ENVIRONMENTAL ASSESSMENT

TRAPPER PROJECT

Lane and Linn Counties, Oregon

Prepared by:

U.S.D.A. Forest Service
Willamette National Forest
McKenzie River Ranger District

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PURPOSE AND NEED FOR ACTION

This Environmental Assessment is written to fulfill the purposes and requirements of the National Environmental Policy Act (NEPA), as well as to meet policy and procedural requirements of the USDA Forest Service. The intent of NEPA, its implementing regulations, and Forest Service policy is to evaluate and disclose the effects of proposed actions on the quality of the human environment. The intent of these procedures is to improve the quality of decision-making, as well as make the decision-making process more accessible and transparent to the affected public.

INTRODUCTION

Central Cascades Adaptive Management Area

The alternatives analyzed in this Environmental Assessment are located entirely within the Central Cascades Adaptive Management Area, as described in the Northwest Forest Plan Record of Decision (NWFP, USDA USDI 1994, 2001) (Figures 1 and 2).

The purpose of this Adaptive Management Area (AMA) is to "encourage the development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives." While the management of areas outside of AMAs, such as matrix and reserve lands, is grounded in a set of prescriptive, region-wide standards and guidelines, AMAs are recognized as areas where innovation, testing, and experimentation are both expected and appropriate. They are places where learning leads to validating or changing how resources are managed.

The following specific objectives for the Central Cascades Adaptive Management Area are listed in the NWFP (pages D12-13):

1. *"Intensive research on ecosystem and landscape processes and its application to forest management in experiments and demonstrations at the stand and watershed level,*
2. *approaches for integrating forest and stream management objectives and implications of natural disturbance regimes, and*
3. *management of young and mature stands to accelerate development of late-successional conditions."*

Blue River Landscape Strategy

The Blue River Landscape Strategy (*BRLS*, USDA 1997, 2002) was developed to respond to direction contained within the NWFP for the Central Cascades Adaptive Management Area. The Strategy consists of a recommended landscape management and watershed restoration

INSERT FIGURE 1

INSERT FIGURE 2

plan; an administrative study designed to measure effects on the ground; and a series of analyses of landscape effects over time. The *BRLS* outlined the idea that, over time, a landscape could be developed with a pattern and structure based to some degree on historical disturbance regimes -- particularly fire. To achieve that idea, the strategy recommended a system of no-harvest "reserves" coupled with three distinct landscape areas where timber harvest and fire could be used to alter forested conditions (Figures 3 and 4). The recommended timber harvest would approximate the important aspects of the frequency, severity, and spatial extent of historic fires. The retention of abundant down and standing live and dead woody material would approximate important habitat structures left after a fire. An initial evaluation of this approach indicates several potential benefits (Cissel et. al 1999).

The *BRLS* proposed to "restore" the pattern of the landscape over a period of many decades while meeting the objectives of the NWFP, including providing timber products; sustaining native habitats, species, and ecological processes; and meeting Aquatic Conservation Objectives. Where the landscape pattern is currently highly fragmented from a past "staggered-setting clearcutting" approach, it would evolve into a landscape with large blocks of old forest with high levels of connectivity (Figure 3). Where it is currently lacking in structure from standing dead and down wood in openings, those elements would be restored.

1. **Existing conditions are far different from historical conditions.** Forest roads, a patchwork of openings from past timber harvest, and a reservoir all influence the current landscape.
2. **Using timber harvest and prescribed fire as disturbance "tools" will produce results different than historical disturbances like fire, landslides, floods, etc.** During harvest, biomass is removed from the forest system in the form of live and dead trees for timber products. At the stand-level during historical natural fires, material that wasn't volatilized by the fire stayed on site and contributed structure to a future forest. At the landscape-level, natural historical fires occasionally occurred at large scales, burning thousands of acres. That level of modification can not be done through timber harvest or prescribed fire because the results would be unacceptable to today's society. Various laws require that native species be maintained, timber produced, and fire suppressed.

The *BRLS* can be found in its entirety at the Cascade Center for Ecosystem Management Web Site at http://fsl.orst.edu/ccem/brls/brls.html.

The Willamette National Forest previously implemented recommendations from the *BRLS* with the Blue River Timber Sale Environmental Assessment (USDA 1997).

The *BRLS* was formally approved as an **Administrative Study** (Forest Service memo on file with the McKenzie River Ranger District, 4/28/98). Revisions to the *BRLS* are expected as new information becomes available and experience is gained while implementing this management approach. This is the foundation of an "adaptive management" approach. Numerous monitoring activities are underway as part of the study. Updates and results of the study can be found on the internet at http://fsl.orst.edu/ccem/brls/brls.html. The *BRLS* was

INSERT FIGURE 3

INSERT FIGURE 4

presented to the Regional Interagency Executive Committee in 2001, which resulted in a memo signed by all of the NWFP agency executives. The memo supported continued implementation of recommendations from the *BRLS* (Appendix J.

PROPOSED ACTION

The District Ranger from the McKenzie River Ranger District proposes to implement a portion of the recommendations found in the Blue River Landscape Strategy, as described above. Actions include using timber harvesting techniques, prescribed fire, and snag creation methods to approximate stand structures resulting from historic high severity, stand-replacement fires and partial-stand replacement fires on 155 acres. The treatments would retain some overstory green trees and abundant standing and down dead woody material. Prescribed burning is proposed on 92 acres to approximate the effects of historic low severity fires. An extensive landscape and stand-level monitoring strategy is in place to evaluate the effects of these actions. Monitoring results would be incorporated in an adaptive management process.

Approximately 11.4 miles of existing permanent roads would receive maintenance to facilitate access for logging that includes resurfacing, culvert replacement, hazard tree removal, and roadside brushing and ditching. These roads are all currently open and expected to have continued use in the future for a variety of uses. The 1500, 1516, and 1517 roads were identified in the Forest Road Analysis (USDA 2003) as Key Forest Roads.

Approximately 1 mile of road would be decommissioned or stored to improve watershed conditions. These roads and road segments were not identified as Key Forest Roads in the Forest Road Analysis (USDA 2003).

Legal Description of Project Area: The proposed project area (Figure 1) is located in the Blue River watershed north of Highway 126, near the town of Blue River, Oregon. The legal location is T14S, R5E Sections 34 - 36 and T15S, R5E section 4, W.M., Lane and Linn Counties, Oregon.

PURPOSE AND NEED

The primary purpose and need for this project is to manage mature timber stands within the project area in a manner that is consistent with the Willamette National Forest Land and Resource Management Plan, as amended by the Northwest Forest Plan in 1994, to provide timber products; to provide sustainable native habitats and ecological processes which support wildlife, fish, and plant species; to meet Aquatic Conservation Objectives; and to respond to issues about the resources within the project area obtained through scoping.

