bird Thin), but was contained in a buffer and did not appear to be caused by the thinning action. Thus, based on these reviews, commercial thinning does not appear to accelerate the natural rate of landsliding on steep slopes in plantations in the central Oregon coast range.

To avoid or minimize stream sedimentation, headwall areas and stream channels (intermittent and perennial) would be protected with no-harvest buffers, trees would be directionally felled and yarded away from them, and logs would be fully suspended above them during yarding. In some locations, there will be trees that cannot be fully suspended over the intermittent streams. Observations made during past thinning projects indicate that there is little, if any, impact from yarding across intermittent streams when whole-tree yarding (tops dragging across the ground) is used. The tops act like a large broom and do not normally cause soil disturbance. Because these intermittent channels are well above streams that contain anadromous fish habitat, we do not expect whole-tree yarding to affect anadromous fish habitat.

Although some incidental impact may occur from log yarding near headwalls, we expect this impact to be minimal because of buffers or requirements for log suspension. There is potential for some sediment movement in the unit from yarding that occurs at the toe of large benches associated with earth-flow slump terrain where there is higher stream density and considerable water near the ground surface. All such areas would be excluded from yarding except those where we expect minimal levels of sediment movement to occur. By implementing project design criteria (appendix A), we do not expect sediment caused by yarding to measurably affect streams and fish habitat.

Alternative 2 (No Action) will have the following effects on sediment production:

- Sediment would continue to be produced from existing classified and unclassified roads in the Lower Siuslaw planning area, including classified roads that are not maintained (2/3 of the road system) and maintained classified roads (1/3 of the road system, including all ATM roads) throughout the watershed;
- It is expected that with large storms over the next 10 to 20 years, old roads in the Lower Siuslaw planning area will continue to deliver up to 50,000 cubic yards or 4,000 dump truck loads of sediment to streams as sidecast and abandoned culverts fail along these roads;
- At least 14 culverts, containing about 2, 475 cubic yards (250 dump-truck loads) of associated fills, will be left in the watershed as potential sediment sources over the long term (table 10);
- No log hauling from Forest Service will occur adjacent to streams or stream crossings. Consequently, potential sediment delivery and resultant short-term turbidity due to hauling on these roads would not occur; and

- Little change from background levels of sediment coming off older plantations is expected in the absence of harvest activities.

Soil productivity (*Johan Hogervorst*)

Past timber harvesting in the Lower Siuslaw planning area has resulted in the creation of many old roads and log landings where soil compaction and displacement (removal of topsoil) have altered soil productivity. Typically, soils in this area are compacted by heavy equipment and use by other vehicles or by rock surfacing placed in these areas to facilitate winter use. Soils that were once porous and easily penetrated by water are now susceptible to overland flow and surface erosion. Where topsoil has been removed or excessively compacted, only shrubs, alders, and undersized conifers will grow. Froehlich et al. (1985) and Wert and Thomas (1981) found slow rates of natural recovery of compacted soil restricted primarily to the top 6 inches. Wert and Thomas (1981) observed that heavy compaction persisted at the 8- and 10-inch depths.

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

Table 12 shows the results of a study done by Hogervorst (1994) in a second-growth Douglas-fir thinning stand in the Oregon Coast Range where soil bulk density of both skid trails and undisturbed areas were measured with a nuclear densimeter. Skid trails showed a significant increase in soil strength in the top eight inches, representing loss of pore space and infiltration capacity. Dick et al. (1988) found a decrease in microbial activity in compacted soil and attributed it to decreases in porosity, air content, water infiltration, and saturated conductivity. They also determined that restriction of root growth was a factor, as the rhizosphere is known to promote microbial activity.

Table 12. Comparing soil bulk densities

Soil depth (inches)	Average undisturbed bulk density (g/cm^3)	Average skid trail bulk density (g/cm^3)	Percent difference
4	.89	1.05	18
8	.98	1.06	11
12	1.05	1.01	-3

Froehlich (1974) has found that ground-based logging equipment can cause compaction by a combination of tire and tread pressure, kneading action, vibration, and scarification and pressure from a turn of logs being skidded. Froehlich (1978) also found that the greatest increase in soil bulk density occurred in the first few trips, and then increased slowly in amount and depth with added number of trips up to 20.

Froehlich (1978), Kairiukstis and Sakunas (1989), and Zaborske (1989) have shown that a litter layer of logging slash on a skid trail may act as a buffer and reduce the amount and depth of compaction. Froehlich (1974) has documented severe breakdown of soil structure in high moisture conditions; and Steinbrenner (1955) found that when assessing soil compaction, one trip with a tractor under moist soil conditions was equivalent to four trips when soil was dry. Garland (1983) showed that compaction over a harvest unit can be greatly reduced by using tractors on slopes below 40% and by designating skid trails as opposed to letting equipment choose a different route each time. He also showed that with proper planning, the total management area compacted in roads, landings, and skid trails can be kept below 15% where tractors are used. In summary, factors that can help limit compaction where tractors are used include restricting operations to the dry season, using logging slash as a buffer between the tread and the ground, and designating log-skid trails.

Under Alternative 1, new soil compaction and displacement will be kept to a minimum by reusing log-haul roads and landings built during previous harvest activities, reusing and designating tractor skid trails, and restricting about half of the commercial thinning operations—including all tractor use—to the dry season.

Past log-haul roads and tractor main-skid logging trails can easily be relocated for reuse. Although the location of other (non main-skid) past skid trails in plantations is less obvious, designated skid trails spaced about 150 feet apart would be identified on the ground by a sale administrator prior to harvesting to limit the extent of tractor movement and corresponding soil damage. About 46 acres are planned for tractor harvest, affecting plantations 80, 118, 191, 240, 257, and 301. Based on a trail width of 12 feet and spacing of 150 feet, about 1.8 acres of possible compaction or displacement would be expected. Project design criteria will allow for temporarily stopping ground-based operations if summer rains cause rutting and puddling in skid trails. Specialists, in cooperation with the sale administrator, will determine need for stopping operations.

Aulerich et al. (1974) and Power (1974) have shown that skyline logging systems causes considerably less impacts to soil than ground-based (tractor) logging. In addition, skyline-logging systems substantially reduces the need for additional roads in units. About 2, 950 acres are planned for harvest using skyline-logging systems. By minimizing the number of new temporary roads used for harvesting plantations, about 0.8 miles of new temporary road will be built and located on stable ridgetops to access 13 plantations. Road lengths will range from 100 to 600 feet, and based on a 12-foot wide roadbed, about 1.3 acres will be compacted. Although these roads will be hydrologically stabilized and closed after use, they will remain compacted over the long term.

Based on restrictions that will limit soil compaction and displacement (appendix A) under Alternative 1 and past observations on similar projects, we expect soil displacement and compaction to increase in each plantation by no more than 5% where skyline-logging systems are used (about 2,948 acres), and by no more than 10% where tractor-logging systems are used (about 46 acres). After harvesting is completed, total soil displacement and compaction in each plantation is expected to be below 10% where skyline-logging systems are used and below 15% where tractor-logging systems are used. Therefore, effects on soil productivity are expected to be under the Siuslaw Forest Plan threshold of 15% in any given plantation proposed for commercial thinning.

Under Alternative 2 (no action), both soil compaction and soil displacement throughout the watershed would remain at current levels. Compacted conditions occur on existing roadways as well as older, unused roads; tractor skid trails; and landings in plantations scattered throughout the planning area. Similarly, displacement of soil is related to past logging and road building throughout the watershed where topsoil was removed. Smaller-sized conifers and an increased distribution of alder trees are typical side effects of compaction and removal of topsoil in these areas.

Fire (*Edward Garza*)

Based on Forest fire records since 1975, the Siuslaw National Forest has averaged 11 fires, burning about 35 acres a year. People caused about 95% of those fires; in other words, on this Forest, most fires are in accessible areas. Therefore, though commercial thinning may increase fuel loading, reduced access because of road closures is likely to reduce the risk of fire ignitions. Because the potential for fire ignition cannot be eliminated, however, the team is obligated to disclose the potential for wildfire as a result of an ignition in a commercial thinning unit.

In the Lower Siuslaw watershed, about 39 acres of commercial thinning units lie adjacent to and within 25 feet of ATM roads. Fuel treatments such as burning hand-piled slash will be done adjacent to and within 25 feet of these roads, after thinning operations are completed, to mitigate the potential for wildfire. About 144 acres of commercial thinning units adjacent to private property and within the wildland-urban interface pose an increased fire hazard. Burning hand-piled slash and/or broadcast underburning slash will be done after thinning to mitigate wildfire potential. Slash treatments are not expected to adversely affect the Eugene airshed, but it may cause some short-term localized negative effects to air quality.

Fire suppression equipment access will be maintained on some roads in the wildland-urban interface in case of fire emergency. Road-surface treatments include rolling dips and barricading road entrances with guardrails that can be removed if needed.

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 forests or range-lands across North America. Andrews' (1986) fire-behavior program (BEHAVE) predicts fire behavior characteristics such as fireline intensity, rates of spread, and resistance to control. Using these tools--along with local knowledge and weather variables from Cannibal Mountain--I expect thinning under Alternative 1 to have the following effects on fuels and the potential results from fire ignitions:

- ⇨ Commercial thinning in the managed stands will increase fuels on the forest floor, as will adding coarse woody debris gradually.
  - Fuels created from slash will result in the thinning units' falling under the light-slash fuel model (fuel model 11) in the light-to-moderate thinning units and the medium-slash fuel model (fuel model 12) in moderate to heavy thinning units.
  - The fuels are expected to decay over time, decreasing the risk of wildfires. Observations of past thinning have shown decomposition of the fine fuel component (needles and twigs) in 3 to 4 years. This period would be when the thinning slash could support a surface fire.

  - Leaving whole trees on the ground as coarse wood increases resistance to control by fire suppression resources beyond that for fine fuels.
- Fire behavior in thinning slash in late summer would create fireline intensities and flame lengths difficult for hand and engine crews to suppress safely and successfully by direct attack.
  - Roads and skid trails would be the primary control lines in indirect suppression, likely increasing the number of acres burned.
  - The late-successional reserve objective to limit the size of all wildfires in the reserve would be difficult to meet.
- Increased fireline intensity could increase the cumulative effects on other resources.
  - Soils could be damaged by burning off nutrients and organic matter and increase potential for overland flow.
  - The severity of any damage would be directly linked to the intensity of the fire.
- Increasing the number of thinned units in a given area increases the hazard with a larger area of contiguous fuels. Spotting from one thinned unit to another is likely, given the wind speed that would be expected on a high fire-danger day.

Alternative 2 will not change the current potential effects from fire ignitions. As roads continue to deteriorate, access to fires will continue to become more difficult.

Human uses and influences

Heritage resources (*Phyllis Steeves*)—A thorough literature search was conducted to determine if heritage resources (prehistoric or archaeological sites) are known to exist in the planning area, or have the potential to be adversely effected by proposed project activities. Included in the literature search were district site files, homestead records, land and cultural resource surveys, maps, land status atlas and local historical publications. In addition, resources provided by the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians and a documentation review of a joint Tribal-Forest survey indicated that no known sites will be impacted by proposed activities. 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.

The former Sunset Wagon Road located along the southern portion of the planning area has been documented, evaluated, and determined ineligible for the National Register by the State Historic Preservation Office (SHPO 1983) because it has been altered by natural and human actions prior to enactment of the National Historic Preservation Act.

Proposed activities such as commercial thinning, building or reopening temporary roads and landings, and underplanting conifers and hardwoods in existing plantations, are on previously disturbed sites and will not require field inventories, based on our 1995 Programmatic Agreement with the State Historic Preservation Office (appendix A, page 5**)** provides additional information about our agreement). Activities that will occur on previously undisturbed ground in defined high probability areas will require standard case-by-case review.

Recreation (*Don Large)*--The primary consequence of the proposed actions would be to change from motorized to nonmotorized access, a process already happening under the ATM system and road decommissioning across the Forest. The highest concentration of vehicle travel on the interior forest will continue to be associated with hunting seasons. Access to dispersed recreation sites such as the Sweet Creek trail will be maintained under both alternatives (appendix A, page 21). All existing trail systems will be maintained and two interpretive signs will be posted near trailheads.

Proposed actions are not expected to adversely affect fish habitat and subsequently, should not adversely affect recreational fishing. Alternative 2 is not expected to affect recreational fishing.

Scenery (Don Large)—Outside of the Siuslaw River-Highway 126 scenic corridor, the scenic-quality objective for the project area is maximum modification. Proposed actions are consistent the objective. Proposed thinning actions are expected to increase the scenic value of the planning area in the long term by restoring the landscape to a generally continuous (less fragmented) forest with mostly larger diameter trees. The existing scenery in the Siuslaw River corridor will not be affected because the proposed actions will be in areas not visible or not very noticeable from the Siuslaw River-Highway 126 scenic corridor.

Under Alternative 2, the landscape will continue to appear fragmented for a much longer duration as untreated plantations continue to develop at a slower natural rate.

Public and management access *(Ken McCall)*

Of the National Forest System (NFS) roads considered in this environmental assessment, about 55 miles are designated for primary or secondary long-term use under the Siuslaw National Forest Access and Travel Management Guide (USDA 1994). The guide outlined a system of primary and secondary forest roads and for both public and administrative access throughout the Siuslaw National Forest. Roads not designated as part of the ATM system were presumed to be project-specific and would be maintained with project funding and generally open only during projects. The figures include private land access roads on National Forest lands and National Forest access roads crossing private lands. The figures do not include State and County roads.

Alternative 1 will close about 63 miles and decommission about 14 miles of roads that are currently open to public travel although they are not regularly maintained and are waterbarred and growing closed. During periods of commercial thinning, some of these roads will be temporarily opened for equipment access unless specifically closed for public safety or resource protection during project activities. This short-term access will be eliminated following project work as these roads are closed or decommissioned. These short-term project roads will be physically blocked, stabilized, and allowed to grow closed until the next project entry. Some roads will be maintained for emergency fire access but will not be opened or maintained for public use. During periods of commercial thinning, timber hauling on ATM roads will increase in the project area, requiring minor safety precautions. Signs will be posted for forest visitors.

Alternative 2 (no action) would maintain the current road maintenance strategy by keeping 9 miles closed and leaving 144 miles open for management and public access at various levels of maintenance. No additional miles would be either added to the National Forest System or physically closed to public use. The roads not included as part of the ATM system will continue to grow closed and become less accessible for vehicle use, including high-clearance vehicles.

Aquatic species *(Paul Burns)*

Sedimentation—Thinning (commercial and non- or precommercial) plantations to speed the development of late-successional habitat is not expected to cause sediment to enter streams and adversely affect fish. Past monitoring (personal observations) on commercial thinning sales (Minerva Thin, 1998 and 1999; Deadwood Thin, 2000) during winter operations indicated that no sediment entered streams from thinning or in-unit road use activities. Similar design criteria—such as stream buffers or yarding requirements—used for protecting streams in these sales will be used for this project. Thus, no sediment stemming from falling and yarding trees is expected to enter streams and affect salmonids or other aquatic species.

In the short term, turbidity and sediment inputs may increase locally during log hauling on some roads. The US Fish and Wildlife Service requires the planning team to minimize the effects of disturbance to listed species such as the northern spotted owl and marbled murrelet. Consequently, where thinning or road hauling occurs within ¼-mile of occupied sites, these operations are generally limited to the wet season (after September 15 for owls; after September 30 for murrelets). Wet-season log hauling has the greatest potential for adversely affecting coho salmon, a listed fish species. Wildlife and fisheries biologists try to balance these operating seasons to meet the needs of all listed species. For example, summer operations are maximized where operations will not disturb listed wildlife species; winter operations are maximized where adverse effects to listed fish are negligible.

Project design criteria such as requiring monitoring of surface conditions of aggregate roads, placing sediment containment devices in ditches, and temporarily suspending log hauling where needed will be included in timber-sale contracts. These criteria are expected to keep sediment increases small, of short duration, and very limited in geographic extent. Thus, effects to aquatic species from log hauling are expected to be minor and short-term.

No effect on coho salmon is expected from log hauling on paved surfaces because no sediment will be generated from them. Based on the design criteria and/or proximity to coho streams, wet-season hauling on aggregate-surfaced roads is not likely to adversely affect coho salmon. Table 13 summarizes the effects of log hauling on coho. The timing of hauling on roads reflects the balance between minimizing effects to listed wildlife and fish species.

Table 13. Effects of log hauling on coho salmon

Road number	Type of road surface	Total number of units for log hauling	Number of units for wet-season or partial wet-season haul	Effects on coho
2400	Pavement	22	22	No effect
4800	Pavement	27	27	No effect
2610	Aggregate	36	27	NLAA[a]
2170	Aggregate	5	4	NLAA
2680	Aggregate	4	4	NLAA
4800-831	Aggregate	8	5	NLAA
Total		102	89	

[a] NLAA = Not likely to adversely affect

For additional information about effects on coho, refer to the Biological Assessment, Lower Siuslaw Management Project (May 29, 2002; a project-file document).

Under Alternative 2, sedimentation will continue to be generated from poorly maintained roads. By not thinning, this alternative will not accelerate the development of large wood for fish habitat.

Stream temperature—Currently, in the Siuslaw River basin, very little light enters the stream influence zones due to dense (greater than 60% canopy cover) conifer plantations, mature alder, and to a lesser extent, mature conifer. Thinning plantations—commercial and noncommercial—is not expected to change perennial stream temperatures because variable-width buffers will be designed for streams to prevent temperature increases. Buffer width delineation will be based on existing channel characteristics, shade from understory vegetation, and sensitivity of downsteam reaches to temperature increases. Because there is no surface flow during the summer months, temperature changes will not occur in intermittent streams.

Streams in commercial thinning units will include no-harvest buffers at least 50 feet wide. Zwieniecki and Newton (1999) found that 80% of existing shade was maintained adjacent to clearcuts using no-harvest buffers less than 33 feet wide. Brazier and Brown (1973) found that 90% of the maximum shade adjacent to clearcuts came from within 55 feet of the stream. Therefore, buffer prescriptions for plantations to be commercially thinned are expected to maintain over 90% of the potential stream shade because of the added shading from residual trees above the buffers.

The silviculture prescription for plantations that will receive the heaviest thinning would maintain about 50% canopy closure. Since 90% of the shade is maintained with buffers, we expect residual trees in heavily thinned plantations to provide an additional 5% shade (or 50% of the remaining 10%**)**. Therefore, about 95% of the current shading will be maintained. This figure doesn't account for topographic or understory-brush shading that is prevalent in the coast range. Consequently, the percentage of shade that would be maintained is expected to be more than 95%. Thus, by maintaining 50-foot, no-harvest buffers along perennial streams, coupled with the influence of the residual trees above the buffers, we expect stream shading to be maintained at levels that will not increase stream temperature.

Sources of short-term small wood and long-term large wood for streams will be maintained with buffers and the residual trees left in the plantations as described in the Fisheries Biological Assessment (project-file document).

Essential fish habitat—Actions to address the shortage of late-successional habitat under Alternative 1 are not expected to adversely affect essential fish habitat for coho salmon, chinook salmon, groundfish, or coastal pelagic fish species. Chinook salmon abundance levels are near historic highs in the Siuslaw River Basin. The main concentrations of chinook are in lower Sweet Creek, Knowles Creek, lower Hadsall Creek, lower Divide Creek, and lower Walker Creek. The locations of these spawning areas are further downstream from the units than the coho habitat and therefore will not be affected. Chinook juvenile also extensively use the Siuslaw River Estuary. This project will have no effects on the estuary since any sediment production will be short-term and miniscule compared to natural levels of turbidity in the mainstem Siuslaw River. Since there are no effects on the estuary from this project, coastal pelagic and groundfish species such as the starry flounder will not be adversely affected.

Watershed Restoration Action—Predicted Effects of Activities To Improve Watershed Function

Aquatic species (*Paul Burns*)

Fish habitat—Sedell and Luchessa (1981) documented that large wood was abundant in Oregon coast streams during the early years of European settlement. They documented that organized stream cleaning projects since the late 1800s have removed most wood from Pacific Northwest streams. Farnell (1979) conducted the Siuslaw River Navigability study that documented the techniques used by the European settlers around the turn of the 19th century. The use of splash dams and the clearing of obstacles in the Siuslaw River basin are described in detail. Maser et al. (1988) summarize conclusions that wood provides stream complexity, retains sediment and organic material, and creates off-channel and flood-plain habitats. In reaches with gravel or cobble substrates, they found that large wood increases pool area and maximum pool depth. Large-wood additions to stream channels under Alternative 1 are expected to have similar effects to those observed by Maser et al. (1988) and thus, will increase the amount and quality of fish habitat compared to Alternative 2.

