1792A
EA-02-18
Starks Creek

August 20, 2002

Concerned Citizen,

The McKenzie Resource Area of the Eugene District Bureau of Land Management has completed the Environmental Assessment (EA) and Finding of No Significant (FONSI) for a commercial thinning project in the Starks Creek drainage located in Section 15, T. 18 S., R. 1 W., Will. Mer.

You have expressed an interest in receiving copies of Environmental Assessments for district projects. Enclosed is a copy of the Environmental Assessment for your review and any comments. Public notice of this proposed action will be published in the Eugene Register Guard on August 21, 2002. The EA will also be available on the internet at http://www.edo.or.blm.gov/nepa. The public comment period will end on September 20, 2002. Please submit comments to me at the district office, by mail or by e-mail at OR090mb@or.blm.gov by close of business (4:15 p.m.) on or prior to September 20, 2002. If you have any questions concerning this proposal, please feel free to call Don Wilbur at 683-6994.

Comments, including names and street addresses of respondents, will be available for public review at the district office, 2890 Chad Drive, Eugene, Oregon during regular business hours (7:45 a.m. to 4:15 p.m.), Monday through Friday, except holidays, and may be published as part of the EA or other related documents. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Sincerely,

Emily Rice, Field Manager
McKenzie Resource Area

Enclosure

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Starks Creek

McKenzie Resource Area
BLM Eugene District

ENVIRONMENTAL ASSESSMENT

Environmental Assessment No. OR 090-EA-02-18

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STARKS CREEK TIMBER HARVEST
McKenzie Resource Area
BLM Eugene District

ENVIRONMENTAL ASSESSMENT
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1.0 PURPOSE OF AND NEED FOR ACTION

The Bureau of Land Management (BLM) proposes to implement a commercial thinning project in the Starks Creek drainage, located in Section 15 of T. 18 S., R. 1W. The underlying need is the result of a review of timber stand exams of the Starks Creek area, which indicate that approximately 220 acres of 50 to 55 year-old stands would benefit from a commercial thinning. Currently this timber stand has a uniform structural condition and is over stocked, which causes reduced tree growth rates and reduced stand vigor as competition increases. The proposed action is within the Matrix and Riparian Reserves (RR) land use allocations. Harvest treatments would increase vigor, growth rates, crown differentiation and complexity, wind firmness and root structure. Additional specific benefits in RR would be recruitment of diverse large diameter conifer and hardwood species typically present in natural systems.

The purpose of this action, in part, is to help implement objectives on Riparian Reserve lands and the Aquatic Conservation Strategy (ACS) objectives. These objectives, which are described in the Northwest Forest Plan, must strive to restore and maintain the ecological health of watersheds and aquatic ecosystems on public lands. The Eugene District ROD/RMP (USDI 1995, p.24) states that BLM should, "apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy Objectives." The Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (April 1994) says, "Active silvicultural programs will be necessary to restore large conifers in Riparian Reserves. Appropriate practices may include . . . thinning densely-stocked young stands to encourage development of large conifers . . . " (B-31).

The purpose is to also help implement objectives on Matrix areas as described in the Eugene District ROD/RMP (USDI 1995, Appendix E, p. 200). Silvicultural practices that would apply on Matrix areas are: 1) harvest anticipated mortality of small trees as the stand develops, 2) increase the proportion of merchantable volume in the stand, 3) maintain good crown ratios and stable wind-firm trees, 4) accelerate development of trees that can later provide large-diameter snags and down logs, 5) produce larger more valuable logs, 6) manage species composition and, 7) promote development of desired under-story vegetation.

Objectives of this proposed action would:

* Thin an estimated 220 acres of 50-55 year-old timber in T. 18. S., R. 1 W., Sec 15 in both Matrix areas and Riparian Reserves.
* Construct a minimum amount of temporary roads to harvest the timber.
* Improve and/or decommission existing roads in the harvest area.

Approximately **3,778** acres of BLM land (11 percent) is within the Hills Creek Watershed Analysis Area *(Hills Creek Watershed Analysis September 2000),* and private land owners manage **32,273** acres (89 percent). Approximately **1,872** acres of BLM land in this watershed is in Matrix land use allocation. Riparian Reserves total 1,541 acres and Unmapped LSRs total 337 acres. The area of analysis for purposes of this environmental document is approximately 7 miles southeast of Springfield, Oregon, and encompasses all of Section 15. The main drainage in Section 15 is Starks Creek, a tributary of Hills Creek, which drains into the Willamette River.

1.1 Conformance

This environmental assessment (EA) is tiered to the *Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl*, April 1994, and the *Eugene District Record of Decision and Resource Management Plan (RMP)*, June 1995 as amended by the Record of Decision (ROD) for Amendments to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, January 2001. Actions described in this EA are in conformance with the Aquatic Conservation Strategy (ACS) Objectives listed on page B-11 of the Northwest Forest Plan (NFP), and in **Appendix D** of this Environmental Assessment. The RMP makes land use allocations and allows for density management thinning in the Riparian Reserves LUA, and thinning in the General Forest Management LUA to acquire desired vegetative and structural characteristics needed to attain ACS objectives. These documents are available for review at the Eugene District Office of the BLM, Eugene, Oregon.

The Analysis File contains additional information used by the interdisciplinary team (IDT) to analyze impacts and alternatives and is hereby incorporated by reference. The above referenced documents are available for review at the Eugene District Office of the BLM, Eugene, Oregon or on the internet at http://www.or.blm.gov/nwfp.htm.

1.2 Monitoring

Monitoring guidelines are established in the 1995 RMP/ROD, Appendix D, and the 1994 Northwest Forest Plan Standards and Guidelines, pp. E-1 to E-10.

1.3 Scoping

The scoping process identified both agency and public concerns relating to the proposed projects, and defined the issues and alternatives that would be examined in detail in the Environmental Assessment. The public was informed of the planned environmental assessment through letters to those on the Resource Area's mailing list, and to those receiving the *Eugene District Planning Update.*

1.4 Issues

Scoping by the interdisciplinary team and public input identified the following three issues:

1. *What would be the effect of harvesting and road management activities on water quality and resident fish habitat?*

   Indicators:
   - Number of stream crossings constructed or removed, and the potential to deliver sediment.
   - Road improvements designed to intercept road related runoff.
   - Potential large woody input into stream (acres & diameter).
   - Changes in water quality

2. *What would be the effect of road management activities on soil productivity?*

   Indicators:
   - Acres of compacted soil surface and length of road with infiltration characteristics restored.

3. *What would be the effects of harvest activities on the spotted owl site adjacent to the project area?*

   Indicators:
   - Modification or disturbance to nesting or foraging habitats in or near the project area and within the adjacent owl site provincial home range.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This section describes alternatives identified by the interdisciplinary team, alternatives eliminated from detailed study, and comparison of alternatives. Design features associated with these alternatives can be found in the appendices: **Appendix A** for Project Design Features, **Appendix B** for Harvest Area Details and Road Construction and Closure Summary, **Appendix C** for maps of proposed harvest areas, and **Appendix D** for Analysis of Alternatives by ACS Objectives.

2.1 Alternative I – No Action

2.1.1 Timber Harvest Activity in the Matrix

No timber harvest would occur within the Starks Creek Analysis Area at this time. Meeting the District's decadal Potential Sale Quantity volume commitment would have to be accomplished from other areas.

2.1.2 Density Management within Riparian Reserves

No density management activities would occur within the Starks Creek Analysis Area at this time.

2.1.3 Roads

Under this alternative, no temporary road construction, decommissioning of old existing roads, or improvements to the existing road system would occur.

2.2 Alternative II – Maximize Use of Existing Roads

2.2.1 Timber Harvest Activity in the Matrix

This alternative consists of commercial thinning five harvest areas comprising 177 acres of 50 to 55 year-old Douglas-fir dominant, naturally regenerated stands. This stand exhibits some diversity (Western hemlock, Western red cedar, grand fir, bigleaf maple, yew) with approximately 63% Douglas-fir. However, this stand is in a stagnate state, where many of the suppressed trees have reached mortality. This "thin from below" treatment would remove the smaller suppressed trees in the under-story, and release from competition the dominant and co-dominant trees. This alternative would reduce the number of trees per acre from 200-215 to 70-80. Harvesting would be completed by cable system, and a small amount (approximately 3 to 5 acres) of ground base yarding (see **Appendix A** for Design Features).

2.2.2 Density Management within Riparian Reserves

Density management is recommended on certain Riparian Reserve areas totaling 44 acres; roughly half the 90 acres of Riparian Reserves in the project area considered for treatment. Density management in the Riparian Reserves is designed to provide greater diversity as well as develop larger trees for future course woody debris and snags. Reasons for initiating density management in some of the Riparian Reserve areas are: 1) over stocked dense stands exist with small diameter trees, 2) RR areas lack structural diversity and complexity, 3) lack of species diversity, 4) few snags and little down wood and, 5) lack of large conifers. Although the riparian areas currently exhibit some diversity, to achieve desired ACS objectives this alternative would change the species percentages that currently occupy the reserves. In doing so, the riparian reserves would be enhanced and the growth of existing conifers and hardwoods would be expedited. Preference would be given to the larger Western red cedars, bigleaf maples, and grand firs rather than to the Douglas-firs and Western hemlock. Cable yarding would be used on all areas receiving density management.

Perennial and intermittent non-fish bearing streams would retain the interim Riparian Reserve width of one site potential tree height (180 feet slope distance) on each side of the stream channels except where riparian thinning is designated. The no-cut riparian buffer width would be a minimum of 75 feet from the stream. All fish-bearing streams would retain the interim Riparian Reserve width of two site potential tree heights (360

feet slope distance) on each side of the stream channels, except where Riparian Reserve thinning is designated. Intermittent streams and wetlands greater than 1 acre retain the interim Riparian Reserve width of one site potential tree height (180 feet slope distance) on each side of the stream channel. Wetlands of less than one acre in size would be buffered to the extent of the riparian vegetation.

Table 2.2.1 summarizes proposed acres harvested in Alternative II.

Table 2.2.1

TYPE HARVEST	LAND USE ALLOCATION	PROPOSED ACRES TO BE HARVESTED	VOLUME (MBF)
Density Mgt.	**Riparian Reserves**	**44**	**440**
Thinning	**Matrix**	**177**	**1770**
	TOTAL	**221**	**2210**

MBF - Thousand Board Feet

2.2.3 Roads

This alternative would require an estimated 1.41 miles of temporary native surface road construction and approximately 0.53 mile of existing native surface road improvement. The improvement would include a portion of Spur 2 (0.38 mile), Spur 3 (0.02 mile), Spur 4 (0.09 mile), and Spur 5 (0.04 mile). This would consist of widening, shaping, grading, and establishing drainage and removal of two log culvert creek crossings and the fill on an additional stream crossing with three temporary culvert installations for the timber haul. All new road construction would be on ridge tops or upper slopes so no stream crossings would be necessary. All new construction and improvement would be blocked, tilled and/or water barred upon completion of harvest activities. Culverts would be removed and the stream channels restored. An additional 0.43 mile of existing road in the riparian reserve would be decommissioned including removal of two old log culverts (see **Appendix A** for Best Management Practices and Design Features for road construction, and decommissioning).

Table 2.2.3 summarizes the miles of road construction, improvements and decommissioning under this alternative.

Table 2.2.3

Harvest Area	Temporary New Road Construction (Miles)	Temporary Improvement on Existing Road (Miles)	Existing Road Decom. (Miles)	Total Decom. (Miles)
1	0.02	0	0	.02
2	0	0.38	0.02	.40
3	0.40	0.02	0	.42
4	0.25	0.09	0	.34
5	0.74	0.04	0.41	1.19
Totals	1.41	0.53	0.43	2.37

Decom. – Decommission: Roads to be blocked and treated as necessary to restore infiltration and hasten vegetative recovery after completion of timber sale contract. Roads would be closed and not require future maintenance.