Actions to meet the primary purpose and need would apply the adaptive management-learning process for Adaptive Management Areas by implementing and monitoring the alternative landscape management approach recommended in the Blue River Landscape Strategy *(BRLS)*.

The *BRLS* tests whether historical disturbance regimes can be used as a general model for forest management.

The purpose of the Adaptive Management Area (AMA) is to "encourage the development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives." While the management of areas outside of AMAs, such as matrix and reserve lands, is grounded in a set of prescriptive, region-wide standards and guidelines, AMAs are recognized as areas where innovation, testing, and experimentation are both expected and appropriate. They are places where learning leads to validating or changing how resources are managed.

DECISION FRAMEWORK

The McKenzie River District Ranger will decide which of the alternatives, if any, meets the purpose and need of achieving objectives of the NWFP while testing an alternative model for landscape management. The decision maker, in a Decision Notice and Finding of No Significant Impact (DN/FONSI), will document any concurrence with the findings in this Environmental Assessment. The selected alternative needs to be consistent with the amended Willamette Forest Plan.

THE FOREST PLAN

This Trapper Project Environmental Assessment is tiered to the 1990 Willamette National Forest Land and Resource Plan. The 1990 Forest Plan resulted from the extensive analysis and considerations addressed in the accompanying Final Environmental Impact Statement (FEIS) and Record of Decision (ROD). The Willamette Forest Plan was substantially amended in 1994 and 2001. In April 1994, the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Spotted Owl, April 1994 (USDA, USDI Northwest Forest Plan ROD, 1994) modified the Willamette Forest Plan with overlaying management areas and their accompanying standards and guidelines.

Watershed Analysis

The Aquatic Conservation Strategy in the NWFP includes two designations for Key Watersheds: Tier 1 and Tier 2. This project is located within the Blue River Watershed, which was not designated as a Key Watershed.

The Blue River Watershed Analysis (USDA 1996) developed and documented a scientifically based understanding of the processes and interactions occurring within the watershed. Blue River contributes indirectly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. The NWFP requires that actions be designed to maintain or restore aquatic habitat and riparian ecosystems in accordance with the Aquatic Conservation Strategy objectives. The *BRLS* updated the Blue River Watershed Analysis, documenting an

alternative approach to managing the watershed's landscape. This process was peer-reviewed by the scientific community and approved by the Regional Ecosystem Office. A memo from the land management and regulatory agencies associated with the Northwest Forest Plan (USDI USDA USEPA USDC 2002) recognized the *BRLS* as resting on sound science and encouraged its implementation (Appendix J).

Adaptive Management Areas

The standards and guidelines for AMA's were reviewed by the Regional Interagency Executive Committee and an Intergovernmental Advisory Committed chartered by the Regional Ecosystem Office. The results were documented in a May 2000 Memorandum (USDA USDI May 2000, Memo).

The Memo specified that the "intent" of NWFP Standards and Guidelines for the following must be met:

- The intent of matrix coarse woody debris, snags, and green tree retention.
- That 15% of federal forest land in a 5th field watershed should be in late-successional forest.
- That riparian protection be comparable to that prescribed for other federal land areas.

The Memo also specified that changes are allowed as indicated in the following:

- Interim riparian reserve boundaries can be changed based on Watershed Analysis, site analysis, and appropriate NEPA decision-making processes.
- S&G in existing land management plans, where they were not amended by the NWFP, can be modified in AMA plans based on site-specific analysis.

The Memo specified that the following must be met, though temporary deviations may be allowed if part of an approved research, monitoring, or administrative study specifically designed to test a standard and guideline:

- Meet "minimize soil and litter disturbance" S&G's.
- Meet "Survey and Manage" S&G's.
- Meet "Manage recreation areas to minimize disturbance to species" S&G's.
- Meet "Protect sites from grazing" S&G's.
- Meet "Protection of roost sites for bats" S&G's.

The Memo also specified that the following must be met. Any deviations require site-specific plan amendments:

- "Congressionally reserved areas" S&G's apply where they occur in AMA's.
- Aquatic Conservation Strategy Objectives must be met.
- Key Watershed S&G's overly all land allocations.
- Late Successional Reserve S&G's apply in AMA's.

SCOPING AND PUBLIC INVOLVEMENT

Scoping is the process for determining issues relating to a proposed action and includes review of written comments, distribution of information about the project, public meetings, interdisciplinary team (IDT) meetings, tours of the project area, and local news releases.

The Trapper Project was initiated in 1998 as part of the Wolfmann DEIS. Field trips and mailings occurred over a 2-year period to gain feedback on that Draft. The Trapper EA, a modified-subset of Wolfmann proposed actions, was listed in the spring 2002 issue of the Willamette Forest Focus--the quarterly schedule of proposed actions (SOPA) for the Willamette National Forest. The project has since appeared in the Forest Focus through the current issue (Winter 2002).

In August 2002, letters were sent seeking comment from the Tribal Council and Cultural Resource Coordinators of the Confederated Tribes of Warm Springs, Confederated Tribes of the Siletz Indians and the Confederated Tribes of the Grand Ronde Community. Letters were also sent to interested parties on the McKenzie River Ranger District mailing list.

One letter was received in response to scoping. Oregon Natural Resources Council Action and Oregon Natural Resources Council Fund supplemented original scoping letters to Wolfmann. Issues raised included roads and road building, roadless/wilderness areas, old growth, fish and wildlife, lynx, and water quality. "Fish and wildlife and lynx" are discussed in the Biological Evaluations in Appendices B and D. "Water Quality" is discussed as a Significant Issue in Chapters 2, 3 and 4. "Old Growth" is discussed in the issue *Vegetation Pattern and Composition* in Chapters 2, 3, and 4. "Roads and road building" are discussed in the Water Quality, Elk, and Inventoried Roadless Areas, Unroaded Areas, and Wilderness Areas Issues. There are no Inventoried Roadless Areas, Unroaded Areas, or Wilderness areas in the Trapper Project area.

SIGNIFICANT ISSUES

Forest Service regulations (1950, chapter 11(3)) require that issues that are not significant to the project or that have been covered by prior environmental review be identified and eliminated from detailed study. Discussion of these issues should be limited to a brief statement of why they will not have a significant effect on the human environment or a reference to their coverage elsewhere. The issues will be listed as Significant Issues and Other Issues.

The public and ID team identified nine issues. The ID team and responsible official considered these pertinent issues and have determined which are significant to the project. Three Significant Issues drove the development of the alternatives. Their description is followed by criteria for measuring each alternative. The Significant Issues are tracked through issue identification (in this chapter), alternative description in Chapter II, and environmental consequences in Chapter IV.