Fish populations--Solazzi et al. (1998) documented that wood additions to streams increase freshwater survival and smolt production of juvenile salmonids in Oregon coast streams, including tributaries to Lower Siuslaw. Therefore, wood additions and upstream migration barrier removals (road decommissioning) under Alternative 1 are expected to improve freshwater survival and production of juvenile salmonids.

Placing large wood in streams would substantially increase the amount of complex pool rearing habitat available in affected reaches and improve floodplain interaction. The complex pool habitat created by large wood is expected to increase summer rearing potential for juvenile salmonids by providing more physical space and greater habitat diversity (Dolloff 1983) and winter rearing habitat by creating areas of low water velocities where young fish can find refuge during high flow events (Everest et al. 1984). Large wood would also increase available food resources for fish by providing a suitable substrate for aquatic insects and by trapping leaves and other detritus.

Adding large wood to streams by helicopter--Effects on fish include short-term disturbance during log placement. Fish will disperse, but observations made during past similar helicopter projects have shown that fish re-colonize the area within a few minutes after placement. Fish could be struck (impinged) periodically during log placement, but this is unlikely. Because some creeks will receive more logs than others, fish disturbance and potential impingement are greatest in Cedar and Knowles Creeks and least in Sweet and Lawson Creeks.

As streams adjust to the added large wood and the wood is oriented by streams, stream banks will erode and minor amounts of fine sediment will be transported downstream, especially during the first winter after log placement. Sediment from large wood is expected to decline over time.

Adding large wood to streams by ground-based equipment—Ground-based equipment includes a portable yarder such as planned for Walker Creek, and an excavator. The portable yarder has been extensively used on the Mapleton Ranger District to pull trees into streams after they have been cut. Based on past projects such as the Knowles Creek project, minor amounts of fine sediment are expected to enter streams as logs are pulled into streams causing short-term turbidity and disturbance to fish.

Where ground-based equipment such as an excavator will be used, the equipment will generally traverse the streambed to place logs in streams. Because most affected streambeds are bedrock-dominated, minor and short-term increases in turbidity can be expected resulting in some disturbance and harassment to fish residing up to 0.5 miles below activity areas. Generally, short-term, higher levels of turbidity result when heavy equipment operates on gravel-dominated streambeds, and consequently, these areas will be avoided to the greatest extent possible. Where heavy equipment enters and leaves streams, the disturbed streambank may cause elevated levels of fine sediment production during the first storms after work has been completed. Design criteria (appendix A) will be implemented to minimize sediment production from streambanks.

Table 14 provides a list of streams proposed for large wood additions, how the logs will be placed in them, and how many trees will be needed to accomplish the objectives (refer to the Karnowsky Creek Stream Restoration Project EA (USDA 2002b) for information about Karnowsky Creek).

Table 14. Required equipment and tree number for large wood placement

Stream	Miles of stream for large wood placement	Required equipment	Mature tree number	Plantation tree number
Cedar	3	Helicopter	90	50
Divide	3	Helicopter	45	60
Hoffman	1.5	Helicopter	15	50
Knowles	2	Excavator and helicopter	140	0
Lawson	1	Helicopter	15	0
Sweet	1	Excavator	10	20
Thompson	3	Excavator	60	0
Walker	1	Yarder	20	50

Lane County does not intend to reopen the Thompson Creek road if the recurring landslide occurs again. Should a landslide occur, the U.S. Forest Service will work with Lane County to secure additional funding to return Thompson Creek to a more natural condition by removing culverts and road-fill material and adding large wood to improve stream channel stability and fish habitat.

Road decommissioning—Road decommissioning actions such as road sidecast pullback and culvert removal will produce varying amounts of fine sediment. Excavated surfaces will continue to produce some fine sediment during the first year after completion. By using brush, woody debris, and straw to intercept sediment on exposed surfaces, effects on fish are expected to be minor and short term.

Robison et al. (1999) documented that upstream migration of juvenile salmonids is prevented or restricted at culverts when outlet drops exceed 6 inches, gradients exceed 0.5%, velocities exceed 2 feet per second, or the depth is less than 12 inches. Several culverts on roads planned for decommissioning prevent or restrict upstream fish passage of juvenile salmonids.

Decommissioning roads under Alternative 1 will remove about 9 fish-passage barriers—8 in Hand and 1 in Divide subwatersheds—and will make about 2 miles of fish habitat more easily accessible for upstream juvenile migrants. Should a natural event such as a landslide cause the Thompson Creek road to be closed and Lane County decides to abandon the road, 3 fish-passage barriers will be removed from the road to provide about 2 more miles of fish habitat that is more easily accessible.

Essential fish habitat--Actions to restore watershed health under Alternative 1 may affect Oregon Coast coho and Chinook salmon or their habitat. I believe these actions are not likely to adversely affect coho and Chinook salmon or their habitat because the effects will be minor and short term. Potential effects may result from increases in turbidity and sediment from road decommissioning, increased bank instability from adding wood to streams, and the risk of hitting these salmon when large wood is placed in streams. These effects are miniscule when compared to the long-term habitat improvement expected from these actions. Therefore, no adverse effects to essential fish habitat for coho and Chinook salmon are expected from project actions.

Riparian planting—Riparian planting 60 acres will serve to increase future sources of large wood for affected streams and will increase future, long-term stream shading.

Riparian thinning—Thinning (noncommercial) 145 acres of conifer in riparian areas will allow the trees to become larger more quickly, thereby lessening the time for the development of large wood that will benefit fish habitat.

Sediment production (*Johan Hogervorst*)

Under Alternative 1, about 14 miles of classified road would be decommissioned, including removal of culverts and associated fill material (about 4,349 cubic yards) at 19 stream crossings (table 15). Removing culverts and associated fill has the potential to cause sediment to enter streams in the short-term. Based on local experience and monitoring of past projects, sediment that cannot be practicably removed from the stream channel generally erodes during high winter flows in the first two or three winters after excavation. Based on personal observations, vegetation recovers quickly on disturbed soils in the Oregon Coast Range, and stream channels reach equilibrium after 5 years so that management-related sediment entering streams is near zero. The estimated volume of management-related fine sediment delivered to streams at each removal site should be less than 5 cubic yards (Reiter et al. 1995) which is far less than the potential sediment perched over existing culverts. By removing an estimated 4,349 cubic yards of fine sediment from stream crossings, road decommissioning will eliminate the risk of this sediment entering streams in the event culverts become plugged and fill materials fail.

About 63 miles of classified roads will be waterbarred and closed under Alternative 1 (map 4). Based on local experience, roads closed to vehicles and waterbarred on the Siuslaw National Forest are usually covered with leaf litter and vegetation within 5 years of closure, which effectively eliminates road surface erosion. Both closed and decommissioned roads should yield sediments in the range of the abandoned road category shown in table 9.

Under Alternative 2, future naturally occurring culvert blockages, such as landslides or debris flows can occur. Based on the effects of recent (1996-99) major storm and flood events in the Siuslaw National Forest, not removing culverts and fill material from stream crossings will increase the probability of diverting streams from their channels or catastrophic fill failure. By not removing culverts and fills, the potential of large-wood delivery to streams via debris flows will be reduced. Under this alternative, if culverts are blocked naturally before road decommissioning, the number and kinds of possible actions to meet the goals of the aquatic-conservation strategies may be substantially reduced. By not closing and waterbarring roads, sediment will continue to enter streams at current levels.

Table 15. Key road decommissioning numbers

Road number	Sub-watershed	Miles	Slope position[a] and miles	Number of stream crossings to be removed	Total volume to be removed in cubic yards	Total number of waterbars to be built	Estimated cost
2480933[#]	Cedar	1.9	R=0.8, M=1.1	4	451	63	$6,400.00
2480934	Cedar	0.9	R=0.1, M=0.8	0	0	32	$1,060.00
[redacted]							
2400872	Divide	0.2	R=0.2	0	0	7	$310.00
2400876	Divide	1.0	R=0.8, M=0.2	0	0	35	$1,155.00
2400877	Divide	0.6	R=0.6	0	0	21	$730.00
4800831*[#]	Hand	1.3	V=1.3	9	2,583	40	$27,030.00
4890912[#]	Hand	1.2	R=0.6, M=0.6	6	1,315	36	$14,230.00
4890917[#]	Hand	0.3	R=0.1, M=0.2	0	0	11	$430.00
4890920	Hand	0.2	R=0.2	0	0	7	$310.00

[redacted]

Table 16 shows the number of unstable stream crossings and their estimated fill volumes by subwatershed. During periods of heavy rainstorms, inlets of culverts can become plugged from slope failures above culverts resulting in a high probability of a large mass of sediment being delivered directly to streams from the fill above these culverts. These events can seriously impact aquatic resource habitats, sometimes for up to a mile of stream channel.

Table 16. Temporary road stream crossings with high failure potential

Subwatershed	Stream crossing sites-(number) and cubic yards
Berkshire	0
Cedar	(4) 920
Divide	0
Hadsall	0
Hand	(6) 1,315
Hoffman	0
Hood	0
Knowles	0
Lawson	0
Lower Sweet	(1) 50
Siboco	0
Thompson	(3) 190
Upper Divide	0
Upper Knowles	0
Walker	0
Total	**(14) 2,475**

Soil productivity (*Johan Hogervorst*)

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

Soil compaction and displacement will occur in areas using heavy equipment to place large wood in streams. To minimize these effects, access routes will be decompacted after this activity is completed. Where a portable yarder will be used for log placement, no effects on compaction and displacement are expected.

Riparian planting activities will have no effect on soil productivity.

Terrestrial species **(***Doug Middlebrook***)**

Listed species—As required by the Endangered Species Act of 1973, as amended, a biological assessment (a project-file document) has been prepared for this project. This assessment evaluates and describes the potential effects of proposed actions on species listed--under the Endangered Species Act--that may be found on the Siuslaw National Forest. Because the planning area is outside the range or contains no suitable habitat for the Oregon silverspot butterfly, brown pelican, Nelson’s sidalcea, western lily, or western snowy plover, none of the alternatives affect these species. Formal consultation with the U.S. Fish and Wildlife Service

(FWS) has been completed for activities that potentially remove habitat as well as those that may cause nesting disturbance (FWS reference 1-7-00-F-649, as extended; FWS reference 1-7-02-F-422).

Bald eagle—Under Alternative 1, no actions are proposed within ¼-mile (1/2 mile line-of-sight) of known bald eagle nests. Consequently, proposed actions will have no effect on known nesting bald eagles. Project design criteria developed for mature tree removal for in-stream structure avoids the potential for removal of suitable nest trees; therefore, this activity will have no effect on bald eagle suitable habitat. Some watershed function improvement activities that generate noise above ambient levels will occur in unsurveyed suitable bald eagle habitat during the nesting season. However, because nesting bald eagles are highly visible and existing nests are likely to be known, the potential for disturbance is low. Thus, all watershed improvement activities listed in table 17 may affect, but are not likely to adversely affect, nesting bald eagles.

By placing large wood in streams, fish numbers in these streams are expected to increase. Thus, Alternative 1 is likely to benefit eagles in the long term by increasing eagle forage opportunities.

Alternative 2 will create no noise-associated disturbance to bald eagles. Long-term benefits, including stream improvements that are likely to increase fish numbers and improve eagle foraging opportunities, would not occur.

Northern spotted owl and marbled murrelet--Alternative 1 would remove up to 395 mature trees for creation of in-stream structures. This action has the potential to modify or reduce spotted owl and murrelet suitable habitat. Project design criteria, such as avoiding removal of suitable nest trees, known nest trees, and trees that buffer suitable nest trees, will mitigate potential negative impacts. Therefore, this action may affect, but is not likely to adversely affect, northern spotted owl and marbled murrelet suitable habitat.

Depending on the season, noise associated with actions under Alternative 1 can disturb the breeding behavior of nesting spotted owls and marbled murrelets. All actions are assumed to occur within ¼-mile of unsurveyed suitable habitat. After September 15, disturbance associated with watershed restoration will have no effect on nesting marbled murrelets. Actions conducted after September 30 will have no effect on nesting spotted owls. Table 17 shows estimated disturbance effects on owls and murrelets for each watershed improvement activity, and includes quantities associated with each activity.

Alternative 2 would not implement any actions adjacent to known nest sites, occupied sites, or unsurveyed suitable habitat. Consequently, Alternative 2 will have no effect the spotted owls and marbled murrelets.

Table 17. Effects on northern spotted owls and marbled murrelets from noise disturbance associated with Alternative 1

Activity	Operating period and effects determination for disturbance			
	March 1 to July 7	July 8 to August 5	August 6 to Sept. 30	Oct. 1 to Feb. 28
Northern Spotted Owl	MA-LAA	MA-NLAA	MA-NLAA	NE
Marbled Murrelet	MA-LAA	MA-LAA	MA-NLAA	NE
Riparian conifer release (acres)	127	0	0	0
Riparian planting (acres)	60	0	0	0
Riparian thinning	0	0	0	145
In-stream fish structures, plantation trees (trees)	0	0	230	0
In-stream fish structures, mature trees (trees)	0	0	395	0
Road culvert and fill removal (sites)	0	0	33	0
Road decommissioning (miles)	0	0	14	0

MA-LAA = May affect, likely to adversely affect,
MA-NLAA = May affect, not likely to adversely affect,
NE = No effect

Sensitive species—The following sensitive species identified for the Siuslaw National Forest have potential for occurring in the project area:

Pacific shrew—By placing large logs in streams—some of which will rest outside of streams—and creating down logs, Alternative 1 is expected to enhance habitat for this species. No adverse effects to local populations of Pacific shrews are expected. Alternative 2 will have no effect on this species.

Southern torrent salamander—Under Alternative 1, while some short-term disturbance due to log placement may occur, placing large wood in streams is expected to provide long-term benefits this species by increasing stream complexity, trapping sediment and cobble, and reducing the amount of stream bottom consisting of bare bedrock. Other restoration actions such as noncommercial thinning are not expected to result in sedimentation of streams and therefore, will have no effect. No adverse effects to torrent salamanders are expected. Alternative 2 will not affect this species.

Pacific fringe-tailed bat—Under Alternative 1, proposed noncommercial thinning in riparian zones is expected to benefit this species by opening canopies, thereby improving forage habitat. No adverse effects are expected. Alternative 2 will have no effect on this species.

Land birds—Since no species are expected to be completely displaced from stands by noncommercial thinning in riparian zones, local populations of land birds are not expected to be adversely affected by Alternative 1 and no intentional take of migratory birds will occur. Alternative 2 will have no effect on land birds.

Survey-and-manage animal species—The only survey-and-manage terrestrial species that could be affected is the red tree vole. Recent surveys indicate that no active or inactive red tree vole nests exist in areas proposed for mature tree removal for in-stream placement (map 5). Additional surveys will be conducted prior to removing mature trees to avoid adverse effects to red tree vole nest sites. Therefore, Alternative 1 is not expected to affect active or inactive red tree vole nest sites. Alternative 2 will have no effect on this species.

Management-indicator species—With the exception of large tree removal for in-stream placement, activities under Alternative 1 occur outside suitable habitat for martens, spotted owls, pileated woodpeckers, and primary cavity nesters and are not expected to have adverse effects on local populations or habitats. Thinning is expected to benefit these species in the long-term by speeding the development of mature forest conditions.

Removal of mature trees for in-stream placement will occur along edges of mature stands. Since live trees will be used, and such trees will be scattered, the potential for impacts to martens, pileated woodpeckers, and primary cavity nesters should be minimal. Impacts to spotted owls are discussed under the *Listed Species* section. No impacts to ruffed grouse are expected.

Under Alternative 2, no adverse effects on MIS species are expected. However, it will take longer to develop mature forest characteristics in plantations, thereby delaying the development of habitat that is preferred all MIS species except ruffed grouse. Alternative 2 is expected to have no effects on ruffed grouse.

Listed, sensitive, and survey-and-manage plants (*Forest Botanist*)--No listed (threatened and endangered**)** or sensitive plant species or potential habitat is known or suspected in or adjacent to proposed project sites. Thus, project activities will have no direct or indirect effects on these species.

The botanist also evaluated the effects of proposed watershed restoration actions to survey-and-manage fungi, lichens, bryophytes and vascular plant species. None of the proposed actions are expected to affect these species and will not require any protective measures.

Potential habitat exists in the project area for eight survey-and-manage species requiring pre-disturbance surveys (categories A and C; USDA, USDI 2001). Surveys were conducted for these species during the fall of 2001. None of these species will be affected by proposed watershed restoration actions.

Noxious and undesirable weeds (*Forest Botanist*)--Ground disturbing activities which result in exposed mineral soil on sites with moderate to full sunlight exposure, greatly increase the potential for noxious or undesirable weed colonization and establishment. Because existing shade will be maintained adjacent to roads and streams where road decommissioning and large wood additions to streams are planned, none of the actions proposed for watershed restoration are expected to increase the potential for weed colonization and establishment.

Public and management access *(Ken McCall)*

A formal roads analysis process (USDA 1999) was conducted for this project as a guide for managing the National Forest transportation system in the Lower Siuslaw planning area. National Forest System (NFS) road miles in this section do not include all miles of roads that will be affected by this project. Because the planning area is based on hydrological boundaries, only those road segments (miles) that lie within the planning area are used in determining road density and maintenance costs. Road segments that lie outside the hydrologic boundaries and are affected by this project total about 2.5 miles. These miles include segments of roads 2400-888, 2400-950 and 2500-796 which will be closed by this project following use.

Alternative 1 will decommission about 14 miles of NFS roads and close about 63 miles of roads currently open for high-clearance vehicles. Additionally, some minor changes in administrative designations on ATM roads that do not alter access, public use, or administrative traffic levels on the ATM roads will be implemented. Alternative 1 will maintain fewer miles of open roads and reduce overall maintenance costs. Open-road density for NFS roads on Forest Service lands will be reduced from the current 2.3 miles per square mile to 1.2 miles per square mile. When state, county, and other public agency road miles and ownership acres in the analysis area are considered, the open-road density is reduced from 2.0 miles per square mile to 1.4 miles per square mile. The project makes no changes in roads administered by other public agencies nor does it reflect the miles of private road within the project area.

Alternative 1 will also change ATM designations on the 2500 and 2127 roads that are mostly outside the planning area. The 2500 road from Thompson Creek County Road 5110 to the junction of road 2570 will be designated as a secondary high-clearance route and the 2127 road will become the secondary low-clearance route. The miles of theses two roads are about the same so there will be no net change in ATM miles. This change will reduce the impacts of Thompson Creek County road on Thompson Creek and provide an alternative route from State Highway 36 to Highway 101 through the forest interior.

Alternative 2 (no action) would maintain the current road maintenance strategy by keeping 9 miles closed and maintaining 144 miles open for management and public access. Under the no-action alternative, no additional road miles would be either opened or closed to public use on the National Forest System. The roads not included as part of the ATM system will continue to grow closed and become less accessible for vehicle use, including high-clearance vehicles.

Table 18 shows the annual road maintenance costs for each alternative. Alternative 2 represents the existing maintenance strategy. Road maintenance levels in the project area include: Level 0, decommissioned roads that are no longer part of the NFS road network; level 1, roads that are closed to vehicle traffic; level 2, roads that are maintained for high-clearance vehicle use; level 3, roads that are maintained for low-clearance passenger vehicle use; and levels 4 and 5, roads that are maintained for low-clearance passenger vehicles with a moderate or high expectation of user comfort. Most of the NFS road changes under Alternative 1 are characterized by moving roads currently in level 2 (maintained for high-clearance vehicles) to level 1 (closed to vehicle use) and decommissioning some level 1 and level 2 roads.

Private landowners, federal agencies, and commercial and community interests have various easements, permits and access agreements in effect at the time of this project. Actions under Alternative 1 are designed to facilitate existing agreements. Additional access needs will be reviewed and authorized case-by-case as requested. Generally, permit holders will be required to perform maintenance items on National Forest System roads related to the permitted uses.

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

Table 18. Annual road maintenance costs by alternative*

Alternative	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Totals
1	18.4/$0	63.3/$8,059	53.3/$25,238	20.8/$17,691	0/$0	0/$0	$50,998
2	3/$0	8.8/$414	122.3/$53,528	20.6/$18,227	1.1/$904	0/$0	$73,073
Difference							$22,075

*Figures are miles/annual cost. Wildland-urban interface roads are included in level 1 costs.