2.3 Alternative III: Proposed Action

2.3.1 Timber Harvest Activity in the Matrix

Same as Alternative II.

2.3.2 Density Management within the Riparian

Same as Alternative II.

2.3.3 Roads

This alternative would require an estimated 1.58 miles of temporary road construction. A portion of Spur 3A (0.11 mile) and Spur 5A (0.04 mile) would require improvement. This would consist of widening, shaping, grading, establishing drainage, and temporary replacement of one log culvert. All new road construction would be on ridge tops or upper slopes so no stream crossings would be necessary. All new construction and improvement would be blocked, tilled and/or water barred upon completion of harvest activities. The culverts would be removed and the stream channel restored. An additional 0.81 mile of existing old road in the riparian reserve would be decommissioned including removal of three old log culverts and restoration of four stream channels (see **Appendix A** for Best Management Practices and Design Features for road construction, and decommissioning).

Table 2.3.3 summarizes the miles of temporary road construction, improvements and decommissioning under this alternative.

Table 2.3.3

Harvest Area	Temporary New Road Construction (Miles)	Temporary Improvement on Existing Road (Miles)	Existing Road Decom. (Miles)	Total Decom. (Miles)
1	0.02			0.02
2	0.17		0.40	0.57
3	0.40	0.02		0.42
4	0.25	0.09		0.34
5	0.74	0.04	0.41	1.19
Totals	1.58	0.15	0.81	2.54

Decom. – Decommission: Roads to be blocked and treated as necessary to restore infiltration and hasten vegetative recovery after completion of timber sale contract. Roads would be closed and not require future maintenance.

2.4 Alternative IV: No New Road Construction

2.4.1 Timber Harvest Activity in the Matrix

This alternative recommends a commercial thinning in approximately 48 acres of Matrix lands. Silvicultural treatment would remain the same as the proposed action.

2.4.2 Density Management within the Riparian Reserves

The amount of Silvicultural treatments in the Riparian Reserves would be about 15 acres.

2.4.3 Roads

An estimated 0.38 mile of existing native surface road would be improved. The improvement would include upgrading one creek crossing by removal of the log culvert and fill removal on another old crossing. Temporary culvert installations would be required on these two crossings for timber haul. All roads that are improved would be blocked, tilled and/or water barred upon completion of harvest activities. The culverts would be removed and the stream channel restored. An additional 0.02 mile of existing road in the riparian reserve would be decommissioned (see **Appendix A** for Best Management Practices and Design Features for road construction, and decommissioning).

Table 2.4.3 summarizes the miles of temporary road construction, improvements and decommissioning under this alternative.

Table 2.4.3

Harvest Area	Temporary New Road Construction (Miles)	Temporary Improvement on Existing Road (Miles)	Existing Road Decom. (Miles)	Total Decom.
1	0	0	0	0
2	0	.38	.02	.40
Totals	0	.38	.02	.40

Decom. – Decommission: Roads to be blocked and treated as necessary to restore infiltration and hasten vegetative recovery after completion of timber sale contract. Roads would be closed and not require future maintenance.

2.5 Alternatives Eliminated From Detailed Study

Helicopter logging was considered for harvest area 3, 4, and 5. This alternative was dropped from detailed analysis for the following reasons: 1) there is an existing road infrastructure already in the area, and 2) concern over an occupied house adjacent to where helicopter activity would happen.

2.6 Comparison of Alternatives

ELEMENTS	ALT. I No Action	ALT. II (Maximize Use of Existing Roads)	ALT. III Proposed Action (Ridge Top Road Construction)	ALT. IV (No New Road Construction)
Density Management Acres (RR)	0	45	45	15
Thinning Harvest Acres (Matrix)	0	175	175	48
TOTAL ACRES HARVESTED	0	220	220	63
Miles of New Temporary Road Construction	0	1.41	1.58	0
Net Miles of Temporary Road Improvement on Existing Road	0	.53	.15	.38
Existing Road Decommissioning	0	.43	.81	.02

3.0 AFFECTED ENVIRONMENTS

This section describes key components of the existing environment. The plants and animals do not differ significantly from those discussed in Chapter 3 of the 1994 RMP

3.1 Vegetation

The forest over-story in the project area is dominated by second-growth Douglas-fir and Western hemlock stands. The typical age of the trees is 55 years old with some remnant older trees (up to 120 years old). Associated conifer species are Western red cedar, incense cedar, grand fir, and Pacific yew. The common hardwoods are red alder, bigleaf maple, black cottonwood, Pacific dogwood, Pacific madrone, chinquapin, bitter cherry and willow.

The under-story of this forest is dominated by salal. Portions of the stands have a forest structure classified as "stem exclusion," which is characterized by high numbers of trees per acre with little or no understory. Shrubs in the region may include associations of vine maple, rhododendron, California hazel, oceanspray, red huckleberry, and poison oak. Frequently occurring vascular plants include salal, swordfern, vanilla leaf, Oregon grape, whipplevine, oxalis and redwood violet. The bryophyte and lichen community is typical of a low elevation second growth forest.

The riparian area are mostly second growth stands approximately 45-60 years, composed primarily of Douglas-fir, red alder, and pockets of Western red cedar. Starks Creek has an alder dominated riparian zone within 50-100 feet of the stream along the majority of its length in the project area.

Noxious Weeds
Starks Creek analysis area has some small populations of "false brome" (*Brachypodium sylvaticum*), which occurs along the road system in the analysis area. False brome, a grass, is an invasive species newly introduced to the Eugene District. This species currently occurs in only a few areas around the Eugene District. False Brome spreads quickly vegetatively and by seed. False Brome can grow in densely shaded stands and crowd out shrubs. Seeds carried by vehicles spread False Brome into new areas.

Scotch broom and various thistle species occur along the roads and within the project area. Again these species are typically spread by vehicles.

3.2 Threatened and Endangered Species

Northern Bald Eagle (Threatened)
Bald eagles are not expected to be found in or near the project area or affected by associated activities because the area is not located close enough to a major water forage resource. This species will not be analyzed further in this document.

Northern Spotted Owl (Threatened)
A spotted owl site exists adjacent to the project area and was occupied by pairs from 1992-1995, 1997, and single individuals in 1996 and 1999-2001. No nesting attempts have been documented at this site since it was located in 1992.

Suitable nesting habitat for spotted owls is conifer forests with mature to late seral characteristics (usually greater than 80 yrs old) including: dense canopy cover, multi story canopy layers, large down logs and snags, and a relatively open understory without a high brush layer.

Approximately 10 acres of suitable nesting habitat exists within harvest areas 3-5 (as small clumps) and an additional 35 acres are within 0.25 mile of the project area.

Dispersal habitat for owls is generally conifer forests with at least 40% canopy cover (usually between 40-80 yrs old) that function for roosting and foraging but not nesting. Approximately 210 acres of dispersal habitat exists in the project area and an additional 140 acres are within 0.25 mile of the project area.

The USFWS established provincial home ranges (PHR) of 1.2 miles around spotted owl sites in the Cascade Range. The amounts of suitable nesting and foraging habitat within a PHR are typically used as one measure of the likelihood successful reproduction would occur at a site.

The Little Fall Creek/Hill Creek watershed analysis identified 887 acres of dispersal and 214 acres of suitable nesting habitats within the PHR of the site near the project area. Some of this habitat may not be usable due to overlap with the PHR of another owl site. When suitable nesting habitat is below 1182 acres (40%) within the PHR, an owl site is considered to be "at risk" relative to the likelihood of successful reproduction. No nesting and less than 100 acres of dispersal habitat exists on private lands within the PHR.

The project area is not within designated critical habitat.

Spring Chinook Salmon (Threatened)
Spring Chinook are not believed to have naturally inhabited Hills Creek due to the steep channel gradient near the confluence with the Middle Fork of the Willamette River. In July of 2000, adult spring Chinook destined for Fall Creek were mistakenly stocked approximately 2.5 miles from the confluence. Surveys completed during the fall of 2000 did not find any spring Chinook redds or juveniles. No evidence of spring Chinook in Hills Creek have been found since this time. As a result of these surveys, Spring Chinook use is considered to be limited to the Middle Fork (located approximately 6 miles downstream from the project area) for spawning, migration, and juvenile rearing.

3.3 Survey and Manage

The ROD for the *Supplemental Environmental Impact Statement Amending the Survey and Manage, Protection Buffer, and Other Mitigating Measures Standards and Guidelines* was signed January 2001 and management of Survey and Manage species conforms to this and associated documents.

3.3.1 Mollusks

No surveys are required for *Pristoloma arcticum*. The project area is within the potential geographic range of the species but below the elevational threshold of 2000 feet. The area is outside of the range where surveys are required for other survey and manage mollusks.

3.3.2 Red Tree Vole *(Arborimus longicaudus)*

The proposed harvest units are potential habitat for red tree voles. Surveys were conducted consistent with the current survey protocol (version 2.0) and detected two active nests. All other potential nest trees were either climbed or evaluated. Management would be consistent with the current Management Recommendations for the species and would result in delineation of two habitat areas, roughly 10 acres each, withdrawn from the harvest area. Red tree voles are not discussed further in this document.

3.3.3 Fungi, lichens, Bryophytes and Vascular Plants

All list A and C fungi, bryophyte and lichen species currently requiring predisturbance surveys were included as part of protocol surveys. No List A and C bryophytes, lichens or fungi were found. *Ramalina thrausta,* a lichen scheduled to be included on the Component A list in 2004 was found in the riparian area of Starks Creek, incidentally during the course of other work. To protect the sites and other resource values, riparian thinning will not occur along Starks Creek in the area of occurrence.

3.4 Soils

Historic logging practices displaced and compacted soil in the project area, and the evidence is still visible on the landscape. Aerial photos taken in 1969 indicate an extensive system of travelways used by ground-based logging equipment. Haul roads surfaced with coarse aggregate (pit run rock) and other unsurfaced roads (including excavated skid trails) are still evident. Generally, advanced conifer regeneration is lacking along primary routes because of persistent residual compaction, even though brush and small conifers have grown back into the road prism along lesser used skid trails. Active erosion of the road surface with the potential to deliver sediment is occurring at the site of a partially failed log culvert on the north end of the project area. Other existing segments in more upland locations do not show signs of active erosion at this time.

Surveys indicate that at least 1.5 miles of this road system are still compacted to the extent that infiltration, water storage, and gas exchange are impaired. This equates to approximately 2.7 acres of reduced soil productivity (slightly more than 1 percent of the project area).

Peavine silty clay loam is the dominant soil in the project area. It occurs on gradual (less than 30%) slopes in the upper portion of all units, generally the northern half of the project area. Bellpine silty clay loam occurs near the bottom of Harvest Area 3, and in portions of Harvest Areas 4 and 5. Slopes are gradual, 20% to 30%. Both Peavine and Bellpine are moderately deep and highly productive.

Ritner cobbly silty clay loam occurs on the south end of Harvest Area 5 and a portion of Harvest Area 3. Klickitat stony loam occurs on the east side of Harvest Area 3. Generally, slopes in

these areas are too steep for ground based harvest, and coarse content would make amelioration of compaction difficult. Both soils are moderately deep and moderately productive.

Cumley silty clay loam occurs on gentle (2% to 20%) footslopes and low lying areas within the Riparian Reserves of many streams (2, 7, 8, 9, 11, 12, and 14). This soil is deep and highly productive, and is also important for water supply. Slow internal drainage creates a seasonal high water which limits rooting at a depth of 2 to 3 feet from November to April, and makes these soils perennially too moist to permit ground based harvest operations without substantial compaction occurring.