1. Learning and the Adaptive Management Area

Because this project lies in an Adaptive Management Area, its location requires that any actions include the components for learning. Two key components facilitate successful learning:

1) Monitoring efforts must be in place. This should include the identification up-front of key questions that, when answered, can benefit future management decisions.
2) A mechanism should be in place that feeds new information back into an adaptive management framework.

Measurement Criteria:
Existence of a monitoring plan in place
Existence of a mechanism to feed the information back into an adaptive management framework

2. Water Quality/Aquatic Resources

Landslide and debris torrents are natural disturbances on this landscape. However, timber harvest on unstable earthflow terrain and slopes could increase the risk of landslides and debris torrents following harvest. If a failure did occur, it could deposit sediment into streams, causing increased turbidity and/or imbeddedness that could adversely affect water quality, fish and other aquatic habitat of Blue River and its tributaries. Deposition of coarse sediment may also have positive affects when combined with inputs of large wood. Streams use these materials to create complex habitat for fish and other aquatic species. Opportunities for road restoration that could eliminate existing sediment sources were identified in the Road Restoration component of the *BRLS*.

Removal of forest canopy cover in the rain-on-snow zone may adversely affect peak stream flows that could affect stream channel conditions.

The *BRLS* did not recommend "no-harvest reserves" on non-fish bearing perennial and intermittent streams in the project area. However, it does include numerous prescriptive guidelines to maintain watershed processes. Timber harvest in riparian areas could potentially increase stream temperatures or bank instability and potentially affect water quality. Timber harvest within these areas may also enhance stand structure that would result in increases in shade, large wood production, and an improvement of habitat for aquatic and riparian species.

Measurement Criteria:
Acres of new soil disturbance
Road-related mass wasting and sediment transport
Potential impacts to stream temperature
Potential impacts on peak flows (ARP)
Large wood availability/delivery

3. Logging Economics

Logging systems vary in their operational expense. In general, helicopter logging is more expensive to accomplish per thousand board foot of timber than ground-based or skyline harvesting. Logging using ground-based or skyline operations may require the building of roads to support the operation.

Measurement Criteria:
Logging system costs

OTHER ISSUES

Forest Service regulations (1950, Chapter 11(3)) require that issues that are not significant to the project or that have been covered by prior environmental review be identified and eliminated from detailed study. Discussion of these issues is limited to a brief statement of why they will not have a significant effect on the human environment or a reference to their coverage elsewhere. These "Other issues" were considered during project development, but they did not "drive" alternative development. They are ameliorated through mitigation measures or application of Standards and Guidelines.

4. Vegetative Pattern and Composition

Forest ecosystems are dynamic: they change when humans disturb them, and they change when humans eliminate disturbance (Agee 2002). Introduction of disturbance through prescribed fire or timber harvest may alter the pattern of early and older forests at the landscape-level, and it may alter forest components such as species' composition, stand layers, snag levels, and large down wood at the stand-level. These impacts may vary in the short and long-term.

Timber harvest and prescribed fire proposed in the Trapper Project follow recommendations from the Blue River Landscape Strategy. Plant species of concern will be protected in all action alternatives, and woody material will be retained at levels that meet the intent of the NWFP. *At least 15% of the watershed will be retained in late successional condition. Currently, 52% of the Blue River 5th field watershed is in a late successional condition (USDA USDI, Late Successional 15% Analysis, 1999)*

5. Threatened Northern Spotted Owl

Activities that alter or remove older-forest habitats may affect the northern spotted owl. The degree of the affect varies by the proximity of the action to known nest sites and the amount of habitat that will remain within a home range. Long-term landscape management strategies can impact the effectiveness of the arrangement of spotted owl habitat on the landscape.

Surveys of the proposed project area have documented the presence of spotted owls and their habitat. Consultation with the USFWS has resulted in a "may affect, but not likely to adversely affect" determination. All applicable protection measures from the consultation will be included in the decision.

6. Heritage Resources

Harvest and other ground-disturbing activities could potentially affect heritage resources.

Surveys of the proposed project area have been completed. Archaeological evidence was found. Consultation with SHPO via the Forest Specialist has resulted in a finding of "No Effect" to significant heritage resources. Boundaries were adjusted so that significant heritage resources are safely outside of any proposed ground disturbance areas. Any newly-discovered cultural resource materials found during the course of project implementation would be evaluated for significance by the Zone Archaeologist.

7. Prescribed Burning and Fuels

Prescribed burning may produce levels of smoke that may negatively impact the health of people or diminish visual qualities of the airshed. Timber harvest may result in increased fuel loads that may change the risks associated with natural fires.

The use of fire would follow regional standards for thresholds in Class I airsheds. All proposed actions that generate fuels would be followed by the application of prescribed fire to reduce fuel loads. Targeted levels will be those outlined in the Willamette Forest Plan.

8. Threatened, Endangered, and Sensitive Wildlife; Migratory Landbirds; Management Indicator Species; Survey and Manage; and Botanical Species of Concern

Activities that remove or degrade forest habitats or create noise above ambient levels may impact a variety of wildlife and plant species.

All proposed actions that remove or degrade forested habitat will follow conservation and protection guidelines provided by the Willamette National Forest Plan, as amended (USDA USDI 1994 and 2001). Activities that generate noise above ambient levels near nest sites of threatened species would be seasonally restricted following USFWS terms and conditions.

9. Inventoried Roadless Areas, Unroaded Areas, and Wilderness Areas

Activities that alter forest habitats may impact the character of roadless or wilderness areas.

All proposed actions occur outside of Congressionally designated wilderness areas or Inventoried Roadless Areas as described in the WNF LMP. Unroaded Areas were mapped for the WNF in the January 2003 Road Analysis Report (USDA 2003, Map #4). The Trapper IDT reviewed this map. No Unroaded Areas occur in the Trapper planning area.

CHAPTER 2.
ALTERNATIVES

This chapter displays detailed information about the alternatives and their proposed actions for comparison. The ID Team developed two action alternatives that are designed to meet the purpose and need for the project, and respond to the three significant issues identified in Chapter 1.

A no action alternative was also developed, and is required by Federal law (National Environmental Policy Act, 1969). The no action alternative provides the baseline from which effects of other alternatives can be compared and measured.

LEGAL REQUIREMENTS

The alternatives for this project were designed to be in compliance with numerous federal and state laws and regulations.

Federal Laws:

The Antiquities Act, June 1906, and National Historic Preservation Act, October 1966 -- Field surveys for the area where ground-disturbing activities would occur have been completed. The Forest Specialist has been delegated authority for "no effect" findings by the State Historic Preservation Office (SHPO). The District Archaeologist found this project to be "no effect" upon review of the cultural resource inventory report for the Wolfmann Project (analysis for Trapper is a subset of that information). Concurrence was received on that finding from the Forest Specialist (Willamette National Forest Archaeologist).