The following summarizes the effects of Alternatives 1 and 2:

Alternative 1

- Closes about 63 miles of Forest-system roads (maintenance level 1) between planned access periods.
- Decommissions about 14 miles of Forest-system roads.
- Reduces road maintenance costs by about $22,075 annually over the next 15 years.
- Keeps county roads and primary and secondary (ATM) Forest roads accessible to all vehicles.
- Reduces open-road density on National Forest lands from 2.3 miles per square mile to 1.2 miles per square mile.
- Reduces open-road density of all public agency roads from 2.0 miles per square mile to 1.4 miles per square mile.

Alternative 2

- No changes in the current maintenance strategy of existing National Forest System roads, including ATM and non-ATM roads.
- No changes in ATM or non-ATM road maintenance costs.
- No changes in road density.
- With limited maintenance funds, vegetation adjacent to some roads currently in maintenance level 2 will continue to grow and gradually close these roads.

Fire *(Edward Garza)*

Under Alternative 1, decommissioning and closing roads, placing logs in streams, and riparian planting will not change existing fuel conditions in the watershed. Decommissioning and closing roads will reduce public access, reducing the risk of human-caused fires. Decommissioning and closing roads will decrease access and increase the response time of initial fire-suppression efforts, however. Reduced maintenance on ATM roads will also increase the response time. Slow response times may allow the size of wildfires to increase. Since people historically have caused about 95% of fires on the Forest, most fires are in accessible areas. Therefore, reduced access because of road decommissioning and closures is likely to reduce the risk of fire ignitions in the project area. As roads degrade under Alternative 2, response times are also expected to increase; however, the risk of fire ignitions is expected to decline as public access decreases.

Human uses and influences

Heritage resources (Phyllis Steeves)--According to our programmatic agreement with the State Historic Preservation Office (SHPO), one action under Alternative 1 will be on previously undisturbed ground and will require field inventories and concurrence from SHPO before the actions are implemented. This action includes placing large wood in streams by ground-based equipment. Pre-field consultation will determine which activity sites may be monitored during placement, in lieu of standard compliance review. Riparian planting will not be allowed in the immediate area of homestead building sites identified during pre-field review. No adverse effects are anticipated to known sites because of protection and avoidance measures to be taken when woody debris is placed in streams and trees are planted in riparian areas.

Under Alternative 1, road decommissioning and road stabilization and closure will have little or no potential to affect historic properties, as they occur at previously surveyed and/or disturbed sites. These actions will be reviewed according to our programmatic agreement with SHPO.

Recreation (The Team)--The primary consequence of closed and decommissioned roads under Alternative 1 will be the change from motorized to nonmotorized access. The highest concentration of vehicle travel on the interior forest will continue to be associated with hunting seasons. Access to dispersed recreation sites such as the Sweet Creek trail will be maintained under both alternatives. All existing trail systems will be maintained. Through time, the same decrease in recreation opportunities associated with closed and decommissioned roads will be experienced under Alternative 2, as road conditions deteriorate from lack of maintenance.

Although some short-term sedimentation of streams are expected under Alternative 1, these effects will be minor and should not adversely affect fish habitat. Proposed actions under Alternative 1 are designed to improve fish habitat in the long term and subsequently, should benefit recreational fishing overall. Alternative 2 will adversely affect fish habitat in the long term as roads continue to fail, likely resulting in adverse affects on recreational fishing.

Scenery (Don Large)--Actions proposed for improving watershed function are consistent with the scenic quality objective of maximum modification for the planning area.

Special forest products (Bruce Buckley)--Opportunities to gather special forest products through permits and leases will continue. Limited vehicle access will make collecting special forest products more difficult. More difficult access has a lowering effect on the sale values of special forest products such as salal, firewood, moss, and evergreen huckleberry. (Palmer, pers. comm.).

Forest stand conditions *(Dan Karnes)*

Riparian stand management--Noncommercial thinning, planting, and releasing of conifers will increase the rate at which large-diameter conifers return to riparian and adjacent upslope areas. Responses would be similar but not identical to those modeled for commercial thinning upslope areas. The largest trees in the natural forest can generally be found in the riparian zone. These are most often few in number but high in species richness. Re-establishing conifers or providing improved growing conditions for existing conifers in these areas will recover natural riparian function sooner.

Because of past harvest practices coupled with slope instability, large conifer is generally lacking in plantation riparian zones. Under the no-action alternative, late-successional forest characteristics will continue to develop slowly, with natural disturbances being the most influential factor. It will take several decades to recover natural stand structure and process in riparian zones. Some alder-salmonberry dominated plant communities may never recover and become mixed conifer-hardwood forests.

Terrestrial and Watershed Actions—Other Predicted Effects

Cumulative Effects (*The Team*)

Alternative 1

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 Alterantive 1 is the 74,000-acre planning area in the Lower Siuslaw watershed. The Team considered the need to extend the geographic area for each of the affected resources, but we believed that effects were not meaningful or measurable beyond the Lower Siuslaw planning area.

The analysis provided for each alternative and resource area reflects the sum of most planned actions on federal lands in the near future, including the effects from changes in the transportation system for Forest users and adjacent landowners. Other likely future actions on federal lands in the Lower Siuslaw Landscape Management Project area include ongoing road maintenance and repair of ATM roads, and harvesting of special forest products such as firewood, salal, swordfern, and moss.

On state and county land, actions are expected to be limited to maintaining roads. Lane County--through the Siuslaw Watershed Council--is replacing culverts that hinder fish passage, although none are planned for the Lower Siuslaw watershed in 2002-03.

On nonfederal land, which comprises 43% of the project area, the Team expects private landowners to continue current practices and uses of their land and no changes to current county and state land-use regulations. Current uses include industrial timber harvesting, farming, livestock grazing, and limited non-industrial timber harvesting. Based on local industrial timber management objectives and practices, we expect harvest activities on industrial lands before those stands reach 80 years of age. Currently, most of these stands are younger than 25 years.

Under this project, cooperative actions with private landowners are proposed for the near future and include placing large wood in Knowles and Lawson Creeks and riparian planting adjacent to Knowles Creek (map 5).

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

Forest stand conditions--Thinning managed stands will speed the development of late-successional forest characteristics across about 3,700 acres (commercial thinning stands) and about 1,854 acres (all thinning stands outside of commercial thinning). These changes will reduce fragmentation and accelerate development of late-successional forest characteristics.

Terrestrial species (listed, sensitive, survey-and-manage, management-indicator)--In the short term, disturbances from noise, road work, adding large wood to streams, and thinning managed stands are likely to have minor adverse effects on all terrestrial species to some degree. The dispersal in timing and distribution of these actions across the watershed, however, are such that impacts are expected to be localized and not lead to adverse cumulative effects. In the long term, accelerated development of late-successional forest conditions is expected to cumulatively benefit species dependent on these conditions. Habitat for species dependent on early-seral conditions will be reduced as decommissioned roads and other forest openings become forested over time, except for openings that are created and/or maintained as early-seral habitat.

Aquatic species--When viewed as a whole, all proposed actions are likely to have minor adverse effects on aquatic species during project implementation and up to 2 years later. In the long term, net improvements to aquatic habitat are expected to accrue with reduced sedimentation and risk of failure from roads, accelerated growth of trees in riparian areas of managed stands, and input of large wood. These actions are expected to substantially benefit aquatic species.

Sediment production--Reopening existing roads, using roads, decommissioning roads, and adding large wood to streams will increase sedimentation in the short term. Stabilizing and closing reopened roads, and closing and decommissioning other roads will reduce sedimentation in the long term. Overall, Alternative 1 is expected to cumulatively reduce sedimentation in the project planning area.

Soil productivity--Less than 10 percent of each skyline-logged plantation and less than 15 percent of each tractor-logged plantation will be in a detrimental soil condition (i.e., compacted and/or displaced), considering past and proposed actions in each plantation. Therefore, each plantation will be under the 15-percent threshold established by the Siuslaw Forest Plan for National Forest system lands. Where heavy equipment is used to place large wood in streams, cumulative detrimental soil conditions will not exceed 15 percent.

Stream flow--Thinning managed stands will not measurably affect stream flows. Closing and decommissioning roads will reduce peak and storm flows resulting in a net cumulative decrease over the long term.

Stream temperature--Based on project design, thinning managed stands is not likely to have any measurable effect on stream temperature; road decommissioning, adding large wood to streams, and riparian planting are likely to improve watershed function and lower stream temperatures resulting in a cumulative decrease in temperature.

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

Heritage resources--Thinning managed stands and road actions will have minimal risk because actions are on previously disturbed ground. Adding large wood in streams will increase the potential for affecting undiscovered sites. Adverse cumulative effects are not expected.

Recreation--Closing and decommissioning roads will cumulatively shift the recreation experience from motorized to nonmotorized.

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

Public and management access--Closing and decommissioning roads across the watershed will reduce public and management vehicle access to public lands for several activities including recreation, hunting, special forest products gathering, and Forest Service monitoring. Road maintenance costs will be reduced and limited maintenance funds will be shifted to maintaining the ATM road system. Open-road density on National Forest system land would be reduced from 2.3 miles per square mile to 1.2 miles per square mile.

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

Noxious weeds--Current weed infestation levels will be maintained and infestation levels are expected to decline in the foreseeable future.

Alternative 2

- Managed-stand health and growth will continue to decline, increasing the severity and extent of damage from insects, disease, and wind; late-successional forest conditions in managed stands will take longer to develop.
- Habitat preferred by species dependent on late-successional forest will take longer to develop; mid-seral species habitat will remain on the landscape longer; habitat preferred by early-seral species will gradually decline as trees encroach on existing meadows and other forest openings; and short-term cumulative effects will be limited to noise disturbance from maintaining and repairing ATM roads.

- Aquatic species habitat recovery will depend on natural processes and take much longer.
- Sedimentation from non-ATM roads will increase as roads deteriorate from lack of maintenance.
- Shading and large wood for streams will take longer to develop before temperatures will be reduced and watershed function will not be improved because of continued use of nearly the entire road network.
- Fire response time will increase as roads fail or roadside vegetation grows and closes roads naturally.
- Recreation experiences will become more nonmotorized as roads close naturally; landscape scenic conditions will take longer to achieve a more natural setting; and public and management access and road maintenance costs will remain unchanged, except where roads fail.

In summary, considering other ongoing and likely actions on federal, state, county and private lands in the Lower Siuslaw watershed, Alternative 1 is expected to reduce the adverse cumulative effects of past actions on the landscape, thereby accruing net beneficial cumulative effects for most resources. The cumulative effects are generally beneficial over time and an improvement over existing conditions.

Consistency with Aquatic Conservation Objectives *(Johan Hogervorst, Paul Burns, Doug Middlebrook)*

Alternative 1

We have evaluated the consistency of all actions under Alternative 1 with the nine aquatic conservation strategy objectives of the Northwest Forest Plan. Project activities will not retard or prevent attainment of any of the strategy's objectives. We have concluded the following for each objective:

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.

> Plantation thinning, road decommissioning, and wood additions to streams will accelerate developing late-successional forest and improving watershed conditions. Thinning will increase the rate of development of large conifers in riparian and upslope areas, understory complexity, and species diversity, which will help restore watershed and landscape features.

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.

> Spatial and temporal connectivity in and between watersheds will be improved through thinning plantations, decommissioning roads, and adding wood to streams. Thinning will accelerate the rate at which plantations become mature stands and increase the connectivity among existing mature stands. Road decommissioning will reconnect stream channels,

allowing unobstructed passage of sediment, wood, and terrestrial and aquatic species. Wood additions will increase the degree of connectedness among stream channels and their floodplains. Improved connectivity will allow aquatic and riparian-dependent species better access to and between refugia to allow diverse life-history types to develop.

Objective 3 --Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Design criteria for all activities will prevent adverse effects to the physical integrity of the aquatic system. Road decommissioning will reduce management-related sediment inputs in the long term and restore the function of natural processes that deliver sediment and wood. Large-wood additions will restore sediment routing and riparian vegetation processes that develop the physical integrity of the aquatic system.

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.

Water quality will be maintained by variable-width, no-harvest buffers adjacent to all stream channels and wetlands in thinning units. In the long term, thinning, decommissioning roads, and adding wood to streams are expected to improve water quality faster than would the no-action alternative.

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.

Plantation thinning is designed to prevent increases in management-related landslides and surface erosion. Thinning is designed to avoid naturally unstable areas. Short-term increases in fine-sediment production associated with road building, rebuilding, haul, and decommissioning, and with wood additions will be minor. Decommissioning roads, closing roads, and adding wood will help restore the natural sediment regime.

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.

Plantation thinning is not expected to result in measurable changes in streamflow. In the long term, thinning, decommissioning and closing roads, and adding wood will restore stream flows to a more natural regime.

Objective 7--Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

In the short term, large wood additions and road decommissioning and closure will restore the timing, variability, and duration of floodplain inundation and water-table elevation. In the long term, plantation thinning will increase the rate that large conifers are developed in riparian areas, which will increase the future supply of large wood to stream channels. Increasing the future supply of large wood to stream channels is needed to restore attributes of this objective.

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.

Thinning plantations, planting an understory, creating snags and coarse woody debris, and planting and release in riparian zones will restore species composition and structural diversity of plant communities in riparian areas. Large, standing conifers, large downed wood, multi-layered canopies, and species diversity will be improved by these activities.

Objective 9--Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

All activities are designed to restore natural processes that develop habitat for native riparian-dependent species.

Alternative 2

The Lower Siuslaw Watershed Analysis identified existing adverse watershed conditions, listed on pages 1 and 2 of this EA. Taking no action, Alternative 2 would rely on natural processes, which are expected to take much longer than Alternative 1 to correct these conditions. Where roads are affected by natural hydrological processes, they may fail. Watershed health will remain degraded or subject to periods of degradation from road failure until natural processes have removed sediments associated with road fills. Because current watershed conditions will not be maintained or improved and road fill is expected to remain in the watershed for tens to hundreds of years, Alternative 2 is not expected to meet the objectives of the Northwest Forest Plan’s 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 Forest Service (USDA, USDI 1994a, p. 321). Short-term uses include actions such as commercial thinning, road decommissioning, and stream enhancement. The design criteria were developed to incorporate the standards and guides of the Siuslaw Forest Plan as amended by the Northwest Forest Plan. We expect that applying them to the proposed management actions will reduce the potential for long-term loss in productivity of forest soils that may result from short-term uses. They will also allow for the long-term development of late-successional habitat and restoring aquatic ecosystems.

Unavoidable Adverse Effects (*The Team*)

Implementing any alternative would result in some adverse environmental effects that cannot be avoided. The design criteria, along with Forest standards and guides, are intended to keep the extent and duration of these effects within acceptable rates, but adverse effects cannot be completely eliminated. The following adverse environmental consequences would be associated to some extent with Alternative 1:

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

Irreversible Resource Commitments (*The Team*)

Irreversible commitments of resources are actions that disturb either a nonrenewable 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 would be associated to some extent with all alternatives:

- Loss of timber volume production in matrix lands where timber management is prohibited or restricted and early seral forest is created and maintained.
- Loss of soil productivity as a result of new temporary roads and landings.
- Loss of vehicular access through the Forest as roads are closed or decommissioned.

Environmental Justice (*Bruce Buckley*)

McGinnis et al. (1996) found that the average per capita income in Lane County is slightly below the average for the state of Oregon. Weber and Bowman (1999) found that Lane County has a poverty rate of 11 to 14.8%. These rates are in the average range for Oregon. Based on local knowledge, small pockets of low-income populations live in the planning area and some gather firewood and pick brush to augment incomes. 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 will reduce vehicle access to areas that provide shrubs harvested by brush pickers, access to these areas will be maintained. Thinning of plantations will improve conditions for growth and development of these shrubs. Some proposed actions will provide opportunities for jobs and firewood gathering. None of the proposed actions are expected to physically affect farms or water quality of domestic-use water systems.

Decommissioning the Thompson Creek road will be postponed until another major slide again closes the road to vehicle traffic. Lane County has indicated that they do not intend to repair the road if another slide occurs. Decommissioning this road removes one alternative for local traffic between Indian Creek and State highway 36. The alternate route using Indian Creek County road will increase commuting distance, but we expect it to be more safe and reliable than the Thompson Creek road during periods of heavy rains. Several alternative routes exist for interior forest travelers seeking links to routes between highway 36 and the Oregon coast, including Forest road 2127 which was recently repaired to be suitable for low-clearance vehicles. Forest roads 2170, 2500, and County road 5070 near Brickerville also provide links between Highway 36, interior locations, and connections to the Coast highway.

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 Alternative 1.

Other Disclosures (*The Team*)

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

- ⇨ Minority groups, women, and consumers may benefit from employment opportunities and by-products that proposed actions will provide; the no-action alternative would have neither adverse nor beneficial effects. None of the alternatives adversely affects civil rights. All contracts that may be awarded as a result of implementation would meet equal employment opportunity requirements.
- ⇨ None of the proposed actions will affect known prehistoric or historic sites. As outlined in the American Indian Religious Freedom Act, no effects are anticipated on American Indian social, economic, or subsistence rights.
- ⇨ The actions are consistent with the pending Reservation Plan and Forest Land Restoration Proposal (1999) submitted by the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw for management of federal lands south of the Siuslaw River, including parcels addressed in this environmental assessment.
- ⇨ No adverse effects on wetlands and flood plains are anticipated. No farm land, park land, or range land will be affected.
- ⇨ This environmental assessment is tiered to the Siuslaw Forest Plan, as amended by the Northwest Forest Plan, and is consistent with those plans and their requirements.
- ⇨ The proposed project is not in or adjacent to an inventoried roadless area.
- ⇨ The proposed project is consistent with the Coastal Zone Management program.
- ⇨ None of the proposed actions are expected to substantially affect human health and safety.
- ⇨ The proposed project is not expected to measurably affect global warming. The USDA Forest Service will continue an active leadership role in agriculture and forestry regarding the reduction of greenhouse gas emissions.
- ⇨ These actions do not set a precedent for future actions.

Consultation with Others

The National Marine Fisheries Service (NMFS) is being consulted about effects on coho through a fisheries biological assessment that was completed for this project on May 29, 2002. The NMFS's response to this assessment is pending. Any NMFS terms and conditions not covered in the project design criteria will be incorporated into the Decision Notice for this project.

In their biological opinions from the following consultation documents, the US Fish and Wildlife Service (FWS) has concurred with our findings that the project will not jeopardize the existence of northern spotted owls, marbled murrelets, and bald eagles. The FWS terms and conditions will be applied to the project design criteria:

- Formal and Informal Program Programmatic Consultation on FY 2001 Routine Habitat Modification Projects within the North Coast Province, October 4, 2000 (as extended through 2002); FWS reference #: 1-7-00-F-649.

- Concurrence letter for the Lower Siuslaw Restoration Project, November 29, 2001; FWS reference #: 1-7-02-I-121.

- Formal and Informal Program Consultation on FY 2002-2003 Projects within the North Coast Province Which May Disturb Bald Eagles, Northern Spotted Owls, and Marbled Murrelets, April 4, 2002; FWS reference #: 1-7-02-F-422.

The Confederated Tribes of Coos, Lower Umpqua, and Siuslaw were informed of the proposed actions during scoping. Their concerns centered on cumulative effects on stream flows, fine sediments, sediment loading; and effects on cultural resources and wildlife habitats.

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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); and
- Forest Stand Dynamics: Update Edition, (Oliver and Larson 1996).

Access and travel management (ATM) roads—National Forest System roads managed under one of the following categories established by the Siuslaw Access and Travel Management Guide (September 1994):
- Primary forest road, all highway vehicle travel is encouraged;
- Secondary forest road (low clearance), passenger car travel acceptable; or
- Secondary forest road (high clearance), passenger car use is discouraged.

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

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

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

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

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

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”).

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.

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.

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.

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

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

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

Large woody debris--Pieces of wood generally at least 24 inches in diameter and more than 50 feet long, in a stream channel.

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.

Late-precommercial thinning--Noncommercial thinning of stands that occur later than normal due to changes in access, variable stocking, and poor commercial thinning potential.

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.

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

Noncommercial thinning--The stocking reduction that results from cutting or girdling excess trees and leaving them on the site.

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

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

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

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

Precommercial thinning--Cutting and leaving some of the trees less than merchantable size in a stand so that remaining trees will grow faster.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Survey-and-manage species--Species that are closely associated with late-successional or old-growth forests whose long-term persistence is a concern; in this document, those with ranges in the Lower Siuslaw watershed. 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. Temporary roads are reopened or built to accomplish a management objective, such as thinning older plantations or maintaining meadows. After the project is completed, these roads may be decompacted and water barred, stream-crossing culverts and fills removed (if any), and road entrances barricaded (if necessary).