All hydric soils (wetlands) have been withdrawn from harvest activities.

3.5 Hydrology and Water Quality

Streams within the project area are located in the Starks Creek drainage area and are tributaries of Hills Creek. Locations and brief descriptions of the streams, wetlands, and springs near the proposed harvest areas are in the Analysis File.

Field reconnaissance indicates that logging roads constructed during the 1950s crossed streams in the project area in 6 locations. Five stream crossings are (on Streams 2, 3, 7, & 14) log culverts with fills ranging in depth from approximately 4 feet to 20 feet at road centerline. Two of these culverts have already partially failed and two others could potentially become unstable if the drainage is impaired. One log culvert, located on Stream 3, is considered a low risk for mass wasting because of the small fill size, low volume winter stream flows, and the gentle gradient at that location. In addition, there are numerous pieces of large wood in the channel below this site to capture sediment should erosion at the crossing occur.

One road that crosses Harvest Area 2 is eroded due to lack of regular maintenance and is currently routing sediment and surface runoff directly to a nearby stream during storm events. No data has been collected to quantify the extent of sediment production or the amount of water draining into that stream from the degraded road.

The harvest areas vary from 1000 feet to 1800 feet in elevation and are in the rain dominated zone, rarely impacted by rain-on-snow events. The Hills Creek Watershed Analysis indicated a low potential in the watershed for a change in peak flows greater than a 2-year event due to rain-on-snow effects since these lands are lower elevations and not prone to accumulation of a snow pack.

3.6 Fisheries

Fish species currently inhabiting the Hills Creek Watershed include rainbow trout, cutthroat trout, summer and winter steelhead trout, as well as several non-game species. Resident fish are located adjacent to the proposed project area (**Appendix C** Maps of the Proposed Harvest Areas). Proposed log culvert removal areas are a minimum of 1,500 feet from resident fish bearing streams and greater than 6 miles to occupied spring Chinook habitat. Please see section 3.2 for further discussion of spring Chinook.

4.0 ENVIRONMENTAL CONSEQUENCES

This incorporates the analysis of cumulative effects in the USDA, Forest Service and the USDI, Bureau of Land Management *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Related Species Within the Range of the Northern Spotted Owl*, February 1994, (Chapters 3 & 4) and in the Eugene District Proposed RMP/EIS, November, 1994 (Chapter 4). These documents analyze most cumulative effects of timber harvest and other related management activities. The following analysis has a cumulative effects section that supplements those analyzed in the above documents, and provides site-specific information and analysis particular to the alternatives considered here.

4.1 Alternative I - No Action

4.1.1 Issue #1 - What would be the effect of harvesting and road management activities on water quality and resident fish habitat?

Indicator 1: *Number of stream crossings constructed or removed, and the potential to deliver sediment.*

Direct Effects: Under this alternative, Aquatic Conservation Strategy Objectives 3, 4, 5, and 6 may not be met because taking 'no action' would not necessarily maintain the physical integrity of the aquatic system, water quality, or the sediment regime in these streams (see **Appendix D**). The two log culvert stream crossings that have already failed where an existing road crosses Stream 2 would continue to erode into the stream under this alternative. Stream 12 would continue to flow down the existing road because the fill location blocks natural drainage into stream 2.

The erosion would be a chronic source of sediment until the banks naturally stabilize, thus negatively impacting water quality and resident fish habitat located approximately 1,500 feet downstream.

Indirect Effects: The six existing stream crossings would not be removed or maintained. The indirect effect of this is that they could erode further and/or fail and scour the channels downstream. Short-term water quality degradation from mass wasting, as well as long-term chronic sediment additions to the stream system, could occur due to the lack of log culvert removal and road maintenance.

The log culvert locations range from approximately 1,500 feet to 4,000 feet to resident fish habitat. This habitat would be negatively impacted from the chronic and/or catastrophic (mass failure) addition of fine sediments. Due to this, ACS Objectives 3, 4, 5, and 6 may not be attained with this alternative (see **Appendix D**). Although the water table elevation in wetlands and flood plain would remain in the existing condition, mass wasting at unstable stream crossings may impact downstream flood plains and ACS Objective 7 may not be attained.

Cumulative Effects: Opportunities to restore five stream crossings where there are currently log culverts would be postponed to a later date. Restoration of natural flow at stream 12 where there is currently a fill would also be postponed. This would result in further erosion of the existing road near stream 12.

Detrimental effects from possible culvert failures could occur due to lack of maintenance. Under a worse case scenario if all stream crossings failed, approximately 500 cubic yards of soil and rock could potentially enter the adjacent streams. Additional soil volume along the channel banks could also be disturbed due to the debris flows. While it is difficult to predict exactly where the debris would be deposited in the channels, it is speculated that most (if not all) of the course material would settle out in these project area tributaries. Some suspended sediment may be carried into Hills Creek and further downstream from the project area.

There would be a negative impact to resident fish habitat should a failure of this magnitude occur.

Other road crossings, both public and private, in the 5th field would continue to be removed. Due to the small scale of this project, cumulative improvement in water quality at the 5th field scale would not be discernable with action or no action alternatives.

Indicator 2**:** *Road improvements and road closures designed to intercept road related runoff.*

Direct Effects: Since no road improvements or closures would occur under this alternative, the direct effect of this alternative is that chronic sediment delivery to stream 2 would continue due the ongoing erosion of the existing road adjacent to it. Downstream resident fish habitat would be negatively impacted.

Indirect Effects: An indirect effect of implementing this alternative is that road-related sedimentation and run-off to streams may escalate due to the lack of road maintenance. Roads that are currently erosion resistant may degrade and direct runoff into adjacent streams.

This sediment addition would negatively impact resident fish habitat but would have negligible effect on downstream populations of spring Chinook.

Cumulative Effects: The opportunity to close 1.5 miles of road would be postponed until a later date. Road related runoff into adjacent streams would continue and potentially escalate due to the lack of maintenance. As a result, water quality and existing resident fish habitat may not be maintained and ACS Objective 4 may not be attained (see **Appendix D**).

Other roads, both public and private, in the 5th field would continue to be closed. Due to the small scale of this project, cumulative improvement in the 5th field scale would not be discernable with action or no action alternatives.

Indicator 3: *Potential large woody input into streams (acres and diameters).*

Direct Effects: None of the riparian reserve areas in this area would be treated at this time. Tree density in the riparian reserves would remain at approximately 200 trees per acre with an average diameter of 12".

Indirect Effects: Tree spacing would remain more dense for decades when compared to the action alternatives. Forecasting out 50 years, untreated stands would be at a density of approximately 150 trees per acre and 21" in diameter breast high (dbh) as compared to 70 trees per acre and 24" dbh forecasted for the action alternatives. In the short term, recruitment of wood into streams would be the same or greater than the action alternatives due to natural mortality, stem exclusion, and disturbances within the project area. Desired increases in diameter, height, species diversity, crown differentiation and overall size and complexity of dominant and codominant conifers in riparian zones would occur at a slower rate as compared to the action alternatives. As diameter and length of trees increase so does their eventual value as stream structure due to their size and ability to persist longer in the stream channel. Overall, the quality and biomass of large wood into streams would be less when compared to the action alternatives because acceleration of late successional forest characteristics in Riparian Reserves would not be realized under this alternative.

Cumulative Effects: Other Federal projects designed to accelerate the attainment of larger trees in the riparian area would continue in this watershed.

4.1.2 Issue #2 - What would be the effect of road management activities on soil productivity?

Indicator 1**:** *Acres of compacted soil surface and length of road with infiltration characteristics restored.*

Direct Effects: No additional soil compaction or soil displacement would be incurred beyond what exists currently, because no temporary road improvement would occur.

Indirect Effects: Soil infiltration (porosity) would not be restored along existing road segments, which are targeted for tillage under the other three action alternatives. Impaired infiltration, water storage, and gas exchange would persist on 2.7 acres into the future with the corresponding growth loss effects. Active erosion would continue near Stream 2, further reducing the productivity potential at this particular locale.

Cumulative Effects: There would be no cumulative effects because the compaction condition would not change.

4.1.3 Issue #3 - What would be the effects of harvest activities on nearby spotted owl site?

Indicator 1: *Nesting and dispersal habitat within the provincial home range.*

Direct Effects: Dispersal or suitable nesting habitats would not be affected and there would be no direct or indirect effects to spotted owls or their habitat due to disturbance or habitat modification on federal lands.

Indirect Effects: Enhancement and acceleration of late seral characteristics in proposed treatment areas that could provide future suitable nesting habitat for owls sooner would not be realized under this alternative

Cumulative Effects: Cumulative effects due to actions on federal lands would be similar but slightly less than those described for the action alternatives. Cumulative effects due to actions on private lands would be the same as the proposed actions.

4.2 Alternative II - Maximize Use of Existing Roads

4.2.1 Issue #1 - What would be the effect of harvesting and road management activities water quality and resident fish habitat?

Indicator 1*: Number of stream crossings constructed or removed, and the potential to deliver sediment.*

Direct Effects: This alternative would provide for the removal of two existing log culverts (one on Stream 2, and the other on Stream 7) and replacing them with temporary culverts and gravel fill. Fill located on this road where it crosses stream 12 would also be removed and a temporary culvert would be installed. Following the completion of harvest activities, the temporary crossings and most of the gravel fill would be removed from the sites (see **Appendix A** for Design Features). By leaving some of the gravel fill on the channel banks and mulching with straw and native seed, erosion and sediment delivery to those streams would be minimized.

Two other log culverts (stream 14 and the lower crossing of stream 2) would be removed and not replaced since they are not needed for harvest activities. Restoration of the stream banks and channel bottoms at those locations would eliminate existing artificial barriers to sediment transport as well as reduce the risk of future culvert and road fill failures there, thus reducing sedimentation. ACS Objectives 3, 4, 5, and 6 would be restored or maintained (see **Appendix D**). By conducting the work during low flow periods (July 1 to October 15), and protecting exposed soils with straw mulch and seed until other native vegetation

encroaches, detectable amounts of suspended sediment is not expected to be delivered to the streams.

At all log culvert removal locations, a small amount of soil (approximately 1 cubic yard at each site) may accumulate at the straw bales/silt fences installed just downstream from the excavation site. This material may mobilize during the first fall rains but detectable impairment of water quality in those drainages or the watershed would not be expected.

Due to the low amount of soil entering the stream system and the quantity of large wood in the stream channel below the culvert locations to catch sediment that is mobilized during the first fall rains, there are not expected to be any negative impacts to resident fish, located a minimum of 1,500 feet downstream. Resident fish will benefit from this alternative due to the improved water quality as compared to the current condition or the "No Action" Alternative.

Indirect Effects: Restoration of the stream banks and channel bottoms at the four log culvert locations and fill at stream 12 would eliminate existing artificial barriers to sediment transport as well as reduce the risk of future road/culvert failures in this area (meets ACS Objectives 3, 5). Sediment, bedload materials, and woody debris stored in some of the channels above the log culvert locations may mobilize after the stream crossings are removed and the natural sediment regime would be restored.

The stream crossing on stream 3 would not be removed under this alternative since new road construction would be necessary to reach it with equipment. Old skid roads that were once used during past harvesting activities when this log culvert was installed are now grown over and barely recognizable as roads. Considerable site disturbance (cutting trees and excavation of a pioneer road) would be necessary to get equipment to the stream crossing. As mentioned in section 3.5 of Chapter 3, the risk of mass wasting at this site is considered to be low since the stream has low flows during much of the year and the fill is shallow. The indirect effect of this action is that at some time in the future, the stream crossing could fail and about 50 cubic yards of soil may enter the channel. The gradient of the stream is less than 10% below this feature and coarse-grained material probably would not be carried further than a few hundred feet due to in stream large wood currently in the stream channel downstream of this location. If the log culvert failed, suspended sediment could possibly reach Hills Creek for a couple of days but is not expected to reach the Middle Fork Willamette River due to the distance downstream (6 miles).