The National Environmental Policy Act (NEPA), 1969 -- NEPA establishes the format and content requirements of environmental analysis and documentation. Preparation of the Trapper Project EA is in full compliance with these requirements.

The Endangered Species Act (ESA), December 1973 – The ESA establishes a policy that all federal agencies will seek to conserve endangered and threatened species of fish, wildlife and plants. Biological Evaluations for plants and wildlife have been prepared, which describes possible effects of the proposed action on sensitive species that may be in the Trapper Project EA project area. A Biological Assessment was prepared for threatened fish in the area. Consultation with the USFWS and NMFS has occurred as needed.

The National Forest Management Act (NFMA), 1976 – The alternatives were developed to be in full compliance with NFMA through compliance with the Amended Willamette National Forest Land and Resource Management Plan (USDA Forest Service 1990, 1994, 2001).

Clean Air Act Amendments, 1977 – The alternatives are designed to meet the National Ambient Air quality standards through avoidance of practices that degrade air quality below health and visibility standards.

The Clean Water Act, 1987 -- The alternatives meet and conform to the Clean Water Act, amended 1987. This act establishes a non-degradation policy for all federally proposed projects. The selected alternative is not likely to degrade water quality below standards set by the State of Oregon. This would be accomplished through planning, application and monitoring of Best Management Practices (BMPs).

State Laws:

Oregon State Best Management Practices (BMPs) -- State BMPs would be employed to maintain water quality.

The Oregon Smoke Management Plan -- The Oregon State Implementation Plan and the Oregon State Smoke Management Plan would be followed to maintain air quality.

Consultation with the Oregon State Historic Preservation Office (SHPO) – This has occurred (see above).

Oregon State Forest Worker Safety Codes-- The Oregon Occupational Safety and Health Code for Forest Activities would be met with implementation of the action alternative.

ALTERNATIVES CONSIDERED IN DETAIL

The three alternatives listed below were analyzed in detail for this project.

Alternative A

1. This Alternative uses timber harvesting, prescribed fire, and snag creation techniques to approximate the stand structures that resulted from historic stand-replacement fires and partial-stand replacement fires on 155 acres (Figure 5). Graphics that approximate the expected outcome are displayed in Appendix I.

INSERT FIGURE 5

All harvest is located within Landscape Area 3 (one of three landscape areas identified by the *BRLS*, see Figure 4). The general objective of Area 3 is to approximate key elements of infrequent, high severity (more than 80 % mortality) or mixed severity (more than 40% mortality) fires. The prescriptions for 6 of these areas will result in 15% canopy closure following all treatments. One area would result in 50% canopy closure (Table 2-1).

There are four stages to this action:

1. Harvest of majority of live green trees for timber products.
2. Understory burn to create some mortality in the retained green trees.
3. Girdle, top, or introduce fungus in retained green trees to create abundant standing dead trees.
4. Fell some of the retained live green trees for down woody material on the forest floor.

In every harvested area, there are two key prescriptive measures to create diversity. One includes retaining or creating an abundance of standing and down dead wood (i.e. snags and logs) following harvest. This would approximate the dead-wood structures historically left after fires on this landscape. The other is the creation of patchiness within each harvested areas. Some areas will be retained intact, while others will be turned into small openings or "gaps" (Appendix G and I).

Table 2-1: Areas proposed for using timber harvest, prescribed fire, and snag creation techniques to approximate the structures that resulted from historic stand-replacing and partial stand-replacing fires in Alternative A.

Unit	Acres	Volume MMBF	Remaining Live Canopy[1]	Snags Created/ Retained /acre[2]	Under-burn? [3]	Logging System[4]	Temporary Roads Constructed (feet)
20-1, 20-2, and 20-3	36	1.695	15% -13 ac. 50% -23 ac.	20-1 = 16.9/8.3 20-2 = 2.8 20-3= 16.0	Yes	C--11 ac. H--25 ac.	200'
21-1	27	1.994	15 %	15.4	Yes	H	
21-2	46	2.744	15 %	15.4	Yes	H	
21-3	1	0.0236	15 %	15.4	Yes	G	
40-1	39	1.886	15 %	23.7	Yes	C--21 ac H--18	
Total	**149**	**8.343**					**200'**

Volume MMBF = Millions of Board Feet

[1] Average across entire stand, including non-harvested retention areas, following timber harvest, prescribed burning, and snag creation.

[2] Approximately 240 lineal feet of down woody material will also be retained.
[3] Underburning occurs following timber harvest.
[4] Logging Systems – H = Helicopter; C = Cable; G = Ground Based

2. Prescribed burning would be used on 92 intact- forested acres to approximate the effects of historic low-severity fires.

Prescribed under-burning would occur in 2 forested stands within Landscape Area 3 (Figure 5 and Table 2-2) that have not been previously harvested. The fires would be manually lit in the spring under damp conditions. This should result in a creeping ground-fire that occasionally lifts into the canopy. Approximately 10-20% of the tree cover may be killed from the heat and flames. All of the trees that are killed will be left in place to provide important future snag habitat.

Table 2-2: Areas proposed for using prescribed fire to approximate historic low-intensity fires in Alternative A.

Unit	Acres	Prescribed Fire Acres	Prescription
26	119	67	Low-severity fire. 10-20 % mortality in overstory trees
71	84	25	Low-severity fire. 10-20 % mortality in overstory trees

3. Approximately 200 feet of temporary spur road, located on a ridge top, and without stream crossings, would be constructed. Approximately 11.42 miles of existing roads would be maintained (Table 2-3 and Figure 6).

Temporary road construction is minimal because helicopter logging systems are used for the majority of logging. Decisions for all temporary road construction must be informed by a Forest Roads Analysis, which was completed in 2003 (USDA 2003). The Analysis acknowledges the need for temporary road construction to support timber harvest activities (USDA 2003 pg. 40). Approximately 11.42 miles of road would be maintained, which includes roadside brushing, hazard tree removal, re-establishment of the roadway template and ditch functionality, culvert cleaning and replacement, site repairs to restore 12-foot minimum road width, and surface rock placement. The 1500, 1516, and 1517 roads were identified in the Forest Roads Analysis (USDA 2003) as Key Forest Roads.

INSERT FIGURE 6

Table 2-3: Road Maintenance associated with Alternative A.