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

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

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

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

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

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

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

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

Wildland-urban interface (WUI)—National Forest land generally within 1 mile of privately owned land. Actions on National Forest land (e.g. commercial thinning) in the WUI that increase fire-hazard risks by increasing the fuel loading near residential properties are mitigated through controlled burning or other fuel-reduction measures.

Yarding--The removing of logs from the stump to a central concentration area or landing.

Appendix A

Lower Siuslaw Landscape Management Project
Design Criteria

These design criteria for the Lower Siuslaw Management Project were developed to ensure that standards and guides of the 1990 Siuslaw Forest Plan (SFP) as amended by the 1994 Northwest Forest Plan (NFP) are met. Where applicable, pertinent standards and guides from these Plans are cited. The design criteria apply to all action alternatives, unless otherwise specified. Appropriate specialists will be consulted before any design criteria for proposed activities are changed.

I. Design Criteria Common to All Activities

1. Formal and informal consultation

The National Marine Fisheries Service (NMFS) is being consulted about effects on coho through a fisheries biological assessment that was completed for this project. Any NMFS terms and conditions not covered here will be incorporated into the Decision Notice for this project.

In their biological opinions from the following consultation documents, the US Fish and Wildlife Service (FWS) has concurred with our findings that the project will not jeopardize the existence of northern spotted owls, marbled murrelets, and bald eagles. The FWS terms and conditions will be applied to the project design criteria:

- Formal and Informal Program Programmatic Consultation on FY 2001 Routine Habitat Modification Projects within the North Coast Province, October 4, 2000 (as extended through 2002); FWS reference #: 1-7-00-F-649.

- Concurrence letter for the Lower Siuslaw Restoration Project, November 29, 2001; FWS reference #: 1-7-02-I-121.

- Formal and Informal Program Consultation on FY 2002-2003 Projects within the North Coast Province Which May Disturb Bald Eagles, Northern Spotted Owls, and Marbled Murrelets, April 4, 2002; FWS reference #: 1-7-02-F-422.

Coho salmon

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

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

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

d. Six plantations proposed for commercial thinning are within 100 feet of coho habitat. <u>Use</u> the following thinning prescriptions for areas between 50 and 100 feet from coho streams: <u>Thin</u> stands 024, 028, 029, 037, and 047 to 70 trees per acre; <u>thin</u> stand 226 to 50 trees per acre (EA, appendix B-2).

e. Five plantations proposed for commercial thinning are within 250 feet of coho habitat. <u>Use</u> the following thinning prescriptions for areas between 100 and 250 feet from coho streams: <u>Thin</u> stands 034, 051, 160, 209, and 244 to 70 trees per acre (EA, appendix B-2).

f. Five plantations proposed for commercial thinning are within 500 feet of coho habitat. <u>Use</u> the following thinning prescriptions for areas between 250 and 500 feet from coho streams: <u>Thin</u> stands 006, 155, and 304 to 70 trees per acre; <u>thin</u> stands 040 and 303 to 90 trees per acre (EA, appendix B-2).

Bald eagle, marbled murrelet, and northern spotted owl habitat

Bald eagle, marbled murrelet, and northern spotted owl

a. For any activity that proposes to remove mature conifer, <u>involve</u> a wildlife biologist.

b. Except for hazard trees, <u>do not remove</u> individual known nest trees or trees with nesting structure from areas where, in the opinion of the unit biologist, the loss of such a tree would limit nesting. A known nest tree <u>may be removed</u> only when it is a hazard tree **and** when the tree is unoccupied by nesting birds or young (e.g., after the young have fledged).

c. Where landings are adjacent to mature stands, <u>give priority</u> to existing stumps and trees less than 24 inches in diameter at breast height (DBH) when selecting trees as guy-line anchors. Where tree diameters are limited to those larger than 24 inches DBH, <u>use</u> only those trees that do not have nesting structure. If a tree with nesting structure must be used as an anchor, <u>do not fall</u> the tree during the nesting season.

Marbled murrelet

a. <u>Comply</u> with the standards of the 13 May 1997 biological opinion addressing the effects of implementing the Northwest Plan standards and guides on designated murrelet critical habitat (USDI 1996) for all thinning and individual hazard-tree removals that may affect critical habitat or suitable habitat of the marbled murrelet.

Bald eagle, northern spotted owl, and marbled murrelet disturbance

Bald eagle, marbled murrelet, and northern spotted owl

a. If a new nest site is discovered in the project area, <u>evaluate</u> any activity within 0.25 mile of the nest site (0.5 mile line-of-site for bald eagle nests) for potential effects. <u>Restrict</u> activities to prevent disturbances where necessary.

b. <u>Do not begin</u> helicopter operations until October 1 in any given year where operations will be within ¼-mile of suitable occupied or unsurveyed suitable habitat.

c. <u>Do not use</u> blasting for part of any proposed action from March 1 through September 30.

Marbled murrelet and northern spotted owl

a. To minimize risk of attracting predators to activity areas, <u>contain</u> or <u>remove</u> all garbage (especially food products) in the vicinity of any activity.

b. <u>Restrict</u> hauling on classified road 2400 between the junction of classified roads 2400-852 and 2400-863 to occur outside the period of April 1 through August 5 (<u>appraise</u> for adverse haul).

Bald eagle

a. <u>Do not implement</u> any activity within 0.25 mile (0.5 mile for aircraft operations) or a 0.5-mile sight distance of a known bald eagle nest site between January 1 and August 31, unless a wildlife biologist has determined that the nest site is unoccupied.

Marbled murrelet

a. <u>Do not implement</u> activities (including associated site evaluation, road building, log hauling, planting, etc.) within 0.25 mile of a known occupied marbled murrelet site during the critical nesting period of April 1 through August 5. The unit wildlife biologist <u>may modify</u> the distance and timing of activities based on site-specific information. <u>Document</u> all changes and <u>notify</u> the US Fish and Wildlife Service before actions are implemented.

b. <u>Do not begin</u> activities associated with projects within 0.25 miles of occupied or unsurveyed suitable or potential marbled murrelet habitat between April 1 and September 15 until two hours after sunrise; <u>end</u> activities two hours before sunset.

Northern spotted owl

a. <u>Do not implement</u> activities (including associated site evaluation, road building, log hauling, planting, etc.) within 0.25 mile of a spotted owl nest site or the activity center of any known pair (unless known to be unoccupied, as defined by protocol) during the critical nesting period of March 1 through July 7. The unit wildlife biologist may modify the distance and timing of activities based on site-specific information. Document all changes and notify the US Fish and Wildlife Service before actions are implemented.

2. Wildland-Urban Interface

a. 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 of 50 to 70 trees per acre to allow for underburning or for hand-pile burning. Wider spacing in stands permits heat to escape minimizing crown damage and creates a fuel break that will not easily support a running crown fire. Based on past results, no more than 10% 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.

   Affected stands and type of treatment: stand 104: no thinning within 150 feet of private land boundary (ok to thin adjacent to any stream); stands 010, 081, 099, 100: hand pile and burn within 300 feet of private land boundary; stand 226: underburn.

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

b. 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 that require restricted public access. The district hydrologist, fire management officer, and transportation planner will determine closure type and locations. Classified (system) roads requiring treatment include 2400-848, 852, -867, -888; 2500-796 (barricade both ends); 2610-719, -819; 4800-842, -844; and 4890-911, -915. See wildland-urban interface fuels prescription for additional information.

c. Assess other roads in the planning area boundary 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.

3. Other requirements

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

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

c. The literature was searched for possible heritage resources (historical or archaeological sites) in the project planning area. No known sites were identified that could be affected by this project. In accordance with the Siuslaw National Forest's 1995 Programmatic Agreement with the State Historic Preservation Office (SHPO), conduct field inventories by certified heritage technicians and receive concurrence from the State Office after project design, but before stream enhancement actions are implemented on previously undisturbed ground. Riparian planting will not be allowed in areas identified as homestead building sites. Other actions will all be on previously disturbed ground and will not require field inventories. Should any heritage resources be discovered as a result of any project activities, the site will be preserved or treated in accordance with the National Historic Preservation Act.

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

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

II. Commercial Thinning and Post-harvest Activities

1. Thin and harvest operations

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

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

b. Operating seasons have been established for units to minimized noise-associated disturbances to northern spotted owls and marbled murrelets. Base time frames and corresponding thinning areas (in percent acres) accordingly: July 8 to August 5, 34%; August 6 to September 30, 16%; and October 1 to February 28, 50%.

c. Add provisions (such as CT6.25 and CT9.52) to contracts to protect any of these species that may be discovered when the project is implemented. The Forest wildlife biologist will determine the need for reinitiating consultation with the U.S. Fish and Wildlife

Service, and the Forest fish biologist will determine the need for reinitiating consultation with the National Marine Fisheries Service (SFP: FW-035, 037).

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

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

Survey-and-Manage Species:

a. No surveys are required for terrestrial mollusks. Stands averaging 16" or greater in diameter at breast height must be surveyed for red tree voles. Only one stand (stand 608103) required a survey for red tree voles. No red tree vole nests were found.

b. Protect the lichen site (*Ramilina thrausta*, category A) that is in CVS plot 1086048 adjacent to the commercial thinning stand 608155. Implement a 300-foot buffer measured from the plot perimeter (about 485 feet from plot center) and require directional felling (C6.41) along the buffer boundary.

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

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

a. Emphasize variable spacing in distributing leave trees to mimic natural stands.

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

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

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

e. In stands thinned to 50 TPA, retain 30 to 40% canopy cover (40 trees/acre) except within ¼-mile of known northern spotted owl or marbled murrelet sites, where the canopy cover will be kept above 40%. All areas thinned to 50 TPA must retain a canopy cover greater than 30%.

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

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

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

Streams and Riparian Vegetation

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

b. Determine width of buffers based on site-specific factors such as stream order, presence or absence of conifers, and slope-stability conditions. Buffers will at least include the inner gorge adjacent to streams, the active floodplain, and about 50 feet slope distance from the edge of the floodplain. If no floodplain or slope break exists, retain at least two rows of conifer above streams (SFP: FW-087, -088, -089, -112).

c. Limit skyline corridors to between 10 and 12 feet wide. Corridor width may appear wider in areas where trees adjacent to the corridor are cut to meet the silviculture prescription. Where skyline corridors pass through riparian buffers, remove no more than 20% of the canopy in a given 1,000-foot reach of stream (SFP: FW-091).

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

e. To reduce sedimentation from aggregate-surfaced roads 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), avoiding blading of ditches, monitoring roads by a fish biologist or hydrologist during periods of heavy rain, and using straw bales to trap sediment where needed on log haul routes. Haul may be temporarily suspended if the specialist determines that sediment entering streams is excessive**.**

f. Where skyline cable yarding is planned, design logging systems to yard away from stream channels to minimize soil disturbance on stream-adjacent slopes. If this strategy is not feasible, maintain full suspension of logs over streams (SFP: FW-091, -092).

Soils and Woody Debris

a. Whole-tree yarding may be used if agreed to by a soils scientist or hydrologist. Decisions on whether to implement whole-tree yarding will be made case-by-case.

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

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

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

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

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

g. Ground-based logging systems such as harvesters or wide-tracked skidders may be used if operations are limited to ground less than 35% slope, designated skid roads, and the dry season. A soils scientist or hydrologist will determine case-by-case where ground-based systems may be used. Should rain occur in the late-summer season, operations may be temporarily suspended to prevent rutting and puddling of skid trails. Suspension of operations will be determined by a specialist in cooperation with the sale administrator.

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

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

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

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

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

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

f. Surface temporary roads used during the wet season with rock aggregate where needed. Surfacing depth should allow for log trucks using constant reduced tire pressures. Consider the length of temporary roads when determining the season of use. For the timber sale contract, identify roads where rock is not to be used.

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

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

i. Consider machine piling and burning of landing piles, especially within 25 feet of ATM roads. The district hydrologist, fire management officer, and sale administrator will determine appropriate sites for machine piling and burning. These sites generally include roads and landings that have been rocked (SFP: FW-162).

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

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

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

m. To mitigate effects from road reopening, waste from roadbeds on sensitive mid-slope areas will be removed to avoid failure into streams below. Portions of roads requiring this treatment occur in stands 6, 51, 139, 160, 246, 262, 268, 271, and 291.

n. KV funds will be collected to treat potentially unstable sidecast areas in units 10, 51, 69, 71, 79, 80, 102, 118, 128, 139, 160, 200, 212, 246, 268, 269, 286, 291, and 303 upon completion of the timber-sale contract.

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

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

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

c. Winter haul will not be allowed on County road 5110 (Thompson Creek road) because of its proximity to Thompson Creek.

d. If winter haul occurs on road 4800-831, stream crossings will be rocked on either side to prevent sediment from entering the stream.

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

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

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

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

2. Post-harvest “Essential” KV reforestation activities

Reforestation is considered “essential” only where harvesting has opened up holes in the canopy--such as landings and corridors--that were previously stocked with trees. All conifer underplanting (under the crowns of overstory conifers) is considered as “non-essential” or enhancement. Refer to the Silviculture Prescription in the project file for unit-specific information.

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

a. Plant about 50% of the stands thinned to 50 tpa, 15% of the stands thinned to 70 tpa, and 5% of the stands thinned to 90 tpa. All of the planting acres in the 70 and 90 tpa treatments (365 and 27 acres, respectively) are essential. 30% of the 50 tpa planting areas (111 acres) will be considered essential.

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

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

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

3. Post-harvest mitigation activities

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

Fire and Fuel Management :

a. Follow the Fire Management Plan for LSR RO268 for all wildfire suppression or pre-suppression prevention programs. For all burning, prepare a burn plan that meets all the parameters identified in FSM 5150. Register all material to be burnt through the Forest fuels planner and enter into the FASTRACS program. Allow 5 to 7 days to complete this process that must be done prior to burning. Conduct all burning according to the guidelines of the Oregon Smoke Management Plan.

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

c. Where fuel borders county roads and Forest classified (system) roads maintained open for general use, provide fuel breaks to reduce the risk of human-caused fire. Measure fuel breaks from the edge of the road into the thinned units. Classified roads will require a minimum 25-foot fuel break for each side of the road bordered by fuel. About 39 total acres will be treated. See fuels prescription worksheet--Handpile and Burn Acres Along Classified Roads--for a list of affected roads.

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

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

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

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

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

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

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

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

b. In LSR plantations, maintain 5 to 15 trees-per-acre (tpa) for coarse woody debris. No trees for coarse woody debris are required in matrix plantations. Refer to the silviculture prescription table for site-specific cwd requirements.

c. Defer creating coarse wood in harvested units until four years after the sale contract is closed to allow for canopy recovery. At that time, monitor the canopy cover before the trees are felled to ensure canopy cover remains at or above the 30 to 40% range.

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

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

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

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

a. To mitigate for past losses of mature snags, top mature trees or inoculate them with native fungi (*Phellinus pini* and *Fomitopsis canjanderi*) in natural stands adjacent to commercially thinned managed stands. Top or inoculate about 230 trees to ensure subwatersheds contain at least 1.4 snags/acre or 10% above their existing number.

b. In thinned portions of plantations, inoculate about 3,554 (including 20% mitigation for past harvest practices) trees with native fungi (*Phellinus pini* and *Fomitopsis cajanderi*) to ensure subwatersheds average 2.4 snags/acre. Inoculation will allow for continued tree growth and increase snag diameter while providing cavity habitat. Inoculation numbers are based on the net acres of managed stands commercially thinned.

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

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

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

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

Noxious Weed Prevention and Mitigation:

a. To prevent the spread of noxious and undesirable weeds, maintain canopy cover to the extent possible when reopening and building roads or stabilizing and closing them. Seed disturbed sites lacking canopy cover (landings, tractor skid roads, and roads) with available native, certified weed-free grass and forb species (see 10/96 briefing paper for seeding prescription that is attached to the vegetation management analysis).

b. To prevent spread of noxious weeds, include provision C6.35 (Equipment Cleaning) in the timber sale contract for all ground-based logging equipment.

c. Develop noxious weed treatment prescriptions for harvested units and their adjacent areas. Prescriptions will be based on information obtained from previous monitoring. Limit treatments to manual (handpulling and burning), mechanical, and biological methods (including additional seeding). The funding source for treatments will be KV mitigation collections.

Unclassified Roads Not Reopened:

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

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

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

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

4. Post-harvest enhancement activities

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

a. Non-essential planting will be done under the canopy of stands that are thinned to 50 tpa to enhance diversity. About 70% (or 259 acres) of these stands will be underplanted. Plant shade-tolerant conifers, such as western hemlock, western red cedar, and Sitka spruce. Also consider planting hardwoods, such as Oregon big-leaf maple, cascara, and bitter cherry.

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

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

Creating Snags and Wildlife Trees (NFP: 2; p. C-14):

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

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

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

III. Road Decommissioning and Closure

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

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

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

b. Design fill-removal activities to minimize sediment entering stream channels. The objective is to restore stream processes and floodplain access by removing all fill material on the valley floor. Excavate slopes to approximate 1.5:1, where practical; do not encroach on natural slopes. Allow disturbed slopes to revegetate naturally or use erosion control measures (such as tree limbs and tops, native seed mixtures or plants), where a moderate to high potential for surface erosion exists. Because it can impede the establishment of natural vegetation and deplete soil of nitrogen, use straw as a last resort. Where feasible, restore the natural flood plain. Consult with watershed and/or fisheries staff where technical feasibility or economics limit meeting fill removal objectives (SFP: FW-123).

c. Place material excavated from stream crossings and unstable side-cast road fills on stable areas at least 100 feet away from stream channels or active flood plains. Suitable areas include roadbeds adjacent to cutbanks, or on previously designated waste areas (if locally available). Remove any alder or conifer from the cut bank before placing excavated material, to enhance soil-to-soil contact and long-term soil stability. Contour waste piles to approximate 1.5:1 to 2:1 slopes and allow to revegetate naturally. Seed piles with a mixture of native, certified weed-free species where a moderate to high potential exists for surface erosion, or where noxious weed infestation is likely. (SFP: FW-117, 171).

d. 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.

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

f. Place woody debris, if locally available, in stream channels where sediment is expected to erode from channels at amounts that equal or exceed three (3) cubic yards. This strategy will help reduce sediment rates as streams adjust to gradients during the next year’s high flows.

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

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

i. Design water bars to facilitate proper drainage of surface water and to prevent ponding. Place water bars in areas where drainage will not destabilize road fills. To keep streams within their channels when culverts are obstructed, build water bars immediately above existing culverts to become the overflow point. Use the Siuslaw National Forest Water Bar Construction Guide to determine water-bar spacing and design (SFP: FW-123).

j. Decompact surfaces of decommissioned roads where necessary, to allow water to percolate through the soil and accelerate the recovery of woody vegetation. Although subsoiling is the preferred method, use ripping if subsoiling is not feasible or economical. Consult a geotechnical specialist to determine feasibility of subsoiling (SFP: FW-162).

k. Transport off-site culverts removed from stream crossings and ditches to be recycled, reused, or disposed of at a landfill.

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

2. Road Closure (ML1):

Definition--A road on which vehicle traffic has been excluded (year-long or seasonal) by natural blockage, barricade, or by regulation. A closed road can still operate and remains under the jurisdiction of the Forest Service as a classified road.

a. Close roads placed in ML1 status by one of three methods: growing roadside vegetation, placing an earthen mound or other natural material at or near the road entrance, or installing a guard rail. Closure type will be determined case by case.

b. Stabilize closed roads by reopening culvert inlets where necessary, repairing water bars, or building additional water bars. Build drain dips immediately above stream crossings, to ensure water is kept within stream channels when culvert inlets are obstructed. Harden drain dips with rock to minimize sedimentation of streams when culverts fail.

c. Design and place water bars based on specifications for decommissioned roads.

d. Excavate failing side-cast fill material at stream crossings and at other areas where material could enter streams. Focus on areas where downhill slopes adjacent to roads are greater than 60% and road fills are within 200 feet slope-distance of streams.