Due to the low amount of sediment (a result of mitigation measures, existing large wood in the channel, low stream flows, and low channel gradients below log culvert locations), downstream resident fish habitat would not be negatively impacted. They would be restored because of the restoration of natural sediment and large wood transport mechanisms.

Cumulative Effects Stream channel restoration would be conducted where there

are currently old log culverts and fills ranging from 4 to 20 feet in depth. This work contributes to an on-going effort in the watershed to remove potentially unstable fills that could negatively impact water quality and fish habitat.

Other road crossings, both public and private, in the 5th field would continue to be removed. Due to the small scale of this project, cumulative improvement in water quality at the 5th field scale would not be discernable with this alternative.

Indicator 2: *Road improvements and road closures designed to intercept road related runoff.*

Direct Effects: New road construction (1.4 miles) is not expected to have any direct impacts on stream flows since these roads are predominately in ridge-top or very gently sloping topographic locations outside the stream influence zone with little or no connection to the stream network.

A total of 0.53 mile of existing road would be improved and then decommissioned following use. The existing road into Unit 2 would be improved, used, and then closed following use. The direct effect of this action would be that the existing ruts in this road would be eliminated before fall rains begin and consequently road related runoff to Stream 2 would be decreased. Establishing proper drainage of Stream 12 would also occur during the temporary road improvement by installing a culvert where there currently isn't one.

Following harvest activities, the historic location for Stream 12 would be re-created during road closure work so that the stream drains into Stream 2 instead of down the old road.

These actions all meet ACS Objectives 3, 4, 5, and 6 because these actions would be conducted in a manner to maintain and improve water quality both in the short and long term (see Appendix D). There are also segments of existing roads that would be improved and then closed following harvest activities near streams 7 and 14.

A total of 0.43 mile of existing road would be decommissioned without being used as part of this alternative. These road segments currently contribute sediment to the stream system and closure would improve water quality.

On the roads to be closed, tilling where subgrade conditions allow would minimize future sediment recruitment from the road prism (this action meets ACS Objectives 3, 5). Tilling or storm-proofing roads by using waterbars, drain-dips, and pulling brush or small trees into the road prism especially near streams would reduce road-related runoff and contribute towards the restoration of natural stream flow (meets ACS Objective 6).

The decrease in sediment resulting from closing the road in area 2 would positively impact resident fish habitat, located approximately 1,500 feet downstream, as compared to the current condition by reducing sediment input and

restoring water quality. Natural routing patterns for large woody material and sediment would also be restored. The construction of ridgetop roads or roads with very gentle topographic locations that are not within the stream influence zone would not negatively impact resident fish, as they are not connected to the stream network.

Indirect Effects: At the end of each operating season, roads used for the harvesting action would be water-barred or otherwise left in an erosion resistant condition to reduce the potential for erosion and runoff to nearby streams (see Appendix A for Design Features). New roads constructed to access Units 3, 4, and 5 would be designed with an out-slope to maintain adequate drainage onto the forest floor, rather than towards the stream system. This lack of hydrologic connectivity for the new road construction and mitigation for road closure would not negatively impact resident fish habitat.

In the long-term, stream-side conditions would be improved as the closed roads revegetate after they are left in an erosion resistant condition (this action meets ACS Objectives 4, 5). This activity would benefit resident fish habitat.

Cumulative Effects: None of the new road construction is expected to impact water quality since these new road segments are predominately in ridge top locations. The Proposed Action includes closing several existing and all temporary new roads following harvest activities. Implementation of this proposal, combined with other ongoing and planned road renovation and restoration work in the Hills Creek Watershed (both on BLM and private lands) would result in a long term reduction of road related sediment delivery to streams and water quality would be improved.

Other roads, both public and private, in the 5th field would continue to be closed. Due to the small scale of this project, cumulative improvement in the 5th field scale would not be discernable with action or no action alternatives.

Indicator 3*: Potential large woody input into streams (acres and diameters).*

Direct Effects: Under this alternative 45 acres of riparian reserves would be treated. Tree density in treated areas would decrease from 200-215 trees per acre to 70-80 trees per acre.

Indirect Effects: Treated riparian reserve acres would grow faster than untreated stands and would average approximately 23" dbh and 60-70 trees per acre 50 years after treatment compared to 150 trees per acre with a dbh of 21" in not treated. Desired increases in diameter, height, crown differentiation and overall size and complexity of dominant and co-dominant conifers in riparian zones would occur at a much faster rate as compared to the no action alternative. As diameter and length of trees increase so does their eventual value as stream structure due to their size and ability to persist longer in the stream channel. Overall, treatments would result in greater quality and biomass of large wood into

streams, greater conifer species diversity, and accelerated development of late seral forest characteristics in the Riparian Reserves

Cumulative Effects: This project in addition to other Federal projects would lead to a trend of larger trees and greater species diversity in the riparian area within the watershed. This project is probably not large enough, however, to be noticeable at the 5th field scale.

4.2.2 Issue #2 - What would be the effect of road management activities on soil productivity?

Indicator 1: *Acres of compacted soil surface and length of road with infiltration characteristics restored.*

Direct Effects: Constructing 1.41 miles of new temporary road and improving 0.53 mile of existing road would result in the loss of topsoil and soil compaction on a total of 5.62 acres. Reconstruction would widen the impacted area from 15 feet to 20 feet where soils are compacted or top soils are displaced. Impacts to productivity would be less for the existing portions, where topsoil and porosity have been previously lost. All roads used would be temporary. Compaction would be ameliorated by tillage with an excavator, wherever subgrade conditions allow, after project completion (see Appendix A for Design Features). An additional .77 acres of existing road not used to harvest timber would also be tilled.

Indirect Effects: Tillage would restore infiltration (soil porosity) and hasten vegetative recovery on approximately 6.4 acres. Root and plant growth would be more vigorous and well distributed which would further improve soil structure. The only compacted surface that would not be tilled is a 0.52 mile segment within Harvest Area 5. Impaired infiltration, water storage, and gas exchange would persist on this 0.95 acre into the future, with the corresponding growth loss effects. This equates to less than ½ of 1% of the project area that would remain compacted after project completion (RMP soil standard is less than 2% of area compacted).

The addition of brush and logging slash on treated acres would retard erosion and add organics in the short-term. However, long-term soil productivity, especially where excavation has occurred, would be reduced for many stand rotations.

Cumulative Effects: Implementation of this proposal, combined with other ongoing and planned closures of old roads no longer needed (both on BLM and private lands) would result in a positive long term trend for this watershed; eventually moving acres previously committed to roads back to full productivity.

4.2.3 Issue #3 - What would be the effects of harvest activities on nearby spotted owl site?

***Indicator 1*:** *Nesting and dispersal habitat within the provincial home range.*

Direct Effects: The proposed harvest actions would not remove suitable nest trees because small patches within harvest boundaries would be reserved. Riparian stands that currently provide nesting habitat would not be treated.

The proposed harvest actions would reduce the canopy cover and disturb down wood and snags which would degrade the foraging quality of about 210 acres of dispersal habitat.

If a nesting pair and their young is using the project area or the adjacent site, they would likely not be disturbed by project activities because seasonal restrictions would be applied on all noise and harvest activities during the critical nesting period, or longer if necessary (see **Appendix A**).

Indirect Effects: Some of the remaining nesting habitat (up to 15 acres), although structurally intact, might not function for nesting until the surrounding stand canopy recovers in 10- 15 years. The project area would still function as dispersal habitat, but very little foraging would occur in the 210 acres treated until the canopy density recovers to near pre-harvest condition in 10-15 years.

Cumulative Effects: Due to effects from proposed treatments, their proximity to the existing site, and the existing condition/amount of habitat within the provincial home range, the owl site would continue to be unsuitable for pair occupation or successful nesting.

All current and future foreseeable actions on BLM lands would meet the Standards and Guidelines directed by the Eugene District RMP and the Northwest Forest Plan. These documents manage for owl populations at larger scales and analyzed short and long term effects to owl sites in Matrix lands under the assumption that these sites are not integral to sustaining larger owl populations in the long term.

Private lands in the area currently provide some dispersal habitat and negligible amounts of nesting habitat. It is likely these habitats would continue to be removed by future actions.

4.3 Alternative III: Proposed Action

4.3.1 Issue #1 - What would be the effect of harvesting and road management activities water quality and resident fish habitat?

Indicator 1: *Number of stream crossings constructed or removed, and the potential to deliver sediment.*

Direct Effects: As compared to the other Action Alternatives, this alternative would provide for the removal and temporary replacement of only one log culvert

on Stream 7. Three other log culverts and one fill at stream 12 on existing roads would be removed permanently during road closure work. One log culvert on stream 3 would be left in-place for the same reasons as described under Alternative II. The direct effects to water quality and Resident and resident fish habitat would also be the same as those described under Alternative II.

Indirect Effects: Same as Alternative II.

Cumulative Effects: Same as Alternative II.

Indicator 2: *Road improvements and road closures designed to intercept road related runoff.*

Direct Effects: Under this alternative 0.15 mile of existing road would be improved, used, and then decommissioned (as compared to 0.53 mile in Alternative II). The existing road used to provide access into Unit 2 under Alternative II would not be temporarily improved under this alternative, but would instead be permanently closed. This action would have an immediate effect on improving water quality by diverting surface road-related runoff away from Stream 2. Utilizing Design Features such as tillage, mulching, recontouring, and brush additions on the old road would hasten recovery and revegetation of those soils. All other road improvements and closures would be the same as in Alternative II.

New temporary road construction would total 1.6 miles (as compared to 1.4 miles in Alternative II). The only difference between these alternatives is that a new road would be constructed to access Unit 2 from the west instead of improving the existing road that parallels stream 2 for much of its distance.

A total of 0.8 mile of existing road would be decommissioned without being used as part of this alternative.

Indirect Effects: Same as Alternative II.

Cumulative Effects: Same as Alternative II.

Indicator 3: *Potential large woody input into streams (acres and diameters).*

Direct Effects: Same as Alternative II.

Indirect Effects: Same as Alternative II.

Cumulative Effects: Same as Alternative II.

4.3.2 Issue #2 - What would be the effect of road management activities on soil productivity?

Indicator 1**:** *Acres of compacted soil surface and length of road with infiltration characteristics restored.*

Direct Effects: This proposal would commit approximately 0.6 less acres to roads than Alternative II. There would be 1.57 miles of new temporary road constructed and 0.15 mile of existing road would be improved, resulting in topsoil removal and compaction on about 5 acres. Reconstruction would widen the impacted area from 15 feet to 20 feet where soils are compacted and top soils are displaced. Effects to soil properties would be the same as Alternative II. Treatments are identical to Alternative II in that all roads used would be tilled with an excavator after project completion. More relic road would be tilled under this alternative, 0.8 mile as compared to 0.4 mile for Alternative II.

Indirect Effects: Tillage would restore soil infiltration on approximately 6.5 acres, only slightly more acres treated than Alternative II. Effects to soil function would be the same as Alternative II. The amount of un-ameliorated compaction after project completion would also be identical.

Cumulative Effects: Same as Alternative II.

4.3.3 Issue #3 - What would be the effects of harvest activities on nearby spotted owl site?

Indicator 1: *Nesting and dispersal habitat within the provincial home range.*

Direct Effects: Same as Alternative II.

Indirect Effects: Same as Alternative II

Cumulative Effects: Same as Alternative II.

4.4 Alternative IV: No New Road Construction

4.4.1 Issue #1 - What would be the effect of harvesting and road management activities on water quality and resident fish habitat?