Road	Miles Maintained	Maintained Roads Access These Activities	Key Forest Road
1500-612	1.40	Units 20-1, 20-2, 20-3 to 1500	No
1500-613	0.20	Units 20-1 to 1500-612	No
1500	3.2	Units 20-1, 20-2, 20-3 1500-612 to jct. W/ 1516	Yes
1517-655	1.05	Unit 21-2 to 1517	No
1516	2.84	Units 21-1, 21-2, 21-3 and 40-1	Yes
1517-560	0.24	Unit 40-1 to 1517	No
1517-565	0.19	Unit 40-1 to 1517-560	No
1517	1.5	Units 21-2, 21-2, 21-3, 40-1	Yes

4. An extensive landscape-level and stand-level monitoring strategy would evaluate the effects of these actions.

The *BRLS* has been approved as an administrative study. This includes a long-term, multi-scale monitoring plan to evaluate its effectiveness. Monitoring of previous projects (Blue River Face Timber Sale and N. Fork Quartz Timber Sale) that followed *BRLS* recommendations is occurring. Pre-treatment data has already been gathered for amphibians, trees, vascular plants, lichens, stream channel morphology, and stream temperature in this area. Numerous other on-going monitoring projects are occurring in the adjacent H.J. Andrews Experimental Forest. The varying scales of monitoring for the *BRLS* are shown in Table 2-4. Appendix E displays the types of monitoring questions being addressed.

Table 2-4: Scales of Monitoring of the Blue River Landscape Strategy.

Spatial Scales of Monitoring	
Watershed Scale	**Small-stream scale**
Landscape Pattern	Stream-Breeding Amphibians
Northern Spotted Owl Demography	Stream Temperature
Economics	Riparian Vegetation
Subwatershed Scale	Channel Morphology
Stand and Landscape Structure	**Site Scale**
Stream Discharge	Stand Development
Social Acceptability	Non-vascular Plants
	Forest Regeneration
	Erosion
	Forest Regeneration

Alternative B

This alternative is the proposed action. All four of the actions described above for Alternative A would occur with this alternative (Table 2-5) with these modifications:

1. Road 1508-435 (0.37 miles) would be *decommissioned* (for definition see USDA 2003 pg. 63). This would include activities to make it hydrologically stable on the landscape (Figure 7 and Table 2-6).
2. Road 1508-426 (0.5 miles) would be stored, which includes waterbarring, drain dips, and a berm to close it from vehicle traffic (Figure 7 and Table 2-6).
3. Unit 21-2 would be logged using a combination of cable, ground, and helicopter systems (Alternative A used only helicopter systems for this unit). This type of logging would be facilitated by building 300 feet of temporary road that would be obliterated following logging.
4. Unit 40-1 would be logged using a combination of cable, ground, and helicopter systems. Compared to Alternative A, this Alternative would use less helicopter and more cable and ground systems. This would be facilitated by building 900 feet of temporary road that would be obliterated following logging.
5. Approximately 0.1 mile of Road 1500-613 would be stored following timber sale use. The storage would include water barring, re-vegetation, removal of stream crossing fills below Unit 20-2, and placement of a berm to close it to vehicle traffic (Figure 7 and Table 2-6).

Table 2-5: Areas proposed for using timber harvest, prescribed fire, and snag creation techniques to approximate the structures that resulted from historic stand-replacing and partial stand-replacing fires in Alternative B.

Unit	**Acres**	Volume MMBF	**Remaining Live Canopy**[1]	**Snags Created/ Retained /acre**[2]	**Under-burn?** [3]	**Logging System**[4]	**Temporary Roads Constructed (feet)**
20-1, 20-2, 20-3	36	1.695	15% -13 ac. 50% -23 ac.	20-1 = 16.9/8.3 20-2 = 2.8 20-3= 16.0	Yes	C--11 ac. H--25 ac.	200’
21-1	27	1.994	15 %	15.4	Yes	H	
21-2	46	2.744	15 %	15.4	Yes	C--20.2ac. H--12ac. G--13.8ac.	300’
21-3	1	0.0236	15 %	15.4	Yes	G	
40-1	39	1.886	15 %	23.7	Yes	C--33 ac. H--2 ac.	900’
Total	**149**	**8.343**					**1400’**

Volume MMBF = Millions of Board Feet

[1] Average across entire stand, including non-harvested retention areas, following timber harvest, prescribed burning, and snag creation.
[2] Approximately 240 lineal feet of down woody material will also be retained.
[3] Underburning occurs following timber harvest.
[4] Logging Systems – H = Helicopter; C = Cable; G = Ground Based

Table 2-6: Road Maintenance and decommissioning associated with Alternative B.

Road Maintenance	**Miles Maintained**	**Maintained Roads Access These Activities**	**Key Forest Road**
1500-612	1.40	Units 20-1, 20-2, 20-3 to 1500	No
1500-613	0.20	Units 20-1 to 1500-612	No
1500	3.2	Units 20-1, 20-2, 20-3 1500-612 to jct. W/ 1516	Yes
1517-655	1.05	Unit 21-2 to 1517	No
1516	2.84	Units 21-1, 21-2, 21-3 and 40-1	Yes
1517-560	0.24	Unit 40-1 to 1517	No
1517-565	0.19	Unit 40-1 to 1517-560	No
Road Decommissioning	**Miles Treated**	**Treatment**	**Key Forest Road**
1508-435	0.37	Decommissioned to make it hydrologically stable	No
1508-426	0.5	Water barring, drainage dips, and berming	No
1500-613	0.1	Water barring, re-vegetation, removal of stream crossing fills, berming	No

Mitigation Measures

A number of mitigation measures accompany Alternatives A and B. Mitigation measures help define the alternatives by describing more specifically how the actions would be accomplished and how the resources would be protected. Table 2-7 shows the mitigation measures planned to protect soil and water, vegetation, Survey and Manage species, non-forest habitats, heritage resources, and wildlife. It also includes operating restrictions, safety measures, and mitigation measures for fire. Though they are not all mentioned here, all applicable Standards and Guidelines from the Willamette Forest Plan (as amended) would also be part of Alternatives A and B.

INSERT FIGURE 7

Table 2-7: Mitigation Measures Included in Alternatives A and B.

Mitigation Measure	Objective	Location	How
Soil and Water			
Retain trees on localized areas prone to streamside slides	Minimize risk of failure	21-1,2,3	Layout
Full suspension across class III and IV streams in skyline units	Protect water quality, stream bank integrity and channel bed	20-3, 21-2, 40-1	Contract
Construct one water bar for every 200 feet of cable corridors that have bare soils and with slopes less than 40 % along the corridor and two water bars along cable corridors that have bare soils for greater than 100 feet and with slopes greater than 40 % along the corridor.	To reduce the potential of erosion and fine sediment transport	All skyline units	Contract
Road construction and haul on native surface roads will be restricted to dry conditions, generally between July 15 through October 31. Hauling will be restricted when water pools on road surface.	To assure road stability, and limit sedimentation	20-3, 21-2, 40-1	Contract
All ground-based yarding will be restricted to dry conditions. Activities will not occur when water is pooling in skid trails and landings.	To protect site productivity, maintain soil hydrologic characteristic, minimize the potential of soil erosion and transport of fine sediments	All ground-based units	Contract
Use of ground-based equipment should be avoided within 100 feet of all stream channels.	To avoid sedimentation to streams	All ground-based units	Contract
Clean fill (soil or rock free of slash and debris) will be used for new temporary road construction and maintenance.	To assure stable road construction	21-2,40-1	Contract
All native surface roads shall have water bars constructed and shall be stored before seasonal shutdown.	To provide functional drainage and minimize potential road failures		Contract
Skid trails and landings within areas of regeneration harvest with ground-based equipment will be subsoiled. These trails and landings will have water bars constructed where necessary to provide effective drainage and shall be planted with conifers	To re-establish the natural hydrologic pattern and grow trees until the next entry in about 35 years	21-3	Contract