IV. Hydrologic Function and Water-Quality Restoration (NFP: RA-1 & FW-1; WR-1, 3; p. C-37)

1. Tree Selection

Wildlife biologists, with technical assistance from U.S. Fish and Wildlife Service 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 ATM 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:

1. Select trees that will be dispersed within the first two lines of trees along the periphery of permanent openings such as road rights-of-ways and power line corridors, or along the periphery of nonpermanent openings such as plantation edges or conifer-alder mixed plant associations adjacent to riparian areas;
2. Select trees that will be less than or equal to 36 inches DBH and lack existing or potential bald eagle, marbled murrelet, and northern spotted owl nesting structure—for owls, trees with cavities or other deformities that provide nesting structure; for murrelets, limbs or other platforms greater than or equal to four inches in diameter);
3. In general, select individual trees; however, if the wildlife biologist determines that selecting small groups of 3 to 4 trees will not decrease the amount and suitability of available owl or murrelet habitat in the affected stand, small groups may be selected; and
4. To the greatest extent possible, select trees to avoid any damage to existing or potential nesting structure in the stand during felling and removal operations.

The following trees will **not** be selected for removal:

a. Trees with potential nesting platforms or cavities suitable for bald eagles, murrelets, and northern spotted owls;
b. Known bald eagle, spotted owl or marbled murrelet nest trees or trees adjacent to known nest trees that provide protection for nest trees;
c. Trees within ¼-mile of a known spotted owl nest site;
d. Trees that maintain suitable nesting conditions by buffering trees with nesting structure;
e. The largest trees in areas where the number of large trees is limited; and
f. Trees with the best opportunity to develop future nesting structure.

To evaluate the effectiveness and feasibility of tree selection criteria associated with large wood for stream enhancement, the Forest Service will request technical assistance from the U.S. Fish and Wildlife Service before felling or removing any standing trees not posing an immediate hazard. This technical assistance may include meetings and field reviews as needed and would be both before and during the tree selection process. Additional assistance may also be needed during felling and helicopter operations.

2. In-stream Placement of Large Wood

a. Large wood length should be at least 1.5 times bank-full width, and large wood diameters (measured at breast height on a tree) should approximate 2 times bank-full depth. Where trees more than 1.5 times bank-full width are not available, artificial anchoring of logs with cable and epoxy may be implemented.

b. Do not begin helicopter operations until October 1 in a given year where operations will be within ¼-mile of suitable occupied or unsurveyed suitable habitat of northern spotted owls and marbled murrelets.

c. Begin all ground-based activities within ¼-mile of suitable habitat after August 5 in a given year.

d. If ground-based equipment is used, place large woody debris (partial- and whole-tree length) in streams during the summer-to-fall low-flow period to minimize disturbance to fish and to lessen safety risks. Activities will occur between July 15 and September 15 unless a waiver is obtained by ODFW (SFP: FW-117).

e. Survey for heritage resources prior to and in areas where ground-based equipment will be used for placing large wood in Knowles, Thompson, and Walker Creeks.

3. Riparian Management

a. To prepare sites for riparian planting, fell alder trees and remove brush. A silviculturist and fish biologist will select trees to be felled.

b. Plant western red cedar, Sitka spruce, and willow or other native hardwoods in designated riparian areas. Close to the water or in wetter soils, plant only western red cedar, Sitka spruce, or willow. Base plantings on microsite conditions so that species are best matched to their site. Trees will generally be planted within 200 feet of stream channels. Include, at least, a fish biologist and a silviculturist in selecting planting sites. Implement animal control measures such as tubing or capping to benefit tree survival and growth. Release planted trees the 1st, 3rd, 5th, and 10th years after planting to maintain tree survival and growth.

c. Where designated riparian zones contain a dense conifer component, thin (but do not harvest) these areas to 50 tpa within 5 years after harvest operations are completed, to accelerate developing large wood for streams. Develop thinning prescriptions governed by stream shading requirements and slope stability concerns. Use a silviculturist and a hydrologist or fish biologist in preparing prescriptions. Fell or yard some trees across stream channels to provide additional stream structure. As a means of thinning, create some snags from the residual standing trees.

d. Release previously planted trees in riparian areas in the watershed. Two types of release will be implemented: Release from below—cut all brush around individual trees at a distance of about twice the diameter of the drip-line around the crown of the tree to lessen competition from brush. Release from above—fell, girdle, prune, or top overhanging hardwoods to expose two tree crown sides to sunlight. One of the opened sides should preferably be on the south side of the tree to take advantage of the sun angle. As a general rule, trees will benefit most by the following order of sun exposure: south, east, west, and north.

e. Release natural conifer regeneration that lack adequate sunlight. Use the same techniques and procedures outlined for planted conifers.

f. For the most effective approach in reducing competition from brush and hardwoods, conduct all release work from late spring to late summer.

g. The Forest archaeologist will review plans for riparian planting projects to determine the need for heritage resource surveys. If needed, survey for heritage resources prior to any ground disturbing activity to protect known homesteads and other sites from potential impacts.

V. Other Activities

1. Non-commercial Stocking Control of Managed Stands 5 to 35 Years Old (NFP: p. C-12):

About 1,453 acres in stands less than 25 years old; some older, overstocked stands (401 acres) not feasible for commercial thinning; and about 145 acres of riparian areas (to benefit fish) will be thinned. A total of about 1,999 acres will be treated with this project. [Note: About 2,106 acres—not part of this project—were recently thinned (winter 2001-2002) under contract].

About 1,647 acres (391 of late precommercial thinning, 73 of riparian thinning for fish habitat, and 1,183 acres of precommercial thinning) are within 0.25 miles of proposed commercial thinning units and will be eligible for KV funding (revenue collected from the sale of timber). If KV funds are insufficient, other appropriated funds will be needed to fully fund these treatments. The remaining 352 acres will be funded from other sources, when available.

No treatment will be done for 1,080 acres in the younger stands because 855 of these acres have already been treated and 225 of these acres are sparsely stocked. Many of the older stands in this age group have been precommercially thinned or will forego precommercial thinning and go directly into a commercial thinning treatment.

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

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

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

2. Creating Early-Seral Habitat, Maintaining Existing Meadows, and Managing Noxious Weeds:

a. Create early-seral habitat in existing plantations in matrix. Where available, use existing laminated root-rot pockets as a core area for early-seral habitat. Follow guidelines in the silviculture prescription to determine appropriate boundaries of early-seral habitat when using root-rot pockets.

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

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

3. Roadside Hazard Trees:

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

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

4. ATM Road Maintenance:

a. Remove conifers and hardwoods on ATM road cut banks or road fills through sales or service contracts. Consider using commercial thinning sales as a means for removal.

5. Sweet Creek Trail Mitigation and Enhancement:

a. Temporarily close the trail when precommerical thinning operations occur in the vicinity of the trail in stands 608246 and 608259 or have the contractor place personnel on the trail at worksites during operations to protect hikers.

b. Use directional felling techniques to keep debris away from the trail surface and from areas within 50 feet of the trail. Remove any debris that falls into these areas.

c. Install two interpretive signs—one at the north end of the trail below stand 608226 and the other where the trail crosses road 4800. Place the sign away from road 4800 to minimize vandalism. The signs will be used to explain the purpose of thinning plantations to the public.

VI. Special-Use Road Permits

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

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

VII. Monitoring Objectives

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

1. Implementation Monitoring

Forest Plan Standards and Guides

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

Contract and Operations

Involve appropriate specialists when developing timber sale, road decommissioning and other project contracts or conducting District operations work to ensure activities are implemented as designed. The appropriate specialists will also participate periodically during contract work, especially when unusual circumstances arise that may require a contract modification.

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

2. Effectiveness Monitoring

Monitoring will be tiered to the Siuslaw Forest Plan.

Vegetation Management

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

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

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

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

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

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

g. For a period of three years after harvest, annually visit high and moderate risk (to weed infestation) commercially thinned units and adjacent areas to determine effectiveness of preventive measures. Monitoring information will be used to develop prescriptions for future noxious-weed treatments in and adjacent to units. Refer to the weed risk column of the wildlife table in the project file for a list of high and moderate risk stands.

Road Treatments

a. Field-review excavated slopes from road stabilization activities and note areas where eroded materials enter stream channels. Make observations after the first major rainfall and seasonally thereafter until vegetation reoccupies disturbed sites (about 2 to 5 years). If the surface is eroding and could adversely affect fish habitat, take steps to eliminate or reduce erosion.

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

c. Review the effectiveness of road closures to determine whether another form or location of closure will be required at or near road entrances.

Fish Habitat Treatments

a. Use Oregon Department of Fish and Wildlife and U.S. Forest Service stream surveys to assess changes from measured baseline data in fish habitat characteristics of streams where large wood was added.

3. Project Tracking

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

VIII. KV Actions

Table 1 identifies KV actions for Alternative 1, Proposed Action, including estimated costs. The table lists the projects in order of priority and identifies some as essential or mitigation. Those not identified as essential or mitigation are non-essential or enhancement projects.

Table 2 identifies all non-KV actions for Alternative 1 and their estimated costs. These actions are expected to be funded with appropriated dollars.

Table 1. Alternative 1 KV actions summary

Prioritized action	Mitigation	Unit of measure	Unit number	Cost/unit	Total cost
Sidecast pullback	Yes	Cubic yards	4,932	10	49,320
Road culvert and fill removal from temporary roads	Yes	Cubic yards	14/2,475	10	24,750
Road waterbar and closure	No	Miles	54.4	640	34,820
Snag creation by mature tree topping	Yes	Trees	230	100	23,000
Snag creation by plantation tree inoculation[a]	Yes	Trees	3,554	35	124,390
Down wood creation[b]	Yes	Trees	11,886	10	118,860
Stream shade monitoring	Yes	Miles	10	2,000	20,000
Noxious weed control	Yes	Acres	397	135	53,595
Upland “essential” planting and release (2 releases)	No	Acres	503	1000	503,000
Upland understory “non-essential” planting	No	Acres	259	800	207,200
Precommercial thinning and upland noncommercial thinning	No	Acres	1,574	200	314,800
Riparian noncommercial thinning	No	Acres	73	200	14,600
Riparian conifer release (previously planted)	No	Acres	12	150	1,800
Riparian natural conifer release	No	Acres	60	300	18,000
Riparian planting and release (4 releases)	No	Acres	50	2,000	100,000
Stockpile large wood for streams, mature trees	No	Project	395	150	59,250
Early-seral creation and maintenance	No	Acres	55	1,125	61,875
System road decommission	No	Miles	13	3,967	51,565
Fire equipment access roads[c]	Yes	Miles	25	620	15,500
Lower Sweet Creek trail interpretive signing	No	Signs	2	1,250	2,500
Total					**1,798,825**

[a]20 percent of the snags created will be counted as mitigation.
[b]50 percent of the down wood will be counted as mitigation.
[c]Includes construction of rolling-dip waterbars and closure of road entrances using guardrails as mitigation for wildland-urban interface.

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

Table 2. Alternative 1 **non**-KV actions summary

Prioritized action	Unit of measure	Unit number	Cost/unit	Total cost
Road waterbar and closure	Miles	8.9	640	5,700
Large wood for streams	Mature trees	395	625	246,875
Large wood for streams	Plantation trees	230	250	57,500
Precommercial thinning and upland noncommercial thinning	Acres	280	200	56,000
Riparian noncommercial thinning	Acres	72	200	14,400
Riparian conifer release (previously planted)	Acres	35	150	5,250
Riparian natural conifer release	Acres	20	300	6,000
Riparian planting and release (4 releases)	Acres	10	2,000	20,000
System road decommission	Miles	2	4,308	8,615
Total				**420,340**

Berkshire

Stand Number	Year of Origin	Total TSE Acres	Compartment /cell	Original Unit Name	Current TPA	Current TPA <7 DBH	Ave Ht Largest Trees	Current Mean Diameter	Current Basal Area sq ft per acre	Total Cubic feet (M) per acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Residual TPA (Post CWD)	Residual Diameter	Residual Basal Area	Residual Relative Density	Exam Date
072	1961	17	2153062	Walker Cr #2 Unit 1	191	31	118	12.7	169	5.2	24.5	70	47	90	15	110	28	Mar-01
075	1967	28	2153068	Neely Mt.Salvage #2 Unit 2	306	12	100	11.9	136	6.7	31.1	73	69	50	14.9	60.5	16	Feb-01
077	1974	89	2153067	Neely 1-70 Unit 1	294	44	91	9.9	158	4	18.8	76	50	70	12.5	60	17	Jun-01
085	1971	37	2153060	Neely Ridge #2 CI Unit 1	388	137	89	8.9	169	4.2	18.7	67	57	70	12.3	57	16	Apr-01
092	1965	3	2153053	Neely Ridge Rd.Salv 2 F U-2	347	60	91	11	227	6.2	26.1	72	69	90	13.2	86	24	Feb-01
099	1961	45	2153055	Neely Ridge Unit 2	196	6	113	13.9	205	6.5	30.8	73	55	70	16	99	25	Mar-01
109	1968	20	2254109	Hadsall Ridge Unit 1	197	*	87	12.8	176	5	23.4	57	49	50/70	15.2/14.7	64/83	16/22	Aug-01
Subtotal		239				*information not collected												

Cedar

Stand Number	Year of Origin	Total TSE Acres	Compartment/ cell	Original Unit Name	Current TPA	Current TPA <7 DBH	Ave Ht Largest Trees	Current Mean Diameter	Current Basal Area sq ft per acre	Total Cubic feet (M) per acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Residual TPA (Post CWD)	Residual Diameter	Residual Basal Area	Residual Relative Density	Exam Date
181	1959	38	2256020	Cedar Creek Unit 1	372	140	118	11.2	255	7.8	36.8	80	76	90	16.3	131	32	Nov-00
200	1969	249	2256029	Upper Cedar Cr Unit 1	378	115	107	9.4	183	4.7	22.2	72	60	70	13.6	70	19	Nov-01
209	1959	94	2256036	Sunset Mt Unit 4	254	58	118	12.7	223	7.3	35.6	75	63	70	17.8	121	29	Oct-00
210	1965	8	2256027	Cedar Creek Rd Salv F U-1	252	35	106	11.7	188	5.3	24.8	73	55	70	14.8	84	22	Dec-00
212	1954	52	2256030	Henderson Cr #3 Unit 3	265	32	116	12.9	242	7.6	36.2	71	67	90	16.2	130	32	Oct-00
214	1963	21	2256026	Upper Cedar Creek area	324	71	114	11.7	241	7.4	35.2	74	71	70	16	97	24	Oct-00
226	1974	51	2256045	Sunset 1-70 Unit 2	272	66	90	9.3	130	3.3	15.6	72	42	50	12.9	46	13	Jun-01
230	1975	65	2256038	Red Sunset 3-72 U-1	162	16	100	12.3	135	3.9	18.1	74	38	70	14.3	78	21	Jun-01
233	1965	37	2256037	Mt Peter Blowdown F U-1	299	64	108	10.8	190	5.4	25.2	66	58	70	15.1	87	22	May-01
240	1959	108	2256042	Sunset Mt U-2	204	*	111	13.8	211	6.6	31.8	74	57	70	16.5	104	26	Oct-01
244	1974	94	2256047	Sunset 1-70 Unit 1	217	52	102	10.3	125	3.5	16	72	39	70	13.6	70	19	Jul-01
246	1966	22	2256048	Sweet Ck Blowdown U-1	320	97	101	9.5	157	4.1	19	76	51	70	13.1	66	18	Jul-01
249	1965	3	2256039	Sunset Spur Rd Salv U-1	257	*	103	12.8	227	6.7	31.5	71	64	70	15.8	95	24	Sep-99
255	1965	21	2256051	Sunset Mt U 1	241	*	115	12.5	206	6.2	29.5	73	58	50	16.1	71	18	Sep-99
257	1959	87	2256052	Sunset Mt U-4	281	*	115	12.5	239	7.2	34.8	72	68	70	15.8	96	24	Sep-99
268	1961	108	2257060	Sunset Goodwin Unit 2	289	22	113	12.4	241	7.2	34.5	70	69	70	16.3	101	25	Jun-01
273	1973	35	2257061	Goodwin Peak Unit 1	258	53	97	10.1	142	3.8	17.4	75	45	70	13	64	18	Jun-01
286	1959	49	2257062	Fall Creek Unit 1	256	54	119	12.4	215	6.8	32.7	63	61	70	16.8	107	26	Jan-01
288	1968	5	2257063	Fall Creek Blowdown F U-1	247	33	96	10	134	3.5	16.7	80	42	70	12.3	58	17	May-01
291	1965	49	2257065	Fall Creek Blowdown U-1	293	26	105	11	194	5.4	25.5	72	58	50/70	14.7/14.1	59/75	15/20	Dec-00
307	1967	13	2256041	Sunset Salvage Unit 1	375	*	87	10.9	244	6.4	30.8	70	74	70	13.7	72	19	Sep-99
Subtotal		1209				*information not collected												

Divide

Stand Number	Year of Origin	Total TSE Acres	Compartment/ cell	Original Unit Name	Current TPA	Current TPA <7 DBH	Ave Ht Largest Trees	Current Mean Diameter	Current Basal Area sq ft per acre	Total Cubic feet (M) per acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Residual TPA (Post CWD)	Residual Diameter	Residual Basal Area	Residual Relative Density	Exam Date
067	1966	41	2153020	David Cr 2 Blwdwn F U-1	128	*	115	13.6	138	3.8	18.2	70	35	70	14.2	77	20	Sep-98
080	1967	64	2152068	Hanson Cr Blwdwn F U-1	305	44	103	10.7	190	5.1	23.5	71	58	70	13.4	68	19	Feb-01
087	1967	10	2152066	HansonCr Blwdwn F U-2	388	137	91	8.9	169	4.2	18.7	80	57	70	12.5	60	17	Feb-01
089	1966	26	2152052	David Cr 2 Blowdown F U-2	186	*	101	12.5	159	4.5	21.4	74	45	90	14.3	101	27	Aug-98
102	1967	20	2152043	David Cr Blowdown Unit 4	258	*	93	12	201	5.6	26.4	79	58	70	13.8	72	19	Aug-98
103	1962	8	2153048	Neely Ridge Unit 2	80	*	112	19.7	169	6.2	30.2	70	38	50	20.2	112	25	Aug-98
160	1972	33	2153046	Neely Ridge Unit 1	296	50	97	10.1	164	4.2	19.7	75	52	70	12.7	61	17	Jun-01
607247**	1967	36	2152040	Fossback area	258	*	95	12	202	5.6	26.4	78	58	70	13.8	72	19	Aug-98
Subtotal		238																

*information not collected

**24 acres in North Fork, 12 acres in Lower Siuslaw

Hadsall

Stand Number	Year of Origin	Total TSE Acres	Compartment/ cell	Original Unit Name	Current TPA	Current TPA <7 DBH	Ave Ht Largest Trees	Current Mean Diameter	Current Basal Area sq ft per acre	Total Cubic feet (M) per Acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Residual TPA (Post CWD)	Residual Diameter	Residual Basal Area	Residual Relative Density	Exam Date
153	1975	37	2254036	Beaver 69 Unit 2	218	40	93	10	120	3.1	14.2	73	38	70	12.4	59	17	Jul-01
155	1975	59	2254035	Beaver 69 Unit 1	168	51	96	10.9	168	4.6	21.4	87	51	70	13.5	71	19	Jun-01
166	1961	28	2254038	Beaver Creek Unit 2	236	*	93	12.5	202	5.9	28.5	84	57	70	14.8	84	22	Sep-99
Subtotal		124																