Indicator 1: *Number of stream crossings constructed or removed, and the potential to deliver sediment.*

Direct Effects: Under this alternative, three sites involving streams would be impacted, as compared to five under the Proposed Action. An existing road would be upgraded for use in harvesting Area 2. Along this road, there apparently is no culvert where Stream 12 intersects it. This fill would be replaced with a temporary stream crossing culvert. Further up the road, an existing log culvert at Stream 2 would also be replaced with a temporary culvert. Following the harvest work, these two culverts and most of the associated gravel fill would be removed.

Some of the bar run gravel would be left at those sites to add gravel to the streams and minimize soil erosion during the first fall rains after the work was completed.

Since equipment would be in the area, one other partially failed log culvert stream crossing lower on Stream 2 would also be removed. This impassable stream crossing would be excavated and shaped, and the channel side slopes would be stabilized by mulching and seeding. The site would not be used during the harvest activities.

At each of the three sites, a small amount of soil (approx. 1 cubic yard) may accumulate at the straw bales/silt fences installed just downstream from the excavation area. This material may mobilize during the first fall rains but detectable impairment of water quality in Stream 2, Starks Creek or the watershed would not be expected. The effects to resident and spring Chinook are the same as described in the proposed action.

Indirect Effects: Two stream crossings would not be removed or maintained because of the lack of equipment access. The indirect effect is that erosion could occur, resulting in possible fill and culvert failure causing scouring of the channels downstream. Short-term water quality degradation from mass wasting, and long-term chronic sediment additions to the stream system could occur.

As in the No Action Alternative, the log culvert locations range from approximately 1,500 feet to 4,000 feet to resident fish habitat. This habitat could be negatively impacted from the chronic and/or catastrophic (mass failure) addition of fine sediments. Due to this, ACS Objectives 3, 4, 5, and 6 may not be attained with this alternative (see Appendix D). It is unlikely that there would be any indirect impacts to spring Chinook salmon under this alternative because the project is 6 miles from occupied habitat for that species, and the adjacent streams have large wood to capture sediment. Similar to the No Action alternative, ACS Objective 7 may not be met if stream crossings fail and the debris impacts downstream flood plains and wetlands.

Cumulative Effects: Stream channel restoration would be conducted at three sites where there are currently erosion problems. This work contributes to an on-going effort in the watershed to remove potentially unstable fills in stream channels that could negatively impact water quality and fish habitat.

Opportunities to restore two stream crossings where there are currently log culverts would be postponed to a later date. As a result, detrimental effects from possible culvert failures could possibly occur due to the lack of maintenance. If these features failed, a couple hundred cubic yards of soil and rock could potentially enter the adjacent streams. Addition soil volume along the channel banks might also be disturbed to the debris flows. It is speculated that most, if not all, of the course material would settle out in these project area tributaries. Some suspended sediment may be carried into Hills Creek.

There could be a negative impact to resident fish if either of the stream crossings fail. Spring Chinook habitat in the Middle Fork Willamette River is not likely to be negatively impacted due to instream structure, low stream flows, and section of flat gradient existing in the streams within the project area. These features would capture this sediment before it reached the Middle Fork Willamette River, 6 miles downstream from the project area.

Indicator 2*: Road improvements and road closures designed to intercept road related runoff.*

Direct Effects: No new road construction would occur. The effect of improving the road into Harvest Area 2 and then closing it after harvest operations is that existing ruts that currently can route runoff into the adjacent stream would be eliminated and road related sedimentation would be decreased.

There would be a short term, localized impact on resident fish due to the road improvement and decommissioning activities. Spring Chinook would not be impacted as a result of this alternative due to the distance downstream to the Middle Fork Willamette River (6 miles).

Indirect Effects: No seasonal road stabilization work on the road into Unit 2 would be necessary since the harvest activity and road closure work associated with it could be conducted in one season. In the long-term, the stream-side condition along Stream 2 would be improved as the closed road revegetates. This restoration of the Riparian Reserve would benefit resident fish habitat.

Two stream crossings and existing road segments located south of the harvest area would remain on the landscape and may potentially erode due to lack of maintenance. The indirect effect of this is that road related sediment could potentially enter Streams 7 and 14 until the roads are either maintained or closed and left in an erosion resistant condition.

Cumulative Effects: The reconstruction, use of, and final closure of the existing road providing access into Area 2 would noticeably reduce road related sediment delivery into Stream 2. This action, combined with other ongoing and planned road restoration work in Hills Creek Watershed would result in an improvement of water quality, although it may not be measurable at the watershed level.

4.4.2 Issue #2 - What would be the effect of road management activities on soil productivity?

Indicator 1: *Acres of compacted soil surface and length of road with infiltration characteristics restored.*

Direct Effects: Less acreage would be committed to roadway under this alternative than the other two action alternatives. Improvement of 0.38 mile of existing road would further compact and remove additional topsoil on 1.16 acres. This amount of compaction is within the soil quality standards as set forth in RMP

and only .44 acres more than what exists currently. Compaction would be mitigated by tillage on all roads used in the proposal, and approximately 0.41 mile of existing road not used would also be tilled.

Indirect Effects: This Alternative leaves more of the relic road system unused and untreated than Alternatives 2 and 3. Approximately 0.7 mile inventoried as currently compacted would not be treated under this Alternative. Impaired infiltration, water storage, and gas exchange would persist on these 1.2 acres into the future, with the corresponding growth loss effects. This equates to approximately half of 1% of the project area that would remain compacted after project completion, a quantity well within RMP standards, and less than what exists currently. Impacts to long-term soil productivity would be substantially less under this alternative since no new road would be constructed, and there would be minimal loss of topsoil beyond the current condition.

Cumulative Effects: Same as other Action Alternatives.

4.4.3 Issue #3 - What would be the effects of harvest activities on nearby spotted owl site?

Indicator 1: *Nesting and dispersal habitat within the provincial home range.*

Direct and Indirect Effects: Direct and Indirect effects are the same as described for the other action alternatives except for the following: 1) No suitable nesting habitat is within the proposed units and none would be affected, and 2) roughly 78 acres (vs. 210 acres) of dispersal habitat would be thinned, and temporarily degraded.

Cumulative Effects: Same as other Action Alternatives.

4.5 Other Environmental Effects – Common To All Action Alternatives

4.5.1 Unaffected Resources – The following either are not present or would not be affected by any of the alternatives: Areas of Critical Environmental Concerns, prime or unique farm lands, flood plains, Native American religious concerns, solid or hazardous wastes, Wild and Scenic Rivers, Wilderness, Minority populations, and low-income populations.

4.5.2 Wetlands – Since no ground disturbing activities would occur in meadows and wetlands, the hydrology in these sensitive areas would be maintained in the current condition, and the intent of ACS Objective 7 would be met.

4.5.3 Threatened and Endangered Species

Northern Spotted Owls (Threatened) – The action alternatives would be consulted on programmatically in the *Willamette Province FY 2003-2004 Habitat Modification Biological Assessment for Effects to Northern Spotted Owls and Northern Bald Eagles* and would conform to the guidance in this document,

including application of Reasonable and Prudent Measures to minimize disturbance to spotted owl pairs and their progeny, and updates to include current standards. Based on this document, Alternative I would have no effect on the spotted owl; Alternatives II, III and IV may affect but are not likely to adversely affect spotted owls.

Spring Chinook Salmon (Threatened) – There would be no effect to spring Chinook salmon or their habitat (further discussion is located in the Analysis File). Consultation for Essential Fish Habitat (EFH) is not required for NLAA activities.

4.5.4 Cultural Resources – No Cultural sites have been identified. The analysis file contains the cultural report.

4.5.5 American Indian Rights – No impacts on American Indian social, economic, or subsistence rights are anticipated. No impacts are anticipated on the American Indian Religious Freedom Act. Management action information was sent to the Confederated Tribes of the Grand Ronde, and Confederated Tribes of the Siletz.

4.5.6 Environmental Justice – To comply with Executive Order 12898 of February 11, 1994, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, the Bureau of Land Management, Eugene District, will ensure that the public, including minority communities and low income communities, have adequate access to public information relating to human health or environmental planning, regulations, and enforcement as required by law.

The District has not identified any environmental effects, including human health, economic and social effects of Federal actions, including effects on minority populations, low income populations, and Native American tribes, in this analysis.

4.5.7 Invasive and Non-Native Species –False brome, scotch broom, and various thistle species exist along roadsides inside the analysis area. These species will continue to spread throughout the road system. The design features in **Appendix A** outline some critical stipulations that would help reduce the spread and help contain the population of false brome, scotch broom, and thistle.

Scotch broom is designated as a "weed of economic importance" by the Oregon Department of Agricultural. Scotch broom is very abundant in western Oregon. The Oregon Department of Agriculture has chosen biological control as a main approach to containing these weeds. BLM targets many acres per year with manual or mechanical means to remove this and other types of weeds.

With design features in place, there would be no accelerated spread of these weeds. False brome would be manually pulled prior to implementing any action which would impede the spread.

4.5.8 Solid Or Hazardous Materials – There are no hazardous materials issues in the proposed project area.

During operations described in the proposal, spill containment kits would be available at the site in the event of any diesel, hydraulic fluid, or other petroleum product release into soil and/or water. Notification, removal, transport, and disposal would be accomplished in accordance with U.S. Environmental Protection Agency and Oregon Department of Environmental Quality Laws, and regulations.

4.5.9 Water Temperature- There would be no detectable increase in stream temperatures as a result of implementation of any of the alternatives. In preliminary research results conducted by Samuel Chen (USFS - PNW Research Station - Density Management and Riparian Buffer Studies of Western Oregon, June 2002) there was no increase in temperature in streams where a 50-75 ft. variable no-cut buffer was implemented adjacent to a thinning area. All action alternatives would have a no-cut buffer of a minimum of 75 feet.

5.0 LIST OF AGENCIES AND PERSONS CONSULTED

This Environmental Analysis is being mailed to the following members of the public or organizations that have requested to be on the mailing list:

John Bianco
Oregon DEQ
Jim Goodpasture
Pam Hewitt
Charles & Reida Kimmel
Lane County Land Management
Carol Logan, Kalapooya Sacred Circle Alliance
Oregon Dept of Fish & Wildlife
Oregon Dept of Forestry
Oregon Natural Resources Council
The Pacific Rivers Council
John Poynter
Leroy Pruitt
Roseburg Forest Products Co.
Sierra Club - Many Rivers Group
Swanson Group Inc.
Craig Tupper
Jan Wroncy
Kris and John Ward
Robert P Davison
Tom Stave, U of O Library
John Muir Project
James Johnston
Peter Saraceno

A letter was sent to the adjacent landowners on March 22, 2002 that identified specific areas being considered, project issues, and time lines for providing input. A summary was sent to those receiving the "Eugene BLM Planning and Project Focus," Spring 2002 (approximately 250 mailings – a complete listing is available at the Eugene District Office).

Maps of the Proposed Action were sent to the Confederated Tribes of the Grand Ronde and Confederated Tribes of Siletz in April 2002. No comments were received.

6.0 LIST OF PREPARERS

THE INTERDISCIPLINARY TEAM

NAME	TITLE	RESOURCE/ DISCIPLINE
Rudy Wiedenbeck	Soil Scientist	Soils
Roger Wilson	Forester	Logging Systems
Mike Blow	Wildlife Biologist	Wildlife
Michael Southard	Archaeologist	Cultural Resources
Jill Williams	Forester	Silviculture
Cheshire Mayrsohn	Botanist	Botany
Glen Gard	Natural Resource Protection Specialist	Hazardous Materials Coordinator
Nikki Swanson	Fisheries Biologist	Fisheries
Mike Sabin	Engineering	Roads/Transportation
Kris Ward	Hydrologist	Water Resources
Christie Hardenbrook	Public Affairs SCEP	EA Writer
Don Wilbur	Natural Resource Protection Specialist	Team Leader

DESIGN FEATURES COMMON TO ALL ACTION ALTERNATIVES

Design Features For Harvesting

1. Commercial thinning would be conducted using ground-based and cable logging systems. One-end suspension of logs would be required wherever topography permits to reduce the potential for erosion and run-off during yarding. Intermediate supports would be needed in Harvest Areas 2 and 3 to accomplish this objective.