Mitigation Measure	Objective	Location	How
Locate designated skid trails to facilitate drainage following harvest.	To minimize disrupting drainage	21-3	Contract
Place weed-free straw bale sediment traps at class IV and larger streams during winter time haul.	To minimize the potential of soil erosion and transport of fine sediments into streams	Along all haul routes	Contract
Vegetation			
Ramaria stuntzii-fungus will have a 172-foot radius no harvest or ground disturbance buffer. No prescribed fire within buffered site.	To protect site from disturbance and maintain microclimate	21-2	Layout
Nephroma occultum-lichen will have a 172-foot radius no harvest buffer. No prescribed fire within buffered site.	Maintain substrate and microclimate	40-1	Layout
Mechanically remove noxious weeds in landings and along spur roads adjacent to units prior to project implementation.	Reduce the spread of noxious weeds in harvest units and along travel ways	20, 21, 71	Contract or District personnel
Minimize fireline construction; where it is necessary, use hand-construction rather than machine-constructed line.	Reduce the spread of noxious weeds	Entire project area	Fire Plan
All road construction and logging equipment will be pressure washed prior to working on the area.	Reduce the spread of noxious weeds	Entire project area	Contract
A weed free source of rock will be used for all road construction and maintenance.	Reduce the introduction of noxious weeds	Entire project area	Contract
Non-forested sites will be protected with a 50-200’ no-disturbance buffer.	Maintain integrity of site	Entire project area	Layout
Heritage Resources			
All known significant heritage sites will be protected from harvest activities. Locate unit boundaries away from heritage resources. If any sites are found during future fieldwork or during activities, contract provisions will be used to protect these new findings until they can be evaluated.	Maintain the integrity of heritage sites	Entire planning area	Layout and contract
Wildlife			
If previously undocumented species of concern are found, project modifications will be made as needed.	Minimize effects to species of concern	Entire planning area	Contract

Mitigation Measure	Objective	Location	How
240 lineal feet (or ≥3 sound trees) per acre of class I-II down woody material will be left in each unit. All existing down logs regardless of decay class will be left.	To provide down wood habitat and emulate effects of residual material following fires	All units with harvest activity	Contract
Snag creation will occur August 1-January 15 (inoculation and girdling) and September 30 - January 15 (blasting). It will not occur during elk rifle season or the first week of deer season (See Appendix G for specifications for retained trees).	To provide snag habitat and emulate effects of residual material following fires	20-1 & 20-3 = 16.9 snags/acre 20-1 w/ 30% canopy retention = 8.3 snags/ acre 20-2 = 2.8 snags/acre 21-1,2,4 = 15.4 snags/acre 40-1 = 23.7 snags/acre	Contract
Operating Restrictions			
Restriction on falling trees, ground-based yarding, and helicopter yarding between January 15 to July 31.	Minimize noise disturbance during nesting season of TES raptors	20-1,2,3 and 40-1	Contract
Restriction on falling hazard trees along haul routes April 1 to August 1.	Protect nesting primary and secondary cavity nesters	Haul Routes	Contract
Safety			
A flight safety plan, traffic management plan, and spill prevention and containment plan will be completed as part of contract preparation for the timber harvest and road work.	To maintain safe operations	Entire Project Area	Contract
Require fire equipment during logging operations.	Reduce risk of human caused fire	All units	Contract
Complete a risk assessment and contingency plan before ignition of prescribed fires.	To reduce the risk of fire escapement	All units	Burn Plan
Develop a prescribed fire safety plan.	Reduce risk to humans	All burn units	Contract Burn Plan

Mitigation Measure	Objective	Location	How
Fire Management			
Follow the Oregon Smoke Management Plan.	To control air pollution	All units	Burn Plan
Consult ODEQ to ensure burning will occur within the daily limit on tonnage of logging slash.	To control air pollution	All units	Burn Plan
Verify burn day upper wind direction and airshed condition at the burn site prior to burning.	To control air pollution	All units	Burn Plan
Follow Oregon Smoke Management Plan which encourages burning in spring when fuel moistures are higher.	To control air pollution	All units	Burn Plan

Riparian Management

The riparian management strategy within the *BRLS* includes a network of large, headwater aquatic refugia coupled with fish-bearing stream aquatic reserves (Figure 4). Intermittent and non-fish bearing perennial streams are not included in the reserve system. Interim riparian reserve boundaries in AMA's and non-AMA watersheds can be changed based on watershed analysis and site-specific analysis. The *BRLS* is an update to the Blue River Watershed Analysis that was complete in 1996. The IDT used the recommendations from the *BRLS* as a starting point, but fine-tuned the method of management for streams in the Trapper planning area based on site-specific analysis. Specific prescriptions for individual streams were based on their location in relation to reserves and their potential to provide high quality fish habitat (Table 2-8).

The *BRLS* reserve system was designed to meet the objectives of the Aquatic Conservation Strategy over time on a landscape basis. Reserves, coupled with recommendations for long periods between harvest, would limit the extent of disturbance in any one decade. The location of retained trees in harvested areas would emphasize a connection between riparian and upland habitats. The *BRLS* meets the intent of the NWFP standards and guidelines for riparian reserves (as required by USDA USDI May 2000) by providing protection of watershed and riparian processes (Appendix A). Additional detail on the riparian management strategy and its underlying assumptions can be found in Appendix A and in the *BRLS* on the web at http://fsl.orst.edu/ccem/brls/brls.html.

Table 2-8: Stream and Riparian Management within Alternatives A and B.