*information not collected

Hand

Stand Number	Year of Origin	Total TSE Acres	Compartment/ cell	Original Unit Name	Current TPA	Current TPA <7 TPA	Ave Ht Largest Trees	Current Mean Diameter	Current Basal Area Sq ft per acre	Total Cubic feet (M) per Acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Residual TPA (Post CWD)	Residual Diameter	Residual Basal Area	Residual Relative Density	Exam Date
173	1968	32	2257003	Beaver #2 Unit 1	325	73	95	10.2	184	4.9	22.1	88	58	70	13.4	69	19	Feb-01
191	1961	16	2257008	Beaver Creek Unit 1	457	130	111	9.7	234	6.6	31.8	84	75	70	15.4	90	23	Feb-01
213	1963	70	2257010	East Beaver Unit 3	177	30	114	11.8	135	4	18.8	89	39	50	15.3	64	16	Oct-00
236	1965	42	2257012	East Beaver Unit 2	296	80	111	10.8	187	5.3	24.7	85	57	90	14.1	98	26	Oct-00
237	1962	30	2257017	East Beaver #2 Unit 1	329	114	106	10.1	183	5	23.2	84	58	70	14.1	75	20	Dec-00
241	1969	25	2257019	East Beaver Unit 2	283	97	103	9.2	132	3.4	16.1	85	43	70	12.9	64	18	Nov-00
252	1963	45	2257023	Table Rock Unit 3	322	53	89	11.6	237	6.9	32.7	87	69	50	15.7	68	17	Nov-00
253	1955	13	2257049	Beaver Ce Salv #2 U-1	347	99	116	10.6	210	6	28	76	65	70	15.3	89	23	Jun-01
262	1969	44	2257054	South Canyon #2 Unit 2	321	96	111	10.2	181	5	23.28	89	57	70	14.3	78	21	Nov-00
264	1970	33	2257032	Hand Cr Unit 2	163	17	103	11.8	124	3.6	17	89	36	50	14.8	61	16	Jun-01
269	1973	93	2257053	Goodwin Peak Unit 2	314	62	88	9.5	154	3.9	18.3	83	50	70	12.4	59	17	Jun-01
271	1969	69	2257033	South Canyon #2 U-1	376	139	87	8.8	158	4	18.1	80	53	70	12.9	64	18	Jun-01
283	1967	12	2257077	Table Rock Blowdwn #1 U-1	269	82	103	10.5	162	4.5	21	80	50	50	16.1	71	18	Jun-01
293	1962	48	2257038	South Canyon Unit 3	289	78	115	11.9	225	7	32.9	85	65	70/90	16.3/15.7	101/121	25/31	Nov-00
298	1960	51	2257027	South Canyon Unit 1	327	80	116	11.6	241	7.4	34.8	91	71	70	16.4	102	25	Nov-00
299	1962	82	2257037	South Canyon Unit 1	219	23	119	14	233	7.6	36.3	85	62	50	17	78	19	Nov-00
301	1973	22	2257043	Goodwin Peak Unit 4	380	56	86	9.9	205	5.1	23.5	87	65	50	13.6	50	14	Jun-01
309	1963	79	2257078	Table Rock Unit 1	184	26	117	13.6	186	6	28.7	83	50	50	16.4	73	18	Nov-00
Subtotal		806																

Hoffman

Stand Number	Year of Origin	Total TSE Acre	Compartment/ cell	Original Unit Name	Current TPA	Current TPA <7 DBH	Ave Hi Largest Tree	Current Mean Diameter	Current Basal Area sq ft per acre	Total Cubic feet (M) per acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Residual TPA (Post CWD)	Residual Diameter	Residual Basal Area	Residual Relative Density	Exam Date
128	1967	52	2253019	Lawson Cr Blowdown Unit 2	308	38	95	10.6	187	5	23.3	79	57	70/90	13.5/13.3	70/86	19/24	Jun-01
139	1966	71	2253020	Lawson Cr Blowdown Unit 1	243	45	100	11.2	165	4.5	21.3	69	49	50	14.6	58	15	Nov-00
158	1967	76	2253021	Lawson Creek Unit 1	335	63	109	10.2	191	5.1	24	74	60	70	13.8	72	19	Nov-00
170	1956	7	2256018	Henderson Cr #4 Unit 1	584	233	104	9.7	301	8.7	41.1	73	97	90	16.3	130	32	Nov-00
Subtotal		206																

Lawson

Stand Number	Year of Origin	Total TSE Acre	Compartment/ cell	Original Unit Name	Current TPA	Current TPA <7 DBH	Ave Ht Largest Tree	Current Mean Diameter	Current Basal Area sq ft per acre	Total Cubic feet (M) per acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Residual TPA (Post CWD)	Residual Diameter	Residual Basal Area	Residual Relative Density	Exam Date
192	1971	12	2255009	Karnowsky Ridge Unit 3	430	176	99	8.8	180	4.4	19.7	76	61	90	12.4	75	21	Jun-01
195	1969	76	2255002	Henderson Creek #3 Unit 4	336	72	118	10.4	198	5.3	25.1	73	61	90	13.4	88	24	Nov-00
196	1954	20	2255003	Lawson (F) Unit 1	375	156	123	10.4	221	6.9	32.7	69	68	90	16	127	33	Nov-00
218	1950	19	2255018	Bernhardt Creek	300	55	106	11	200	5.5	26.2	73	60	90	15.8	122	31	Oct-00
310	1967	25	2255036	Jordon Creek # 2 Unit 7	298	55	114	11.9	232	7	33.2	74	67	50	12.5	115	28	Oct-00
Subtotal		152																

Lower Sweet

Stand Number	Year of Origin	Total TSE Acre	Compartment/ cell	Original Unit Name	Current TPA	Current TPA <7 DBH	Ave Ht Largest Tree	Current Mean Diameter	Current Basal Area sq ft per acre	Total Cubic feet (M) per acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Residual TPA (Post CWD)	Residual Diameter	Residual Basal Area	Residual Relative Density	Exam Date
118	1968	42	2254018	Hadsall Ridge Unit 2	280	56	84	10.2	158	4.1	18.5	85	49	90	12.4	75	21	May-01
134	1968	2	2254023	Hadsall Ridge Unit 4	196	36	93	10.8	125	3.4	15.7	87	38	50	13.7	51	14	May-01
Subtotal		44																

Siboco

Stand Number	Year of Origin	Total TSE Area	Compartment/ cell	Original Unit Name	Current TPA	Current TPA. <7 DBH	Ave Ht Largest Tree	Current Mean Diameter	Current Basal Area sq ft per acre	Total Cubic feet(M) per acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Residual TPA (Post CWD)	Residual Diameter	Residual Basal Area	Residual Relative Density	Exam Date
229	1960	25	2255036	Grant Creek Unit 2	260	49	95	12	170	5	25	85	55	90	15.6	119	30	Nov-00
231	1969	34	2255034	Carter Creek (I) #2 Unit 1	270	70	80	10	150	4	18	85	50	50	15.5	70	18	Nov-00
Subtotal		59																

Thompson

Stand Number	Year of Origin	Total TSE Area	Compartment/ cell	Original Unit Name	Current TPA	Current TPA < 7 DBH	Ave Ht Largest Tree	Current Mean Diameter	Current Basal Area sq ft per acre	Total Cubic feet (M) per acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Residual TPA (Post CWD)	Residual Diameter	Residual Basal Area	Residual Relative Density	Exam Date
006	1966	71	2154057	McLeod Creek #2 Unit 1	229	36	115	11.7	172	5	23.6	75	50	70	14.5	81	21	Apr-01
008	1959	16	2154028	Cleveland Creek Unit 2	375	99	109	11.1	253	7.3	34.4	76	76	70	15.3	89	23	Mar-01
009	1965	25	2154058	McLeod Cr #2 Bldwn Unit 1	278	92	93	9.6	140	3.6	16.6	75	45	70	12.7	61	17	Apr-01
010	1971	16	2154052	Cleveland area	116	23	91	12.4	98	2.8	13	78	28	70	13.3	96	26	Jun-01
011	1960	23	2154060	Cleveland area	187	13	105	11.1	126	3.4	16.4	79	38	50	13.1	47	13	Jul-01
015	1964	19	2154077	C;leveland area	340	108	99	10.8	217	6.1	28.5	77	66	70	15.1	87	22	May-01
018	1965	75	2154023	Cleveland area	229	38	114	12.2	187	5.5	25.6	76	53	70	14.9	85	22	May-01
019	1966	7	2154077	Cleveland area	340	108	99	10.8	217	6.1	28.5	77	66	70	14.8	84	22	May-01
030	1970	68	2251012	Old Man unit	266	32	108	11.9	205	5.9	27.4	76	60	70	14.3	78	21	May-01
035	1967	15	2251010	Old Man unit	266	32	108	11.9	205	5.9	27.4	76	60	50	14.8	60	16	May-01
047	1967	26	2252003	Bald Mt Bldwn F #2 Unit 3	284	71	108	11.3	198	5.6	26.5	75	59	70	14.6	86	23	May-01
056	1967	53	2252005	Old Man area	284	103	96	9.5	141	3.6	17.1	72	46	70	13.2	67	18	May-01
303	1959	81	2154030	Cleveland area	179	6	116	13	179	8.7	42.2	70	80	90	15.5	160	38	Apr-01
304	1957	110	2154045	Brickerville Rd (CC) Unit 1	201	35	115	12.6	174	5.4	26	77	49	70	15.8	95	24	May-01
Subtotal		605																

Upper Divide

Stand Number	Year of Origin	Total TSE Acres	Compartment/ cell	Original Unit Name	Current TPA	Current TPA < 7 Dia	Ave Ht Largest Trees	Current Mean Diameter	Current Basal Area sq ft per Acre	Total Cubic feet (M) per Acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Residual TPA (Post CWD)	Residual Diameter	Residual Basal Area	Residual Relative Density	Exam Date
033	1960	34	2153011	David Cr #2 Unit 2	155	5	118	13.2	147	4.5	21.5	77	40	70	14.8	84	22	Mar-01
040	1960	37	2153013	David Cr Unit3	186	228	102	11.1	186	5.1	23.9	80	56	90	13.5	90	24	May-01
057	1964	31	2153017	David Cr Salvage #2 U- 1	217	11	106	11.3	150	4.1	19.1	80	45	50	13.1	47	13	Mar-01
059	1965	30	2153034	David Cr. Salvage #2 U-5	213	32	94	10.7	134	3.6	16.6	73	41	70	13	66	18	Feb-01
071	1965	50	2153052	Neely Ridge Blowdown	229	21	108	11.8	174	5.2	24.4	79	51	50	15.2	63	16	Apr-01
078	1961	47	2153050	Neely Ridge U-4	158	*	116	14.2	174	5.5	26.1	80	46	70	15.6	93	24	Mar-01
079	1965	3	2153093	Hanson Cr Blowdown U-1	550	320	64	6.7	133	2.6	11.7	80	52	70	10.1	39	12	Feb-01
081	1973	77	2153037	Hanson 1/71 Unit 1	236	58	101	9.6	118	3	13.9	81	38	70	12.6	61	17	Jun-01
100	1962	31	2153046	Neely Ridge Unit 1	154	*	102	12.9	141	4	19.1	74	39	70	14.4	79	21	Sep-98
Subtotal		340																

*information not collected

Walker

Stand Number	Year of Origin	Total TSE Acres	Compartment/ cell	Original Unit Name	Current TPA	Current TPA <7 Dia	Ave Ht Largest Trees	Current Mean Diameter	Current Basal Area sq ft per Acre	Total Cubic feet (M) per Acre	Total Board Feet (M) per acre	Ht/Dia Ratio	Relative Density	Residual TPA (Post CWD)	Residual Diameter	Residual Basal Area	Residual Relative Density	Exam Date
024	1961	8	2153024	Walker Cr Unit 2	300	45	117	12.9	274	8.7	41.5	76	76	70/90	17/16.4	110/132	27/33	Feb-01
028	1976	93	2153176	Neely 1-73 Unit 1	189	26	110	10.7	119	3.2	15	80	75	70	12.1	56	16	Jul-01
029	1958	41	2153010	Walker Creek Unit 3	150	40	115	14	140	6	30	76	75	70	16	60	22	Feb-01
034	1958	28	2153036	Walker Cr Unit 4	167	0	115	12.4	140	4.2	20.6	77	40	70	14.4	79	21	Mar-01
037	1966	108	2153023	Neely Blowdown 2 F U-1	218	19	109	11.4	155	4.4	20.4	79	46	70	13.4	69	19	Mar-01
051	1961	45	2153027	Walker Creek 2 Unit 1	307	60	106	10	168	4.4	20.8	80	53	70	13.4	68	19	Mar-01
062	1965	82	2153065	Neely Mt Salvage 2 Unit 1	327	46	110	10.4	194	5.2	24.4	80	60	70	13.7	72	19	Apr-01
066	1957	9	2153075	Neely Mt Unit 2	260	28	101	115	186	5.2	24.7	83	55	70	14.3	78	21	Feb-01
069	1957	17	2153074	Neely Mt Unit 1	160	23	95	141	120	4	15	75	45	70	16.5	60	20	Jun-01
Subtotal		431																

Berkshire

Stand Number	Year of Origin	Total Acres	Total CT Acres	Target TPA (Post CWD)	Addl CWD & Snags	Harvest Method Skyline Acres	Harvest Method Ground Acres	Harvest Method Helicopter Acres	Removal Volume estimate mbf/ac	Total volume removed MBF	No Treatment Acres	Fish NCT Acres	Late PCT Acres	Within Urban Interface Y/N	Matrix Y/N
072	1961	89	27	90	0	27			7.6	205	62			y	y
075	1967	34	28	50	0	28			22	616	6			y	y
077	1974	89	62	70	5	62			10.7	663	27			y	n
085	1971	40	28	70	5	28			11.1	311	12			y	n
092	1965	9	3	90	0	3			16.7	50	6			y	y
099	1961	45	32	70	0			32	14.7	471	13			y	y
109	1968	58	21	70S,50H	10	10		11	11.2S 13.3H	258	37			y	n
Subtotal		364	201			158	0	43		2574	163	0	0		

Cedar

Stand Number	Year of Origin	Total Acres	Total CT Acres	Target TPA (Post CWD)	Addl CWD & Snags	Harvest Method Skyline Acres	Harvest Method Ground Acres	Harvest Method Helicopter Acres	Removal Volume estimate mbf/ac	Total Volume Removed MBF	No Treatment Acres	Fish NCT Acres	Late PCT Acres	Within Urban Interface Y/N	Matrix Y/N
181	1959	65	39	90	5	39			14.3	558	26			n	n
200	1969	302	78	70	5	78			11.1	866	75	9	140	n	n
209	1959	131	92	70	0			92	12.1	1113	29	10		y	n
210	1965	9	6	70	10	6			11.4	68	3			n	n
212	1954	55	39	90	5	39			14.2	554	16			n	n
214	1963	29	20	70	5	20			17.9	358	9			n	n
226	1974	51	36	50	5	36			9.1	328	15			y	n
230	1975	65	26	70	5	26			6.4	166	39			y	n
233	1965	37	26	70	5	26			11.5	299	11			y	n
240	1959	112	78	70	0	43	4	31	14.1	1100	34			y	n
244	1974	94	56	70	5	56			6.7	375	38			y	n
246	1966	238	40	70	5	40			9.4	376	70		128	y	n
249	1965	3	3	70	5	3			16.5	50	0			n	n
255	1965	26	17	50	10	17			16.4	278	9			n	n
257	1959	87	61	70	5	31	10	20	17.9	1092	26			n	n
268	1961	123	86	70	5	69		17	16.4	1410	37			n	n
273	1973	35	25	70	5	25			8.3	208	10			n	n
286	1959	93	65	70	5	33		32	12.3	800	28			n	n
288	1968	12	10	70	5	10			8.3	83	2			n	n
291	1965	105	74	50 H 70 S	5	30		44	S13.9 H15.9	1117	31			n	n
307	1967	13	2	70	5	2			20.6	41	11			n	n
Subtotal		1685	879			629	14	236		11240	519	19	268		

Divide

Stand Number	Year of Origin	Total Acres	Total CT Acres	Target TPA (Post CWD)	Addl CWD & Snags	Harvest Method Skyline Acres	Harvest Method Ground Acres	Harvest Method Helicopter Acres	Removal Volume estimate mbf/ac	Total Volume Removed MBF	No Treatment Acres	Fish NCT Acres	Late PCT Acres	Within Urban Interface Y/N	Matrix Y/N
067	1966	64	36	70	5	12		24	6.6	239	28			y	n
080	1967	64	45	70	5	40	5		13.8	620	13	6		y	n
087	1967	10	7	70	5	7			10.8	75	3			y	n
089	1966	32	22	90	0	22			7.3	161	10			y	y
102	1967	20	14	70	0	14			16.5	231	6			y	y
103	1962	8	6	50	5	6			8	48	2			y	n
160	1972	55	33	70	15	33			10.6	350	22			n	n
607247*	1967	51	36	70	0	36			16.5	594	15			n	y
Subtotal		304	199			170	5	24		2318	99	6	0		

*24 acres in North Fork, 12 acres in Lower Siuslaw

Hadsall

Stand Number	Year of Origin	Total Acres	Total CT Acres	Target TPA (Post CWD)	Addl CWD & Snags	Harvest Method Skyline Acres	Harvest Method Ground Acres	Harvest Method Helicopter Acres	Removal Volume estimate mbf/ac	Total Volume Removed MBF	No Treatment Acres	Fish NCT Acres	Late PCT Acres	Within Urban Interface Y/N	Matrix Y/N
153	1975	37	26	70	5	26			6.3	164	11			n	n
155	1975	74	52	70	5	52			10.7	555	15	7		n	n
166	1961	110	43	70	5	43			15.6	670	67			n	n
Subtotal		221	121			121	0	0		1389	93	7	0		

Hand

Stand Number	Year of Origin	Total Acres	Total CT Acres	Target TPA (Post CWD)	Addl CWD & Snags	Harvest Method Skyline Acres	Harvest Method Ground Acres	Harvest Method Helicopter Acres	Removal Volume estimate mbf/ac	Total Volume Removed MBF	No Treatment Acres	Fish NCT Acres	Late PCT Acres	Within Urban Interface Y/N	Matrix Y/N
173	1968	48	32	70	5	32			12.4	397	16			n	n
191	1961	37	25	70	5	20	5		17.3	436	12			n	n
213	1963	70	49	50	5	25		24	7.1	347	21			n	n
236	1965	46	32	90	5	32			9.9	318	14			n	n
237	1962	35	25	70	5	25			11.6	291	10			n	n
241	1969	46	19	70	5	19			6.7	127	27			n	n
252	1963	53	37	50	10	37			20.5	758	16			n	n
253	1955	28	13	70	5	0		13	12.6	163	15			n	n
262	1969	47	33	70	5	33			10.7	353	14			n	n
264	1970	39	27	50	10	27			7	189	12			n	n
269	1973	93	65	70	5	65			10.5	683	28			n	n
271	1969	74	52	70	0	52			9.4	487	22			n	n
283	1967	14	10	50	15	10			8.8	88	4			n	n
293	1962	67	45	90S 70H	5	11		34	13S 15.5H	669	22			n	n
298	1960	73	51	70	10	51			15.8	806	22			n	n
299	1962	90	63	50	5	63			19.8	63	27			n	n
301	1973	22	15	50	5	5	10		16	239	7			n	n
309	1963	80	56	50	5	56			13.4	750	24			n	n
Subtotal		962	649			563	15	71		7164	313	0	0		

Hoffman

Stand Number	Year of Origin	Total Acres	Total CT Acres	Target TPA (Post CWD)	Addl CWD & Snags	Harvest Method Skyline Acres	Harvest Method Ground Acres	Harvest Method Helicopter Acres	Removal Volume estimate mbf/ac	Total Volume Removed MBF	No Treatment Acres	Fish NCT Acres	Late PCT Acres	Within Urban Interface Y/N	Matrix Y/N
128	1967	69	48	90 S 70 H	5	30		18	13.1S 11 H	591	21			n	n
139	1966	71	50	50	5	35		15	12.1	605	9	12		n	n
158	1967	76	53	70	0	53			12.4	657	17	6		n	n
170	1956	21	7	90	5	7			19	133	14			n	n
Subtotal		237	158			125	0	33		1986	61	18	0		

Lawson

Stand Number	Year of Origin	Total Acres	Total CT Acres	Target TPA (Post CWD)	Addl CWD & Snags	Harvest Method Skyline Acres	Harvest Method Ground Acres	Harvest Method Helicopter Acres	Removal Volume estimate mbf/ac	Total Volume Removed MBF	No Treatment Acres	Fish NCT Acres	Late PCT Acres	Within Urban Interface Y/N	Matrix Y/N
192	1971	41	12	90	5	12			9.3	112	29			n	n
195	1969	106	74	90	5	74			11.8	873	32			n	n
196	1954	20	14	90	5	14			10.6	148	6			n	n
218	1950	34	5	90	10	5			17.3	87	29			n	n
310	1967	33	19	50	10	19			15	285	14			n	n
Subtotal		234	124			124	0	0		1505	110	0	0		

Lower Sweet

Stand Number	Year of Origin	Total Acres	Total CT Acres	Target TPA (Post CWD)	Addl CWD & Snags	Harvest Method Skyline Acres	Harvest Method Ground Acres	Harvest Method Helicopter Acres	Removal Volume estimate mbf/ac	Total Volume Removed MBF	No Treatment Acres	Fish NCT Acres	Late PCT Acres	Within Urban Interface Y/N	Matrix Y/N
118	1968	105	70	90	5	58	12		8.8	406	35			y	n
134	1968	47	20	50	15	20			7.4	148	27			y	n
Subtotal		152	90			78	12	0		554	62	0	0		