2. Ground-based yarding operations can only occur where designated in the Proposed Action (see **Appendix C** for map). Use of all of the following requirements for ground-based yarding systems would keep soil impacts/compaction within RMP standards:
   - Restrict yarding to seasonally dry periods when soil moisture content provides the most resistance to compaction, typically between 25 to 35%, as approved by the Authorized officer in consultation with the soil scientist.
   - Preplan (map) and designate (flag) all skid trails to occupy less than 10% of the harvest area.
   - Require felling of trees to lead to the skid trails and maximize winching distances up to 100 feet and distances between trails up to 200 feet where feasible. Use existing skid roads whenever possible.
   - Till all compacted skid trails and temporary native surface roads with an excavator to a depth of 24 inches, when soil moisture is appropriate (between 25 to 35%), as approved by the Authorized Officer in consultation with the Soil Scientist. If tillage cannot be accomplished the same operating season, all skid trails and temporary native surface roads would be left in an erosion resistant condition and blocked prior to the onset of wet weather. This would include construction of drainage dips, water bars, lead off ditches, and possibly brush piles to prevent OHV entry until final blockage and tilling.

3. Directional felling would be utilized to protect withdrawn areas with sensitive soils (wetlands).

4. Log lengths would be limited to 40 feet in order to protect residual trees during yarding.

5. Thinning prescription for the Matrix: Thin from below, cutting suppressed, intermediate, and some co-dominants. Residual tree spacing would be approximately 25 foot spacing, which would leave approximately 70-80 trees per acre. Trees larger than 24 inches DBH would be reserved, except for trees inside the thinning corridors, landings and roads.

6. Yarding restriction during sap flow is April l through June 15.

7. Management activities would be altered, according to BLM policy and RMP Standards and Guidelines, if any cultural resources, Special Status Plants or Wildlife - including

Threatened and Endangered, Survey and Manage or E-4 Special Provision Species - are found to be in or affected by harvest or associated activities

8. Consistent with IM No. OR-99-036 ("E-4 Special Provisions"), apply seasonal restrictions or suspension of all harvest and road activities that would occur within 1/4 mile of known nesting peregrine falcons, bald eagles, spotted owls, great grey owls, Accipiter hawks, and other owls, hawks, or raptors.

9. For spotted owls: Consistent with consultation with the USFWS, apply Reasonable and Prudent Measures to minimize disturbance to spotted owl pairs and their progeny, including: Apply seasonal restrictions on harvest, hauling, and road activities in/near all harvest areas and roads within 1/4 mile of section 15 during the critical nest period for northern spotted owls (March 1-July 15). These restrictions may be waived or extended by the Area wildlife biologist based on survey information regarding occupation or nesting activity.

10. Snags and large remnant trees would be retained undamaged when possible and would not be cut, except those in temporary road construction right of ways, landings and yarding corridors, and those posing a safety hazard. Directional falling and yarding would be utilized to protect snags and large remnant trees consistent with State safety practices. If these are felled for the above reasons, they would be retained on site as coarse woody debris.

11. For the purpose of long-term productivity and maintenance of biological diversity, all down woody debris of advance decay (class 3, 4, & 5) would be retained on site and disturbed as little as possible.

Design Features For Density Management in Riparian Reserves

1. Density Management prescription for Riparian Reserves: The marking prescription and thinning guidelines for the Riparian Reserve Density Management would be different from the harvest areas located in the upland, Matrix, Matrix. Riparian Reserve treatment would be a combination of thin from below and spacing, removing trees in the suppressed and intermediate canopy classes. However, the order of preference changes as well as Basal area retained.

    a. Riparian Reserves would be managed leaving the best formed and larger trees as leave trees.

    b. Remove all Douglas-fir and Western hemlock from 7-20"

    c. Spacing shall be approximately 25 by 25 feet, while retaining an average of approximately 70 - 80 trees per acre, yielding an average basal area/acre of approximately 60 - 80. The project area has considerable amounts of Pacific Yew, this species shall not be marked and would be reserved by contract.

d. Spacing of trees is unpredictable due to the variability of this natural stand. A priority would be given to leave trees based on: tree species as designated above in "b" and then spacing.

2. There would be no ground based equipment in the Riparian Reserves.

3. No landings would be used or constructed in the Riparian Reserves.

4. Perennial and intermittent non-fish bearing streams retain the interim Riparian Reserve width of one site potential tree height (180 feet slope distance) on each side of the stream channels. Density Management in Riparian Reserves is shown on the maps in **Appendix C.** All designated density management areas will have a riparian buffer width (no cut buffer) of approximately 75 feet from the stream. All fish bearing streams retain the interim Riparian Reserve width of two site potential tree heights (360 feet slope distance) on each side of the stream channels.

Design Features For Road Construction, Road Improvements, and Road Decommissioning

1. All road construction and logging equipment will be washed prior to arrival at the designated site to prevent import and spread of noxious weeds. This equipment will be washed at the project site prior to leaving the area both at seasonal shut-downs and at the completion of harvest and road closure activities. False Brome (*Brachypodium sylvaticum*) currently occurs in only a few areas around the Eugene District. To prevent the infestation from increasing in the Starks Creek analysis area and spreading to new areas, false brome will be manually pulled prior to the thinning operation.

   Vehicles are a major vector for the spread of this species. Road construction equipment and transportation equipment would be cleaned before moving away from the Starks Creek analysis area to avoid spreading weed seeds. In order to prevent the potential spread of weeds from this area into other BLM lands and neighboring private lands, the operator would be required to clean all logging, construction, rock crushing equipment prior to leaving the sites. Cleaning is defined as removal of dirt, grease, plant parts and material that may carry weed seeds. Cleaning may be accomplished by using a pressure washer, cold water, and a portable tank. The designated wash area is the rock quarry located on the east edge of Harvest Unit #3. This site shall be prepared in such a manner as to contain any wash water so that it does not runoff into the nearby stream or the ditchline of Road No. 18-1-15.2. If grease is visible on the soil at this site after washing is completed, the District Hazardous Materials Coordinator shall be consulted to determine if further action is necessary.

2. New temporary road construction and temporary improvement of existing roads:
   New construction and existing road upgrade work with no stream crossings, and harvest operations conducted from native surface roads would be limited to the dry season (generally between June 1 and October 15, subject to soil moisture conditions). Timing of work on roads without stream crossings is subject to soil moisture conditions. Use bar-run river rock covered by common material as a compacted running surface at stream crossing locations. Silt fences or straw bales will be used to minimize sediment transport from the excavation area to down stream locations. Waterbars, drainage dips and/or lead

off ditches may be required to create an erosion resistant condition on roads used for harvesting during seasonal shut-down periods.

3. Road Closures:
In channel work is to be conducted during low flow periods (July 1 to October 15) prior to fall rains. Silt fences or straw bales will be used to minimize sediment transport from the excavation area to down stream locations. At stream crossings, recontour the channel side slopes and seed or plant exposed soils with native plant species in conjunction with erosion control blankets or mulch. Rock and large wood may be placed in the stream channel to simulate natural conditions. Small amounts of washed river rock that was used for temporary fill material at stream crossings may be left in and/or adjacent to the channel to reduce erosion.

River bar-run rock material removed from the stream crossings would be stockpiled or used as directed by the Authorized Officer. Common material would be disposed of along the closed road at a distance at least 50 feet from streams and tilled into the road prism where appropriate.

Where subgrade conditions warrant, till the compacted road surface. If closed roads are not tilled, construct drainage dips, water bars or lead-off ditches to direct surface water to the forest floor and otherwise leave the road in an erosion resistant condition. To block the road(s) and reduce erosion, place slash, logging debris, and pull small diameter trees and brush from the adjacent forest floor onto the road surface. This addition of woody material should be conducted along as much of the length of the road as possible.

Construct earthen barricades with brush or slash additions to adequately limit off-highway vehicle traffic.

Design Features For Fuels Treatment

1. All landing, piles, and burnable fuel concentrations along project roads and spurs will be covered during the summer months and burned in the late fall (normally November and December) when fire season has ended and soil and duff moisture is high, but before conditions become too wet to insure adequate fuel consumption. The treatment of burnable fuel concentrations will be limited to within 25 feet of the road or spur edge.

HARVEST AREA DETAILS FOR ALTERNATIVE II

Harvest Area	Land Use Allocation	Volume/Acre (MBF)	Total Volume (MBF)	Treatment Type	Harvest System	Total Acres	Timber Age
1	Matrix	10	270	Thinning	Cable	27	50-55
1	RR	10	70	Density Mgt.	Cable	7	50-55
2	Matrix	10	160	Thinning	Cable	16	50-55
2	RR	10	90	Density Mgt.	Cable	9	50-55
3	Matrix	10	570	Thinning	Cable Grnd. Based	54 3	50-55
3	RR	10	120	Density Mgt.	Cable	12	50-55
4	Matrix	10	120	Thinning	Cable	12	50-55
4	RR	10	100	Density Mgt.	Cable	10	50-55
5	Matrix	10	650	Thinning	Cable	65	50-55
5	RR	10	60	Density Mgt.	Cable	6	50-55

Matrix= Land Use Allocation
RR = Riparian Reserve Land Use Allocation

ROAD CONSTRUCTION AND CLOSURE SUMMARY FOR ALTERNATIVE II

Harvest Area #	Road No.	*Temp. Road Construction (Miles)	*Temporary Improvement on Existing Road (Miles)	Additional Existing Road Decom. (Miles)	Log Culverts Removed	Temporary Culverts Installed & Removed
1	Spur 1	0.02				
2	Spur 2		0.38	0.02	2	2
3	Spur 3	0.4	0.11		1	1
4	Spur 4	0.25				
5	Spur 5	0.74	0.04	0.41	1	
	TOTALS	1.41	.53	.43	4	3

*** These roads would be decommissioned**

HARVEST AREA DETAILS FOR ALTERNATIVE III - PROPOSED ACTION

Harvest Area	Land Use Allocation	Volume/Acre (MBF)	Total Volume (MBF)	Treatment Type	Harvest System	Total Acres	Timber Age
1	Matrix	10	270	Thinning	Cable	27	50-55
1	RR	10	70	Density Mgt.	Cable	7	50-55
2	Matrix	10	160	Thinning	Cable	16	50-55
2	RR	10	90	Density Mgt.	Cable	9	50-55
3	Matrix	10	570	Thinning	Cable Grnd. Based	54 3	50-55
3	RR	10	120	Density Mgt.	Cable	12	50-55
4	Matrix	10	120	Thinning	Cable	12	50-55
4	RR	10	100	Density Mgt.	Cable	10	50-55
5	Matrix	10	650	Thinning	Cable	65	50-55
5	RR	10	60	Density Mgt.	Cable	6	50-55

Matrix= Land Use Allocation
RR = Riparian Reserve Land Use Allocation

ROAD CONSTRUCTION AND CLOSURE SUMMARY FOR ALTERNATIVE III - PROPOSED ACTION

Harvest Area #	Road No.	*Temp. Road Construction (Miles)	*Temporary Improvement on Existing Road (Miles)	Additional Existing Road Decom. (Miles)	Log Culverts Removed	Temporary Culverts Installed & Removed
1	Spur 1	0.02				0
2	Spur 2	0.17		0.40	2	0
3	Spur 3	0.40	0.02		1	1
4	Spur 4	0.25	0.09			0
5	Spur 5	0.74	0.04	0.41	1	0
	TOTALS	1.58	.15	.81	4	1