Harvest Units	Average Canopy Closure Following Harvest, Prescribed Fire, and Snag Creation	Streams in Unit	Prescription near Streams
20-1	15% canopy closure	None	Not applicable
20-2	50% canopy closure	Stream 20A = Class III Stream 20B = Class III	Retain 50% canopy closure the same as the rest of the unit, and retain all bank trees[1]
20-3	15% canopy closure	Stream 20A = Class III Stream 20B = Class III Stream 20C = Class III	20A: Retain all bank trees and retain 30% canopy closure within ½ potential tree height (86') of the active channel. 20B: Retain all bank trees and leave 15% canopy closure. 20C: No harvest within ½ potential tree height (86') of active channel.
21-1	15% canopy closure	Seep	Retain trees within 25' of seep.
21-2	15% canopy closure	Stream 21F = Class IV	Retain all bank trees and leave the same canopy closure as rest of unit (15%); limit disturbance; avoid ground-based logging within 100' of channel
21-3	15% canopy closure	None	None
40-1	15% canopy closure	Stream 40A = Class IV Stream 40B = Class III	Retain all bank trees and leave the same canopy closure as rest of unit (15%).
Prescribed Fire Units:			
26	Understory Burn	Stream 26A = Class IV Stream 26B = Class III Stream 26C = Class IV	Understory burn through creeks. Avoid installing control lines w/ground-based equipment w/in 100' of all streams.
71	Understory Burn	Stream 71A, B, C, D = Class IV	Understory Burn through creeks. Avoid installing control lines w/ground-based equipment w/in 100' of all streams.

1 Bank Trees = Trees that have the potential to provide stability to the stream bank through their root structure, usually all trees within 25'.

Alternative C – No Action

Alternative C, the no action alternative, would not implement recommendations from the *BRLS*. No timber harvest or project-related road maintenance would occur; no road construction, prescribed burning, or monitoring would occur, and on-going studies would be interrupted. This alternative serves as a baseline from which to understand the changes associated with the action alternative. The information presented in Chapter 3 (Affected Environment) describes the current condition of the watershed.

ALTERNATIVES CONSIDERED, BUT ELIMINATED FROM DETAILED STUDY

Several alternatives were discussed by the IDT, but eliminated from additional analysis:

1. ***Application of Willamette National Forest Standards and Guidelines for snag retention***. This would have resulted in approximately 4 snags per acre in each harvested unit, representing 40% potential population levels of primary and secondary cavity nesters. This alternative does not reflect an interest in emulating conditions following stand- and partial-stand replacing fire events which can result in a greater abundance of standing dead material.

2. ***Application of no-harvest riparian areas along all streams.*** The IDT determined this was not necessary to meet the Aquatic Conservation Objectives in this area based on Watershed Analysis updates documented in the *BRLS*; an Aquatic Conservation Objectives Analysis completed on the *BRLS* ; and site-specific analysis. Within the *BRLS*, all fish-bearing streams are protected by aquatic reserves (*BRLS* pg. 13); however, the units proposed for harvest in the Trapper project do extend into any fish-bearing aquatic reserves. Site-specific analysis indicated that Class III and IV streams present could be managed and still meet the intent of the ACS (USDA USDI 2000)(see *BRLS* ACSO Analysis) through retention of bank trees and at least 15% canopy closure; protecting cold water source areas through shade retention; protecting inputs of large wood by maintaining no-harvest streamside buffers on earth flow terrain; and by increasing canopy retention to 50% on landslide prone areas. The assumption that these measures are adequate will be monitored through the Administrative Study designed to support the *BRLS*. This alternative did not meet the purpose and need of this project.

3. ***Thinning in Mature Forests in the Blue River Watershed***. The District Ranger decided to focus this NEPA decision on implementation of the non-thinning research associated with the Blue River Landscape Study. The thinning described in the Wolfmann EIS may be presented to the public in a future NEPA document.

ALTERNATIVE COMPARISON

Table 2-9 displays information for each Alternative in terms of the Measurement Criteria used for each significant issue.

Table 2-9: Comparison of Significant Issues by Alternative in the Trapper Project.

Issue / Measurement Criteria	Alternative A	Alternative B	Alternative C (No Action)
Learning/Adaptive Management			
***Monitoring plan in place**	Blue River Landscape Strategy Administrative Study approved and in place. Monitoring questions identified in appendix.	Blue River Landscape Strategy Administrative Study approved and in place. Monitoring questions identified in appendix.	No activities proposed to monitor or learn from.
***Mechanism to feed the information back into an adaptive management framework**			
Water Quality/Aquatic Resources		`	
***Acres of soil disturbance**	11.1 acres	16.1 acres	0.0 acres
***Road-related mass wasting and sediment transport**	Road maintenance results in reduced cumulative risk of road-related failures.	Road maintenance results in reduced cumulative risk of road-related failures.	No project-related road maintenance. No change to road- related failure risk.
	No road decom-missioning. Sediment delivery from 0.97 miles of road stays the same.	Road decommissioning on 0.97 miles reduces potential delivery of sediment	No road decom-missioning. Sediment delivery from 0.97 miles of road stays the same.
***Potential impacts to stream temperatures**	Assumptions within *BRLS* support no change to stream temperatures	Assumptions within *BRLS* support no change to stream temperatures	Existing stream temperatures do not change
***Potential impacts on peak flows**	ARP above mid-point following project	ARP above mid-point following project	No change to ARP
***Large wood availability / delivery**	Assumptions within *BRLS* support no measurable change to availability /delivery of large wood	Assumptions within *BRLS* support no measurable change to availability /delivery of large wood	No change to landscape's current ability to provide / deliver large wood

Issue / Measurement Criteria	Alternative A	Alternative B	Alternative C (No Action)
Logging Economics			
***Logging system costs**	$3,683,831.5	$2,710,938.5	$0.0

CHAPTER 3.
AFFECTED ENVIRONMENT

Chapter III describes aspects of the environment that could be affected by the alternatives. This provides the baseline for the effects analysis in Chapter IV. The components of the affected environment follow. Additional details on the affected environment can be found in the Project File, Appendices, and the Blue River Watershed Analysis.

WATER QUALITY/AQUATIC RESOURCES

Blue River Watershed is a 59,000-acre tributary watershed that represents 7 % of the McKenzie River subbasin. Beneficial uses of the McKenzie River include habitat for fish and other aquatic species, recreational use, aesthetic values, power generation, and drinking water for over 200,000 people. Consequently, land management activities within the subbasin that may result in impacts to water quality and water quantities are a matter of public interest.

This project occurs in the Upper Blue River Subwatershed, which includes the Cook, Quentin, Mann, and Wolf Creek drainages as well as Blue River (Figure 8).

Stream Temperature

The streams in this area flow through a mix of managed and unmanaged forests of various ages. The stream system includes a substantial network of small perennial and intermittent tributaries that are highly interactive with ground water (i.e. they tend to go sub-surface). Recorded stream temperatures, based on limited sampling (Blue River WA 1996 and stream surveys in District files) are currently cooler than the 64 degree F standard set by the Department of Environmental Quality (DEQ). Removal of forest cover through past timber management activities has likely elevated stream temperatures because of reduced shade and increased exposure of water surfaces to solar radiation. Analysis in the Blue River Watershed Analysis (USDA 1996) from the adjacent (but similar) Lookout Creek drainage showed that temperatures there have exceeded 64 degrees F, but that appears to be more closely related to climatic variation than to forest management activities. This does not mean that management activities do not affect stream temperatures, but rather their effects are small compared to the stream temperature variations that result from natural climatic variability.