Siboco

Stand Number	Year of Origin	Total Acres	Total CT Acres	Target TPA (Post CWD)	Addl CWD & Snags	Harvest Method Skyline Acres	Harvest Method Ground Acres	Harvest Method Helicopter Acres	Removal Volume estimate mbf/ac	Total Volume Removed MBF	No Treatment Acres	Fish NCT Acres	Late PCT Acres	Within Urban Interface Y/N	Matrix Y/N
229	1960	48	25	90	5	25			13.7	345	23			n	n
231	1969	43	30	50	10	30			15	450	13			n	n
Subtotal		91	55			55	0	0		795	36	0	0		

Thompson

Stand Number	Year of Origin	Total Acres	Total CT Acres	Target TPA (Post CWD)	Addl CWD & Snags	Harvest Method Skyline Acres	Harvest Method Ground Acres	Harvest Method Helicopter Acres	Removal Volume estimate mbf/ac	Total Volume Removed MBF	No Treatment Acres	Fish NCT Acres	Late PCT Acres	Within Urban Interface Y/N	Matrix Y/N
006	1966	93	65	70	0	65			11.3	735	28			n	y
008	1959	67	20	70	5	20			20	400	47			y	n
009	1965	39	15	70	0	5		10	8.7	131	24			y	y
010	1971	149	88	70	0	54		34	8	704	61			y	y
011	1960	52	17	50	10	17			8.9	151	35			n	n
015	1964	85	19	70	5	19			15	285	66			y	n
018	1965	93	65	70	5	43		22	11.8	767	28			y	n
019	1966	17	8	70	10	8			14.5	116	9			y	n
030	1970	80	56	70	5	0		56	14.8	829	24			y	n
035	1967	15	9	50	0	0		9	17.5	158	6			y	n
047	1967	42	28	70	5	0		28	12.7	356	14			y	n
056	1967	66	46	70	5	18		28	7.8	359	20			y	n
303	1959	109	76	90	5	76			12.6	958	33			y	n
304	1957	288	104	70	0	54		50	10.4S 13.2H	1222	184			n	y
Subtotal		1195	616			379	0	237		7171	579	0	0		

Upper Divide

Stand Number	Year of Origin	Total Acres	Total CT Acres	Target TPA (Post CWD)	Addl CWD & Snags	Harvest Method Skyline Acres	Harvest Method Ground Acres	Harvest Method Helicopter Acres	Removal Volume estimate mbf/ac	Total Volume Removed MBF	No Treatment Acres	Fish NCT Acres	Late PCT Acres	Within Urban Interface Y/N	Matrix Y/N
033	1960	41	29	70	5	11		18	7.7	223	12			n	n
040	1960	57	37	90	5	37			10.9	403	16	4		n	n
057	1964	50	14	50	15	14			11.1	155	36			n	n
059	1965	30	21	70	10	21			7	147	9			n	n
071	1965	50	35	50	0	35			14.5	508	15			n	y
078	1961	47	33	70	10	26		7	9.6	316	14			n	n
079	1965	3	3	70	5	3			6.9	21	0			y	n
081	1973	77	9	70	5	9			5.5	50	68			y	n
100	1962	31	22	70	5	22			7.1	156	9			y	n
Subtotal		386	203			178	0	25		1979	179	4	0		

Walker

Stand Number	Year of Origin	Total Acres	Total CT Acres	Target TPA (Post CWD)	Addl CWD & Snags	Harvest Method Skyline Acres	Harvest Method Ground Acres	Harvest Method Helicopter Acres	Removal Volume estimate mbf/ac	Total Volume Removed MBF	No Treatment Acres	Fish NCT Acres	Late PCT Acres	Within Urban Interface Y/N	Matrix Y/N
024	1961	129	14	70H 90S	5	3		11	18.4S 21.4H	290	115			n	n
028	1976	142	99	70	5	99			6.8	673	36	7		n	n
029	1958	139	62	70	0	50		12	15	930	77			n	y
034	1958	51	28	70	0	28			8	224	23			n	y
037	1966	146	88	70	0	88			10.6	933	46	12		n	y
051	1961	85	42	70	0	42			13.1	550	43			n	y
062	1965	89	52	70	0	52			14.2	738	37			n	y
066	1957	30	15	70	5	0		15	12.6	189	15			y	n
069	1957	17	12	70	0	6		6	10	120	5			y	y
Subtotal		828	412			368	0	44		4647	397	19	0		
Total		**6659**	**3707**			**2948**	**46**	**713**		**43322**	**2611**	**73**	**268**		

CT=commercial thinning
TPA=trees per acre
CWD=coarse woody debris
NCT=noncommercial thinning
PCT=precommercial thinning

Berkshire

Stand Number	Year of Origin	Plantation Acres	Harvest Acres	Harvest Volume MBF	Reopen classified road miles	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Ground-based Acres
072	1961	89	27	205	0	0.1	0	27	7	0	0	0
075	1967	34	28	616	0	0.2	0	28	2	0	0	0
077	1974	89	62	663	0	0.7	0	62	2	2	0	0
085	1971	40	28	311	0	0.05	0.08	28	2	2	0	0
092	1965	9	3	50	0	0	0	3	1	0	0	0
099	1961	45	32	471	0	0	0	0	0	0	32	0
109	1968	58	21	258	0	0.12	0	10	1	0	11	0
Subtotal		364	201	2574	0	1.17	0.08	158	15	4	43	0

Cedar

Stand Number	Year of Origin	Plantation Acres	Harvest Acres	Harvest Volume MBF	Reopen classified road miles	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Ground-based Acres
181	1959	65	39	558	0	0	0.06	39	4	3	0	0
200	1969	302	78	866	0	0.41	0	78	3	6	0	0
209	1959	131	92	1113	0	0	0	0	0	0	92	0
210	1965	9	6	68	0	0	0	6	0	1	0	0
212	1954	55	39	554	0	0.47	0	39	7	1	0	0
214	1963	29	20	358	0	0	0	20	0	2	0	0
226	1974	51	36	328	0	0.19	0.04	36	2	1	0	0
230	1975	65	26	166	0	0	0	26	3	1	0	0
233	1965	37	26	299	0	0.22	0	26	2	1	0	0
240	1959	112	78	1100	0	0.34	0	43	4	1	31	4
244	1974	94	56	375	0	0.23	0	56	2	1	0	0
246	1966	238	40	376	0	0.48	0	40	4	0	0	0
249	1965	3	3	50	0	0	0.04	3	0	1	0	0
255	1965	26	17	278	0	0.3	0	17	2	0	0	0
257	1959	87	61	1092	0	0.18	0	31	2	3	20	10
268	1961	123	86	1410	0	0.95	0.1	69	4	1	17	0
273	1973	35	25	208	0.2	0	0	25	1	0	0	0
286	1959	93	65	800	0	0.11	0	33	2	3	32	0
288	1968	12	10	83	0	0.12	0	10	1	2	0	0
291	1965	105	74	1117	0	0.19	0	30	3	0	44	0
307	1967	13	2	41	0	0	0	2	0	1	0	0
Subtotal		1685	879	11240	0.2	4.19	0.24	629	46	29	236	14

Divide

Stand Number	Year of Origin	Plantation Acres	Harvest Acres	Harvest Volume MBF	Reopen classified road miles	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Ground-based Acres
067	1966	64	36	239	0	0	0	12	3	0	24	0
080	1967	64	45	620	0	0.37	0.08	40	4	1	0	5
087	1967	10	7	75	0	0	0	7	3	0	0	0
089	1966	32	22	161	0	0	0	22	3	0	0	0
102	1967	20	14	231	0	0	0	14	3	0	0	0
103	1962	8	6	48	0	0	0	6	1	0	0	0
160	1972	55	33	350	0	0.31	0	33	1	4	0	0
247	1967	51	36	594	0	0	0	36	2	0	0	0
Subtotal		304	199	2318	0	0.68	0.08	170	20	5	24	5

Hadsall

Stand Number	Year of Origin	Plantation Acres	Harvest Acres	Harvest Volume MBF	Reopen classified road miles	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Ground-based Acres
153	1975	37	26	164	0	0	0.05	26	2	1	0	0
155	1975	74	52	555	0	0.51	0	52	6	0	0	0
166	1961	110	43	670	0	0.03	0.02	43	3	1	0	0
Subtotal		221	121	1389	0	0.54	0.07	121	11	2	0	0

Hand

Stand Number	Year of Origin	Plantation Acres	Harvest Acres	Harvest Volume MBF	Reopen classified road miles	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Ground-based Acres
173	1968	48	32	397	0	0	0	32	3	0	0	0
191	1961	37	25	436	0	0	0	20	3	0	0	5
213	1963	70	49	347	0	0	0	25	1	3	24	0
236	1965	46	32	318	0	0	0	32	2	3	0	0
237	1962	35	25	291	0	0.05	0	25	3	2	0	0
241	1969	46	19	127	0	0.03	0	19	2	1	0	0
252	1963	53	37	758	0	0.13	0.03	37	3	1	0	0
253	1955	28	13	163	0	0	0	0	0	0	13	0
262	1969	47	33	353	0.3	0.5	0	33	2	1	0	0
264	1970	39	27	189	0	0.13	0	27	2	1	0	0
269	1973	93	65	683	0	0.04	0	65	5	0	0	0
271	1969	74	52	487	0	0.28	0	52	4	2	0	0
283	1967	14	10	88	0	0.37	0	10	1	0	0	0
293	1962	67	45	669	0	0	0	11	1	1	34	0
298	1960	73	51	806	0	0	0	51	3	1	0	0
299	1962	90	63	63	0	0.38	0	63	5	2	0	0
301	1973	22	15	239	0	0	0	5	3	0	0	10
309	1963	80	56	750	0	0.09	0	56	3	4	0	0
Subtotal		962	649	7164	0.3	2	0.03	563	46	22	71	15

Hoffman

Stand Number	Year of Origin	Plantation Acres	Harvest Acres	Harvest Volume MBF	Reopen classified road miles	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Ground-based Acres
128	1967	69	48	591	0	0	0	30	2	1	18	0
139	1966	71	50	605	0	0	0	35	2	4	15	0
158	1967	76	53	657	0	0.29	0.03	53	2	3	0	0
170	1956	21	7	133	0	0	0	7	1	0	0	0
Subtotal		237	158	1986	0	0.29	0.03	125	7	8	33	0

Lawson

Stand Number	Year of Origin	Plantation Acres	Harvest Acres	Harvest Volume MBF	Reopen classified road miles	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Ground-based Acres
192	1971	41	12	112	0	0.1	0	12	1	2	0	0
195	1969	106	74	873	0	1.36	0	74	4	3	0	0
196	1954	20	14	148	0	0.2	0	14	2	0	0	0
218	1950	34	5	87	0	0	0	5	1	0	0	0
310	1967	33	19	285	0	0.08	0	19	1	0	0	0
Subtotal		234	124	1505	0	1.74	0	124	9	5	0	0

Lower Sweet

Stand Number	Year of Origin	Plantation Acres	Harvest Acres	Harvest Volume MBF	Reopen classified road miles	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Ground-based Acres
118	1968	105	70	406	0.5	0.2	0.03	58	1	6	0	12
134	1968	47	20	148	0	0.02	0	20	4	0	0	0
Subtotal		152	90	554	0.5	0.22	0.03	78	5	6	0	12

Siboco

Stand Number	Year of Origin	Plantation Acres	Harvest Acres	Harvest Volume MBF	Reopen classified road miles	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Ground-based Acres
229	1960	48	25	345	0	0.12	0	25	3	1	0	0
231	1969	43	30	450	0	0	0.07	30	2	1	0	0
Subtotal		91	55	795	0	0.12	0.07	55	5	2	0	0

Thompson

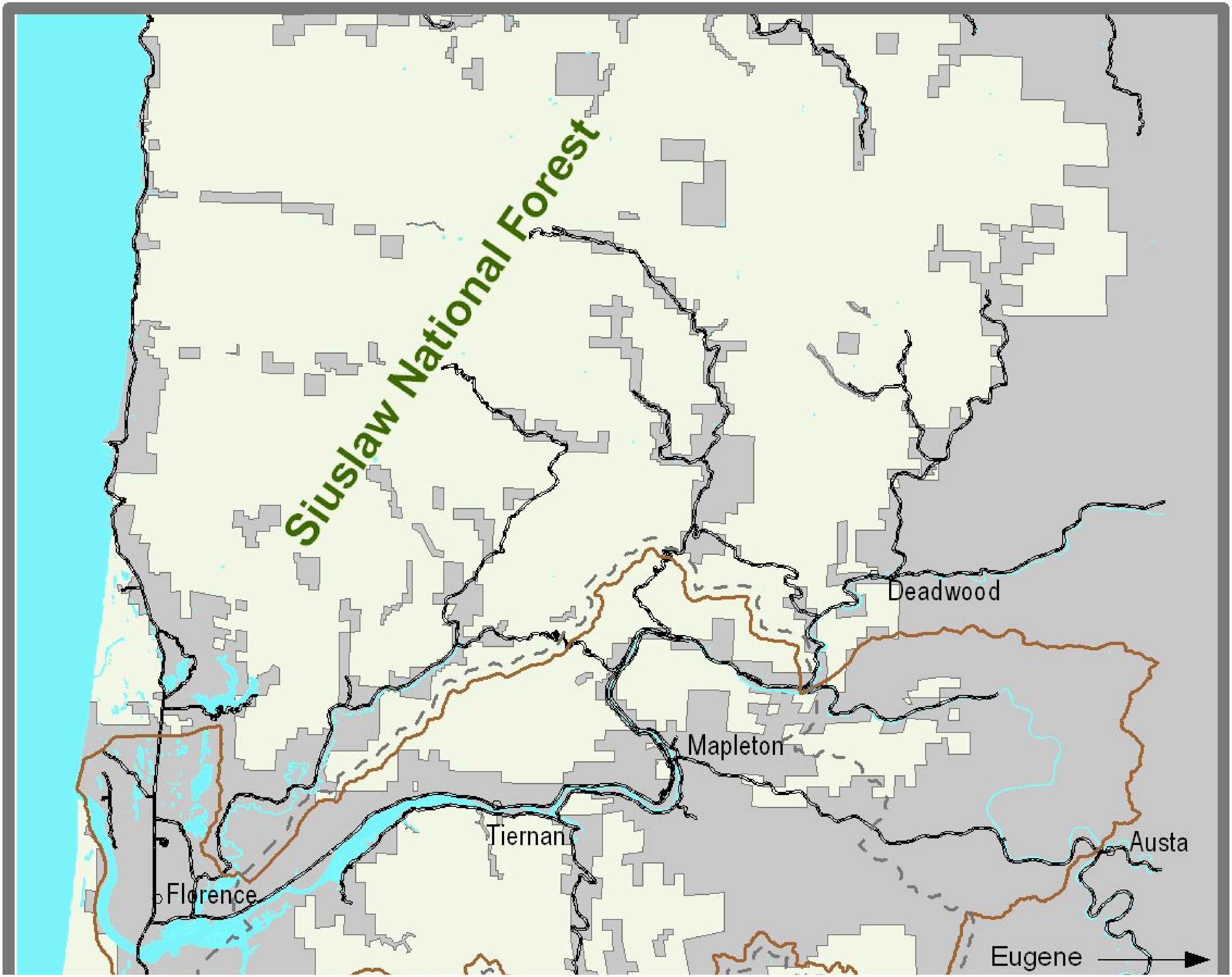
Stand Number	Year of Origin	Plantation Acres	Harvest Acres	Harvest Volume MBF	Reopen classified road miles	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Ground-based Acres
006	1966	93	65	735	0	0.53	0	65	3	1	0	0
008	1959	67	20	400	0	0	0	20	3	0	0	0
009	1965	39	15	131	0	0	0	5	1	0	10	0
010	1971	149	88	704	0	0.36	0	54	4	1	34	0
011	1960	52	17	151	0	0	0.03	17	1	1	0	0
015	1964	85	19	285	0	0.23	0	19	1	0	0	0
018	1965	93	65	767	0	0.77	0	43	6	0	22	0
019	1966	17	8	116	0	0.09	0	8	1	0	0	0
030	1970	80	56	829	0	0	0	0	0	0	56	0
035	1967	15	9	158	0	0	0	0	0	0	9	0
047	1967	42	28	356	0	0	0	0	0	0	28	0
056	1967	66	46	359	0	0.33	0	18	2	0	28	0
303	1959	109	76	958	0	1.23	0.08	76	5	3	0	0
304	1957	288	104	1222	0	0	0	54	6	0	50	0
Subtotal		1195	616	7171	0	3.54	0.11	379	33	6	237	0