* These roads would be decommissioned

HARVEST AREA DETAILS FOR ALTERNATIVE IV

Harvest Area	Land Use Allocation	Total Acres	Volume/Acre (MBF)	Total Volume (MBF)	Treatment Type	Harvest System	Timber Age
1	Matrix	27	10	270	Thinning	Cable	50-55
1	RR	7	10	70	Density Mgt.	Cable	50-55
2	Matrix	16	10	160	Thinning	Cable	50-55
2	RR	9	10	90	Density Mgt.	Cable	50-55

Matrix= land use allocation
RR = riparian reserve

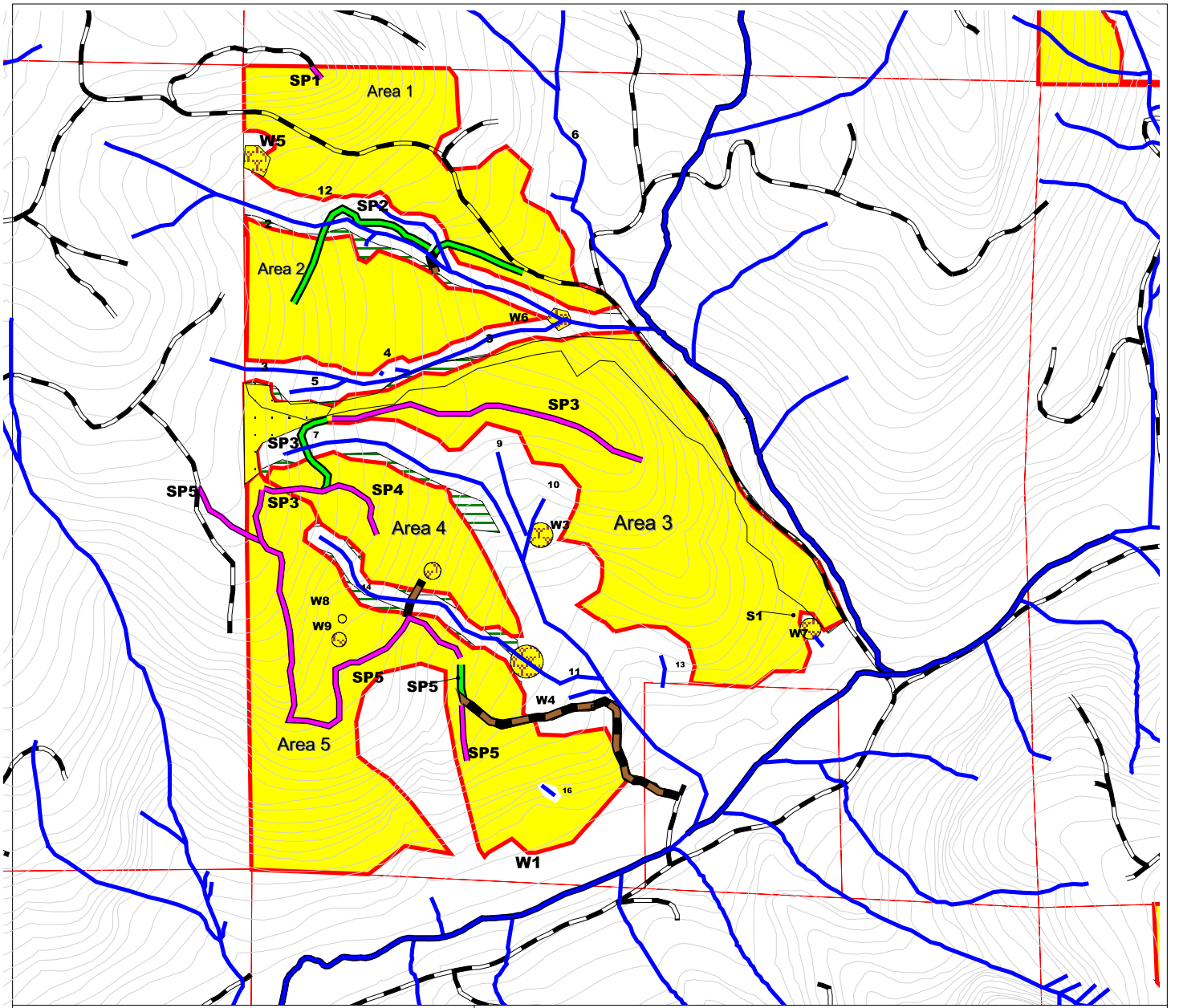
ROAD CONSTRUCTION AND CLOSURE SUMMARY FOR ALTERNATIVE IV

Harvest Area #	Road No.	Temp. Road Construction (Miles)	*Temporary Improvement on Existing Road (Miles)	Additional Existing Road Decom. (Miles)	Log Culverts Removed	Temporary Culverts Installed & Removed
1		0	0	0	0	0
2	Spur 2	0	0.38	0.02	2	2
	TOTALS	0	0.38	0.02	2	2

*** These roads would be decommissioned**

APPENDIX C

MAPS AND LOCATION OF ROAD CONSTRUCTION AND HARVESTING
ON
ALL ACTION ALTERNATIVES



ACRES:
Area 1 - 27
Area 2 - 16
Area 3 - 57
Area 4 - 12
Area 5 - 65
Total - 177

Riparian Reserve
Thinning
44 acres

Roads
Improve - 2,800' - .53 mi
New - 7,400' - 1.4 mi
Decom - 2,250' - .43 mi

- Fish Bearing Stream
- Stream
- Wetlands
- Existing Roads
- Temporary Road Construction
- Existing Road Decomission
- Temporary Improvement of Existing Road
- 20' Contour interval
- Groundbase
- Treatment Area
- Riparian Density Management
- Section lines

Starks Creek EA
Alternative II
Maximize Existing Roads

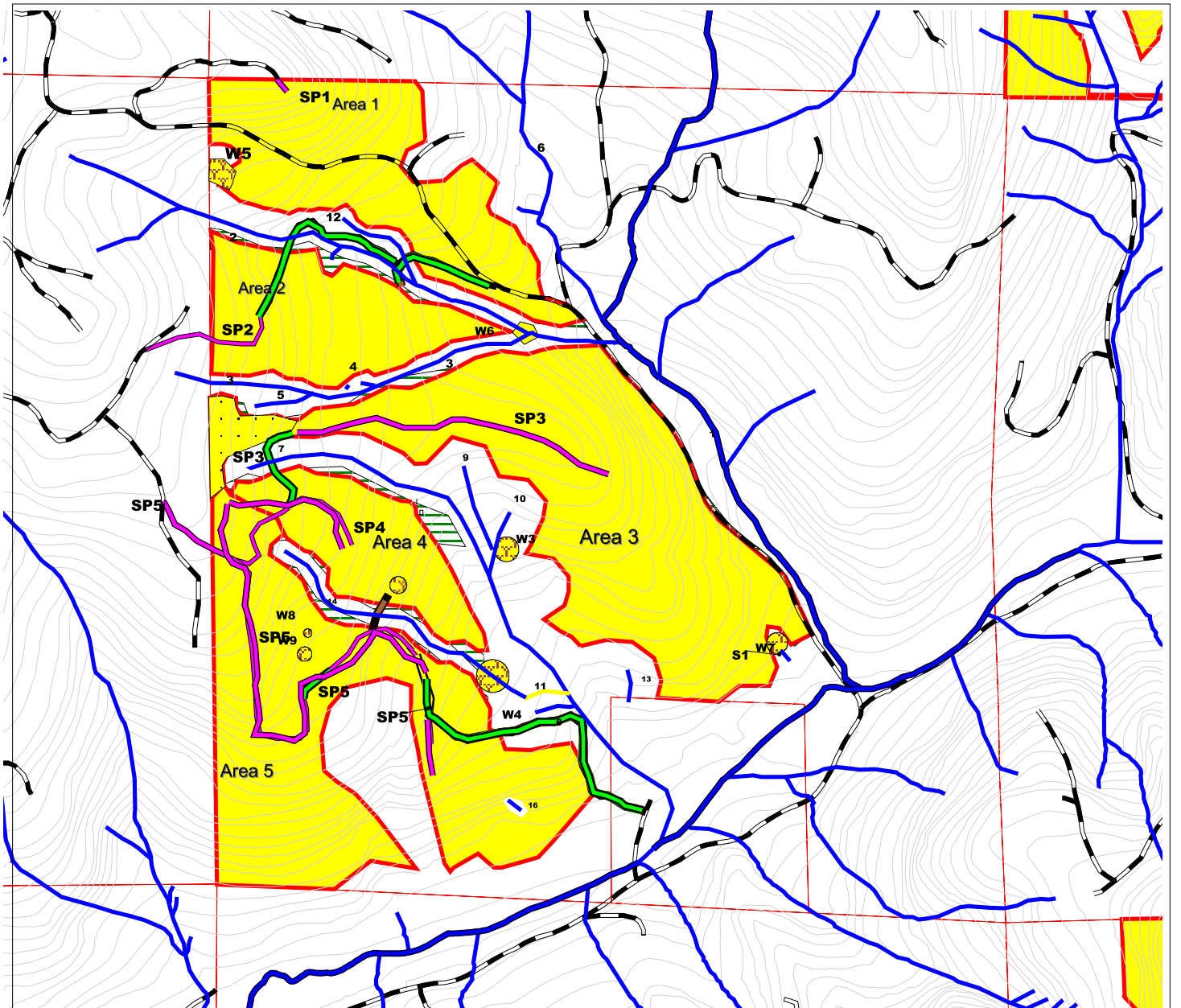
T.18S, R.01 W. Sec 15

500 0 500 1000 Feet

1"=1000'

N

07/01/02



ACRES:
Area 1 - 27
Area 2 - 16
Area 3 - 57
Area 4 - 12
Area 5 - 65
Total - 177

Riparian Reserve
Thinning
44 acres

Roads
Improve - 800' - .2 mi
New - 8,300' - 1.6 mi
Decom - 4,250' - .8 mi

Fish Bearing Stream
Stream
Wetlands

Existing Roads
New Road Construction Alt 2
Road Improvement
Temporary Improvement of Existing Road
Temporary Road Construction
Existing Road Decomission
Existing Road decommission
Existing road decomission
20' Contour interval
Groundbase

Treatment Area
Riparian Density Management
Section lines

Starks Creek EA
Alternative III
PROPOSED ACTION
Ridgetop Road Construction

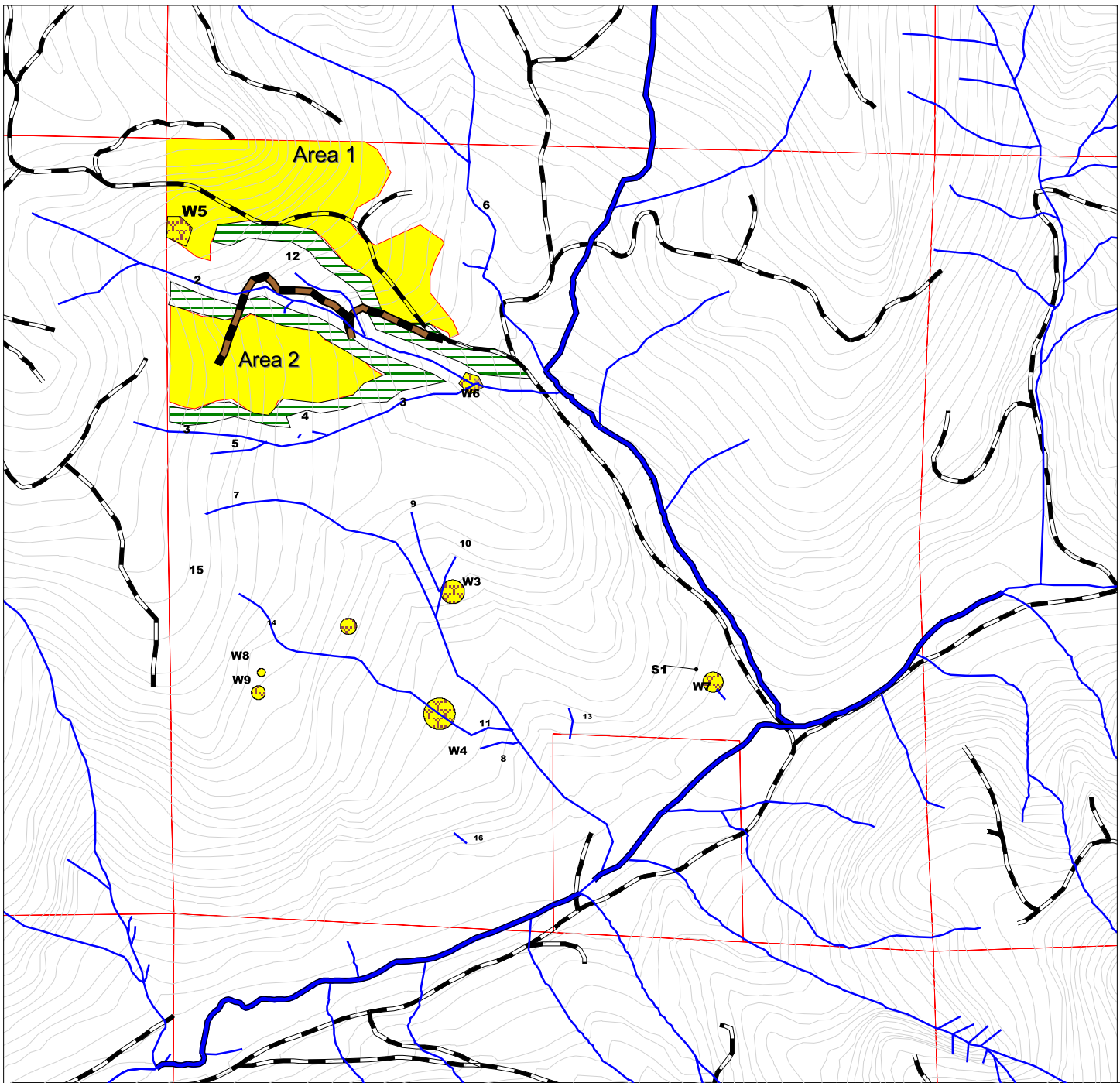
T.18S, R.01 W. Sec 15

500 0 500 1000 Feet

1"=1000'

07/01/02

N



ACRES:
Area 1 - 32
Area 2 - 16
Total - 48
Riparian Reserve Thinning
15 acres

Existing skid roads To be Decommissioned
Area 2 - 2,100
-Area 5 - 2,250'
Total - 4,350' - .8 miles

Fish Bearing Stream
Wetlands
Existing road decommissioned Alt 4
Roads
20' Contour interval
Stream
Riparian Density Management
Treatment Area
Section lines

Starks Creek EA
Alternative IV
No New Road Construction

T.18S, R.01 W. Sec 15

500 0 500 1000 Feet

1"=1000'

07/01/02

N

APPENDIX D

Aquatic Conservation Strategy Objectives

Forest Service and BLM-administered lands within the range of the northern spotted owl will be managed to:

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.

2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include flood plains, wetlands, up slope 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.

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

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.

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.

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.

7. Maintain and restore the timing, variability, and duration of flood plain inundation and water table elevation in meadows and wetlands.

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 distribution of coarse woody debris sufficient to sustain physical complexity and stability.

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

ACSO	For Each Numbered ACSO, Alternative I, No Action Alternative, Would:
1	The current condition of the riparian area would be maintained in its current condition. There would be no increased stand vigor or diversity of overstocked stands. Landscape scale features would be maintained.
2	Maintain the current quality of connectivity. Road crossings would not be removed and the habitat for aquatic species such as amphibians and macroinvertabrates would remain fragmented (see criteria 4). Water quality could be affected by current or future road erosion or culvert failure which could then affect dispersal opportunities.
3	Stream banks and bottom configurations may not be maintained if stream crossings fail and debris scours the channels downstream from those sites.
4	Water quality may not be maintained if existing roads continue to erode and stream crossings fail due to lack of maintenance.
5	The existing sediment regime on these federal lands may not be maintained if existing roads continue to erode and/or stream crossings fail due to lack of maintenance. In addition, natural sediment regimes will not be restored as existing log culverts will continue to block sediment transport.
6	Existing roads would continue to impact streamflow and sediment routing to streams, and the existing condition may not be maintained in the future without maintanance.
7	Existing meadows and wetlands would be maintained.
8	Coarse woody debris quality and amounts in streams (see Issue 1- Indicator 3) and the eventual attainment of a diverse hardwood and conifer species community with late seral characteristics would occur over a much longer timeframe as compared to the action alternatives.
9	In streams, riparian-dependent vertebrate and invertebrate species (particular macroinvertebrates and some amphibians) might be affected due to the current and potential future effects to water quality from failing roads and culverts mentioned in indicators 3-7 and less accumulation of large in stream logs (indicator 7). Restoration of habitats due to the accelerated development of late seral characteristics in riparian zone stands would not be realized under this alternative.

ACSO	For Each Numbered ACSO, Alternative II Proposed Action Would:
1	The riparian area would be maintained and restored by thinning activities that would increase the size and diversity of trees in the riparian area. Landscape scale features would be maintained.
2	Spatial and temporal physical connectivity between streams would be maintained and restored due to removed log culverts. Less mobile species (macroinvertebrates and some amphibians) that require sufficient water quality and stream structure to move between streams would benefit from road restoration that restore and reconnect natural hydrologic flow and density management actions that enhance future habitat and structure in streams.
3	Four stream crossings would be removed and the channel banks and bottom configurations would be restored. One stream crossing would be left in-place and the existing condition at that location would be maintained since it is considered to have low potential for mass wasting.
4	Throughout the project area, mitigation measures would be utilized to maintain existing water quality during the road improvement work into Units 2 and 3 and also for the road closure work elsewhere. Small amounts of sediment (about 1 cubic yard at each of the four sites) in the channel bottoms left following log culvert removal work would not result in detectable water quality impairment. In the *long-term*, water quality would be improved by closing the eroded road into Unit 2
5	The sediment regime would be restored to a more natural condition in the project area by closing roads that are delivering sediment to streams during storm events. Natural in-stream sediment movement would also be enhanced by removing stream crossings that currently are barricades to the movement of gravels and wood materials.
6	No increase in peak flow/base flow or adverse effects to Hills Creek are predicted from harvest of these units or the road closures. Commercial thinning operations in this rain-dominated zone should have very little impact of storm runoff to streams, especially since riparian buffers would be left in place. Road closure work would contribute to a reduction of road-related runoff from entering nearby streams and the implementation of this alternative would maintain and possibly restore the natural timing, magnitude, and duration of stream flows in the project area.
7	Existing meadows and wetlands would be maintained.
8	Long term benefits would be significant and realized by all riparian dependent species, including the accelerated development of late seral stand characteristics and down woody debris quality and amounts in/near streams that would benefit many riparian species (see Issue 1 - Indicator 3).
9	In streams, riparian vertebrate and invertebrate species (particular macro-invertebrates and some amphibians) would not be significantly affected by treatment activities in the short term.
10	Long term benefits would be significant are realized by all riparian-dependent species. These benefits include: restoration of streams features, water quality, and hydrologic connectivity as well as the accelerated development of late seral characteristics in the adjacent forest stands.

ACSO	For Each Numbered ACSO, Alternative III Would:
1	The riparian area would be maintained and restored by thinning activities that would increase the size and diversity of trees in the riparian area. Landscape scale features would be maintained.
2	Achievement of these objectives would be the same or similar as described under Alternative II.
3	Four stream crossings would be removed and the channel banks and bottom configurations would be restored. One stream crossing would be left in-place and the existing condition at that location would be maintained since it is considered to have low potential for mass wasting.
4	Throughout the project area, mitigation measures would be utilized to maintain existing water quality during the road improvement work into Units 2 and 3 and also for the road closure work elsewhere. Small amounts of sediment (about 1 cubic yard at each of the four sites) in the channel bottoms left following log culvert removal work would not result in detectable water quality impairment. In the *long-term*, water quality would be improved by closing the eroded road into Unit 2.
5	The sediment regime would be restored to a more natural condition in the project area by closing roads that are delivering sediment to streams during storm events. Natural in-stream sediment movement would also be enhanced by removing stream crossings that currently are barricades to the movement of gravels and wood materials.
6	No increase in peak flow/base flow or adverse effects to Hills Creek are predicted from harvest of these units or the road closures. Commercial thinning operations in this rain-dominated zone should have very little impact of storm runoff to streams, especially since riparian buffers would be left in place. Road closure work would contribute to a reduction of road-related runoff from entering nearby streams and the implementation of this alternative would maintain and possibly restore the natural timing, magnitude, and duration of stream flows in the project area.
7	Existing meadows and wetlands would be maintained.
8	Achievement of these objectives would be the same or similar as described under Alternative II.
9	Achievement of these objectives would be the same or similar as described under Alternative II.

ACSO	For Each Numbered ACSO, Alternative IV Would:
1	The riparian area would be maintained and restored by thinning activities that would increase the size and diversity of trees in the riparian area. Landscape scale features would be maintained.
2	Achievement of these objectives would be the same or similar as described under Alternative II.
3	Four stream crossings would be removed and the channel banks and bottom configurations would be restored. One stream crossing would be left in-place and the existing condition at that location would be maintained since it is considered to have low potential for mass wasting.
4	Throughout the project area, mitigation measures would be utilized to maintain existing water quality during the road improvement work into Units 2 and 3 and also for the road closure work elsewhere. Small amounts of sediment (about 1 cubic yard at each of the four sites) in the channel bottoms left following log culvert removal work would not result in detectable water quality impairment. In the long-term, water quality would be improved by closing the eroded road into Unit 2.
5	The sediment regime would be restored to a more natural condition in the project area by closing roads that are delivering sediment to streams during storm events. Natural in-stream sediment movement would also be enhanced by removing stream crossings that currently are barricades to the movement of gravels and wood materials.
6	No increase in peak flow/base flow or adverse effects to Hills Creek are predicted from harvest of these units or the road closures. Commercial thinning operations in this rain-dominated zone should have very little impact of storm runoff to streams, especially since riparian buffers would be left in place. Road closure work would contribute to a reduction of road-related runoff from entering nearby streams and the implementation of this alternative would maintain and possibly restore the natural timing, magnitude, and duration of stream flows in the project area.
7	Existing meadows and wetlands would be maintained.
8	Achievement of these objectives would be the same or similar as described under Alternative II.
9	Achievement of these objectives would be the same or similar as described under Alternative II.

UNITED STATES DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT
EUGENE DISTRICT OFFICE

Finding of No Significant Impact for Starks Creek Analysis Area

Determination:

On the basis of the information contained in the attached Environmental Assessment, and all other information available to me, it is my determination that implementation of the proposed action or alternative will not have significant environmental impacts not already addressed in the *Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (April 1994) and the Eugene District Record of Decision and Resource Management Plan (June 1995)*, with which this EA is in conformance, and does not, in and of itself, constitute a major federal action having significant effect on the quality of the human environment. Therefore, a new environmental impact statement or supplement to the existing environmental impact statement is not necessary and will not be prepared.

Field Manager, McKenzie Resource Area _____ Date