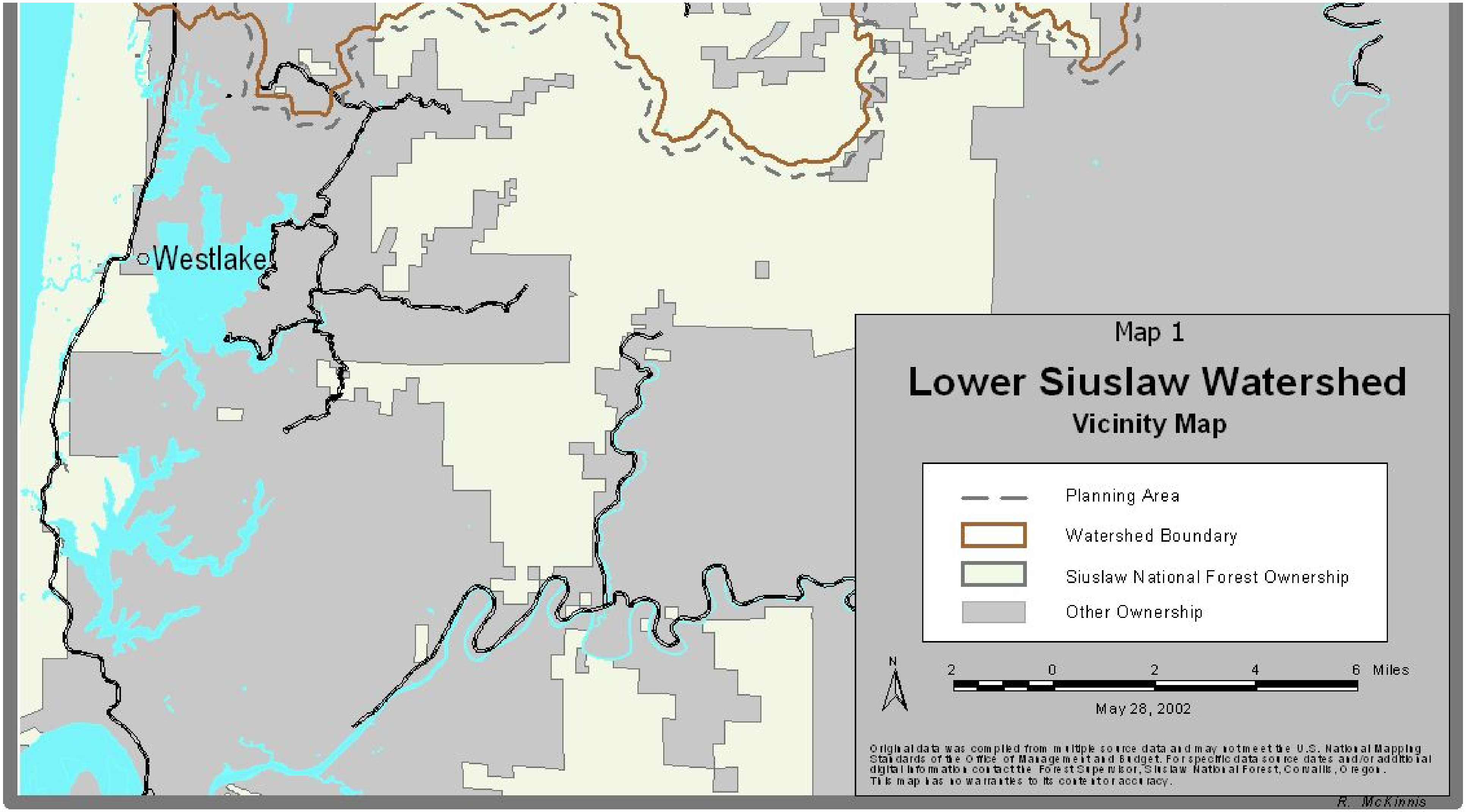
Upper Divide

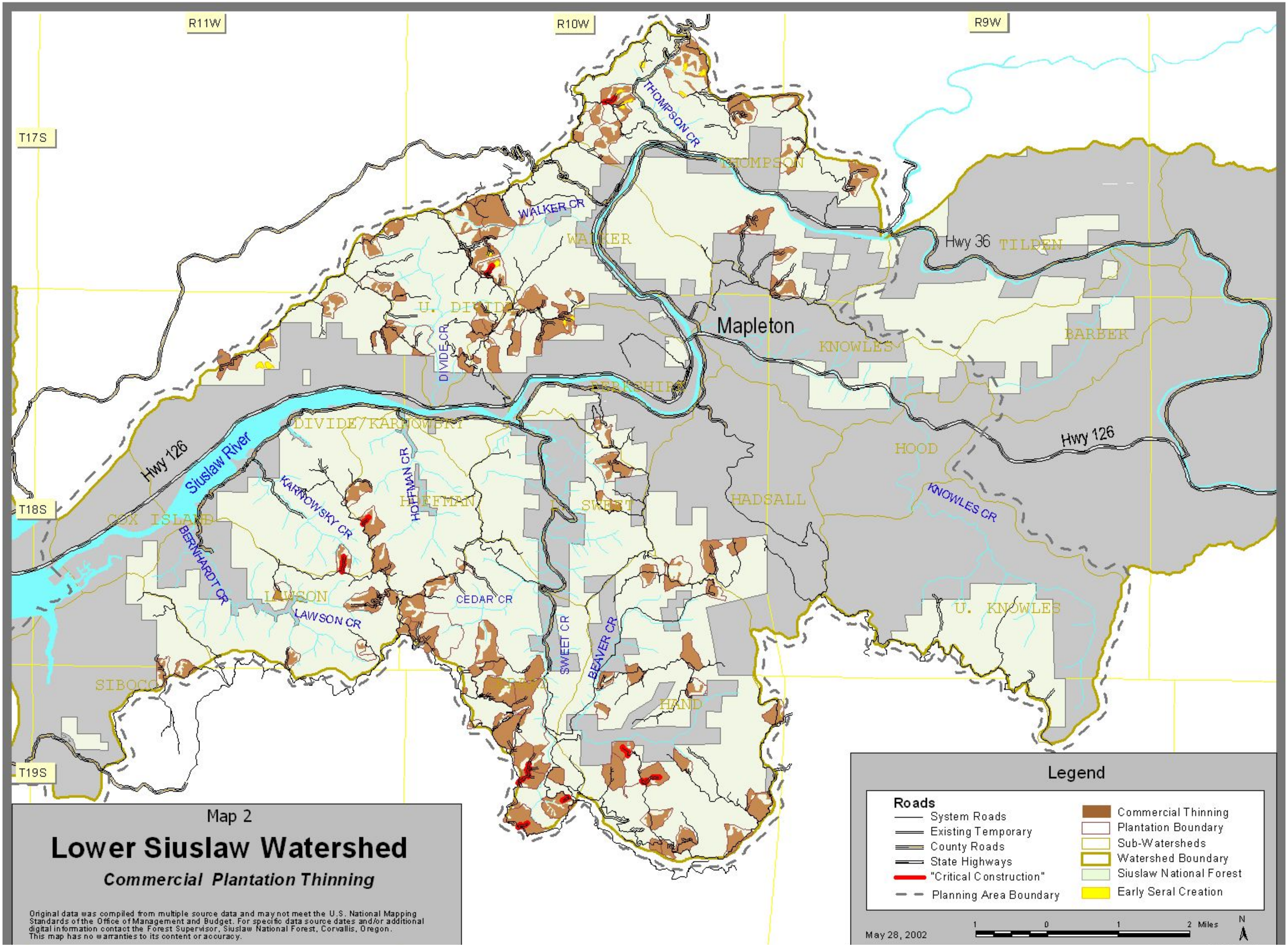
Stand Number	Year of Origin	Plantation Acres	Harvest Acres	Harvest Volume MBF	Reopen classified road miles	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Ground-based Acres
033	1960	41	29	223	0	0	0	11	3	0	18	0
040	1960	57	37	403	0	0.03	0	37	4	0	0	0
057	1964	50	14	155	0	0	0	14	3	0	0	0
059	1965	30	21	147	0	0.03	0	21	3	0	0	0
071	1965	50	35	508	0	0.34	0	35	3	0	0	0
078	1961	47	33	316	0	0.09	0	26	4	0	7	0
079	1965	3	3	21	0	0	0	3	0	0	0	0
081	1973	77	9	50	0	0	0	9	2	0	0	0
100	1962	31	22	156	0	0	0	22	4	0	0	0
Subtotal		386	203	1979	0	0.49	0	178	26	0	25	0

Walker

Stand Number	Year of Origin	Plantation Acres	Harvest Acres	Harvest Volume MBF	Reopen classified road miles	Reopen unclassified road miles	New Temporary Road Miles	Skyline Acres	Existing Skyline Landing #	New Skyline Landing #	Helicopter Acres	Ground-based Acres
024	1961	129	14	290	0	0	0	3	1	1	11	0
028	1976	142	99	673	0	0.3	0	99	5	3	0	0
029	1958	139	62	930	0	0	0	50	6	0	12	0
034	1958	51	28	224	0	0.77	0	28	4	0	0	0
037	1966	146	88	933	0	0.95	0	88	11	0	0	0
051	1961	85	42	550	0	0.39	0.06	42	5	2	0	0
062	1965	89	52	738	0	0.49	0	52	2	1	0	0
066	1957	30	15	189	0	0	0	0	0	0	15	0
069	1957	17	12	120	0	0	0	6	1	0	6	0
Subtotal		828	412	4647	0	2.9	0.06	368	35	7	44	0
Total		**6659**	**3707**	**43322**	**1.00**	**17.88**	**0.80**	**2948**	**258**	**96**	**713**	**46**

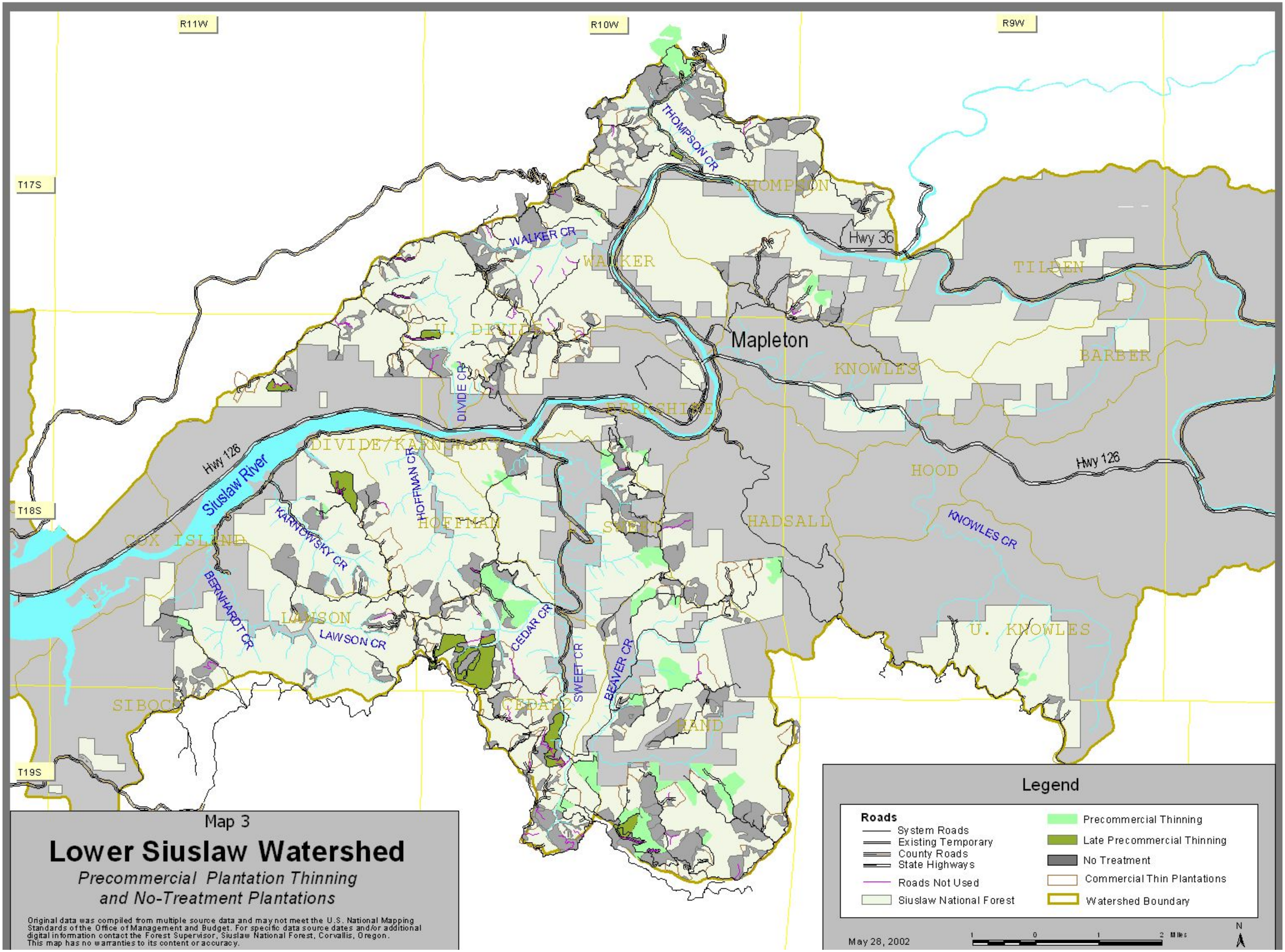

Siuslaw National Forest
Deadwood
Mapleton
Tiernan
Austa
Florence
Eugene


Westlake
Map 1
Lower Siuslaw Watershed
Vicinity Map
Planning Area
Watershed Boundary
Siuslaw National Forest Ownership
Other Ownership
N
2 0 2 4 6 Miles
May 28, 2002
Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon.
This map has no warranties to its content or accuracy.
R. McKinnis



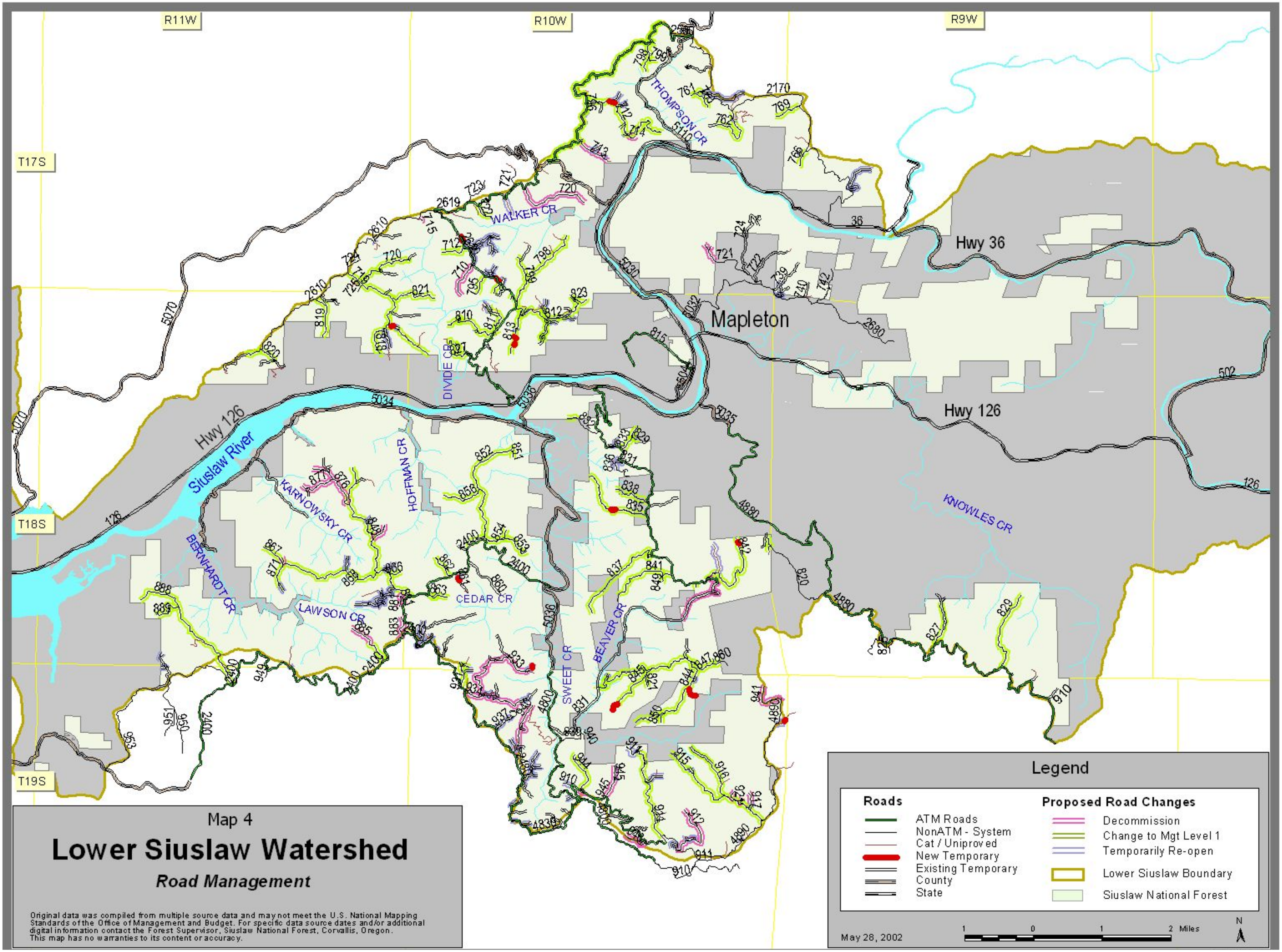
R11W
R10W
R9W
T17S
T18S
T19S
THOMPSON CR
THOMPSON
WALKER CR
WALKER
Hwy 36
TILDEN
U. DIVIDE
DIVIDE CR
Mapleton
KNOWLES
BARBER
BERKSHIRE
DIVIDE/KARNOWSKY
Hwy 126
Siuslaw River
HOOD
KARNOWSKY CR
HOFFMAN CR
HOFFMAN
SWEET
HADSALL
KNOWLES CR
COX ISLAND
BERNHARDT CR
LAWSON
LAWSON CR
CEDAR CR
U. KNOWLES
SWEET CR
BEAVER CR
SIBOCO
HAND
Map 2
Lower Siuslaw Watershed
Commercial Plantation Thinning
Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon.
This map has no warranties to its content or accuracy.
Legend
Roads
System Roads
Existing Temporary
County Roads
State Highways
"Critical Construction"
Planning Area Boundary
Commercial Thinning
Plantation Boundary
Sub-Watersheds
Watershed Boundary
Siuslaw National Forest
Early Seral Creation
May 28, 2002
1 0 1 2 Miles
N


R. McKinnis

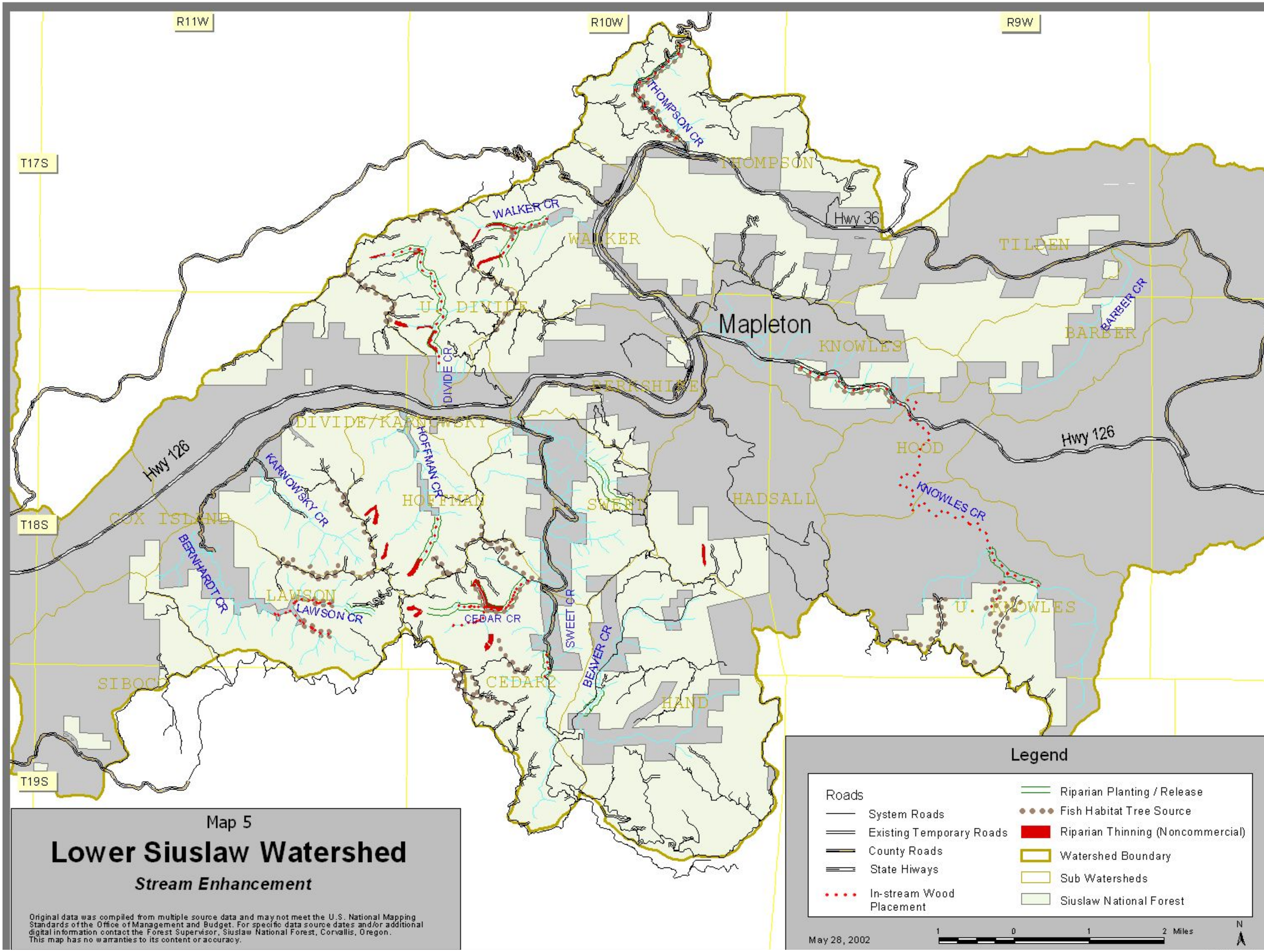


R11W
R10W
R9W
T17S
T18S
T19S
THOMPSON CR
THOMPSON
Hwy 36
WALKER CR
WALKER
TILDEN
Mapleton
U. DIVIDE
KNOWLES
BARBER
DIVIDE CR
BERKSHIRE
DIVIDE/KARNOWSKY
Hwy 126
Siuslaw River
HOFFMAN CR
HOFFMAN
HOOD
Hwy 126
KARNOWSKY CR
SWEET
HADSALL
KNOWLES CR
COX ISLAND
BERNHARDT CR
LAWSON
LAWSON CR
CEDAR CR
U. KNOWLES
SWEET CR
BEAVER CR
SIBOCO
CEDAR2
RAND
Map 3
Lower Siuslaw Watershed
Precommercial Plantation Thinning
and No-Treatment Plantations
Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy.
Legend
Roads
System Roads
Existing Temporary
County Roads
State Highways
Roads Not Used
Siuslaw National Forest
Precommercial Thinning
Late Precommercial Thinning
No Treatment
Commercial Thin Plantations
Watershed Boundary
May 28, 2002
1 0 1 2 Miles
N


R. McKinnis


R11W
R10W
R9W
T17S
T18S
T19S
Mapleton
Hwy 36
Hwy 126
Siuslaw River
WALKER CR
THOMPSON CR
DIVIDE CR
HOFFMAN CR
KARNOWSKY CR
BERNHARDT CR
LAWSON CR
CEDAR CR
SWEET CR
BEAVER CR
KNOWLES CR
Map 4
Lower Siuslaw Watershed
Road Management
Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon.
This map has no warranties to its content or accuracy.
Legend
Roads
ATM Roads
NonATM - System
Cat / Unproved
New Temporary
Existing Temporary
County
State
Proposed Road Changes
Decommission
Change to Mgt Level 1
Temporarily Re-open
Lower Siuslaw Boundary
Siuslaw National Forest
May 28, 2002
1 0 1 2 Miles
N

R. McKinnis



Map 5

Lower Siuslaw Watershed

Stream Enhancement

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R. McKinnis