Blue River downstream from Blue River Dam and Reservoir (outside of the planning area) is listed as “water quality limited” by the DEQ due to elevated stream temperatures. However, the discussion with the Listing clearly ties this problem to operational aspects of the reservoir (Oregon DEQ Final 1998 Water Quality Limited Streams - 303(d) List). Blue River above Blue River Reservoir was added to the list of water quality limited streams, also for elevated stream temperatures in 2002 (Oregon DEQ Draft 2002 Water Quality Limited Streams – 303(d) List). [NOTE: The Oregon DEQ is required by the federal Clean Water Act to

INSERT FIGURE 8

maintain a list of steam segments that do not meet water quality standards. This list is called the 303(d) List, and is updated periodically as new information becomes available, usually every 2 years].

Geology and Sediment Production

The delivery of sediment and woody material to streams is an important ecological process on any landscape. This material "feeds" streams, and provides substrate to build high quality habitat for fish and other aquatic species. The mechanisms that transport that material include earthflows, shallow slope failures, and toe slope erosion. In this landscape, these mechanisms occur both naturally and under the influence of management activities (i.e. road failures). Typically when these events occur naturally, a mix of materials including both sediment and large wood are delivered to streams. Management-induced failures often generate more sediment than wood.

All five of the drainages within the project area contain areas of potentially unstable earthflow terrain. Some of these areas were used in the identification of "Source Areas" for sediment and large woody material (Figure 9) in the *BRLS.* These are important aspects of the landscape that provide building blocks of high quality aquatic habitat. Highly unstable earthflow areas are not appropriate for timber harvest, but those with a lesser degree of instability can support timber harvest if a portion of the stand is retained to provide root strength and stability.

The Cook and Quentin drainages are dominated by steep terrain heavily dissected by streams within deep, narrow-bottomed valleys. The Carpenter Ridge area of the Blue River and Wolf Creek drainages is also steep with highly dissected mountain side slopes. The lower third of the slope above Blue River is a mixture of glacial, riverine and colluvial deposits. Several relatively stable deep-seated earthflows occur on mid-slope positions. Snow and rockfall avalanche chutes originating from rock outcrops along Carpenter Ridge occur across the slope. The Mann Creek subdrainage is not as steep as the planning area, except for Wolf Rock. It is composed of mountain sideslopes and glacial terrain with relatively broad valleys. Figure 10 displays the topography of the project area and includes the soil stability hazard ratings based on soil depth (from the Forest Soil Resource Inventory 1973), slope, and the presence of identified earthflows.

Glacial processes and ancient earthflows (42,000 years old) have reworked much of the geologic deposits in this area. Four active earthflows ranging in size from 10 to 15 acres occur in the Trapper planning area. One occurs on the face drainage on the mid-third of the slope below Carpenter Ridge; two others were found north of Wolf Rock in Unit 20; and one in Unit 21. As a result of this geology, many of the streams carry relatively high natural loads of sediment, as earthflows move down-slope into the valley bottoms and streams undercut and erode their toe slopes.

In addition to high natural levels of sediment transport from earthflows and landslides, numerous roads in these drainages also contribute sediment through cut and fill slope failures, side-cast ravel, and road surface erosion. Prior to the storm events of 1996/1997, the Mann

INSERT FIGURE 9

INSERT FIGURE 10

subdrainage had the second highest incidence of failures within the Blue River watershed. Thirty-eight percent of the failures were in unmanaged forested areas; 46 % were in harvested forests; and 18 % were associated with roads. The Cook and Quentin subdrainages have the greatest stability in the watershed.

During the large storm events in 1996/1997, ninety-six known slope failures occurred in the watershed. Of these, approximately 60 % were road-related; 25 % were within harvested forests; and 15 % were within unmanaged forested areas. Approximately 22 of these failures occurred in the Mann and Quentin Creek subdrainages. The majority of the road-related failures were failures of the side-cast material. Road-related failures were often associated with a cascade of events that generally began with a cutbank, fill or side-cast failure. These failures generally translated into torrents that traveled between 500 to 1,500 feet, often sluicing streams and sideslopes to bedrock and impacting water quality.

Slope failures in Quentin drainage, regardless of source, are more likely to translate into torrents due to the high relief and greater drainage density. The slope failure that occurred during the 1996 storm flowed in a torrent down a fully forested channel and left a great deal of large wood and a stone and gravel substrate, which added to the channel complexity. In Mann drainage, the more gentle topography and relatively low stream densities prevents many of the slope failures from developing torrent velocities and momentum. The four failures on the toe slopes of a rotational earthflow occurred on the active earthflow in landscape block 20. These failures traveled 1,000 feet into a class III tributary to Mann Creek, creating channel complexity in the form of stone and cobble substrate and large wood.

In general, failures that occurred in harvested riparian forests resulted in long torrent paths (between 1,500 and 6,500 feet), which often scoured the channel to bedrock. Torrents that originated in forested areas and accessed forested channels left considerable amounts of large woody debris, channel complexity, and stone and cobble substrate. Often failures in fully forested slopes resulted in the displacement of a few trees with down-slope movement in tens of feet rather than thousands.

Water Quantity and Peak Flows

Fire suppression, road construction, and timber harvest have modified stream flows in these drainages. In particular, peak flows have probably increased from changes in snowpack accumulation/melt associated with timber harvest (Jones and Grant 1996) and because road construction essentially extends the drainage network (Wemple et al. 1996). Mann Creek experienced a unique peak flow event that occurred approximately 10 years ago when an impoundment on private land in the top end of the drainage breached. The resulting surge of water scoured channels and undercut banks and has left the upper reaches of Mann Creek in a deteriorated condition.

The factors that affect how past, present, and future management activities contribute to increased peak flows are analyzed using a process incorporated in the Willamette Forest Plan known as aggregate recovery percentage (ARP). This process evaluates the percentage of an area that is “hydrologically recovered,” and evaluates it against a threshold value that has been tailored for the area. ARP values greater than the threshold values, which are called

midpoint values, indicate that increases in peak flows are not likely to be significant. The areas for which aggregate recovery percentage is calculated are referred to as planning subdrainages.

Currently, all the planning subdrainages in the planning area are substantially above the midpoint values recommended in the Willamette Forest Plan (Table 3-1).

Table 3-1: Aggregate Recovery Percentage for the Trapper Planning Area.

Planning Subdrainages	WFNP Midpoint Value	Current Level
Upper Lookout Creek	75 %	80 %
Mann Creek	65 %	72 %
Quentin Creek	70 %	86 %
Cook Creek	70 %	90 %

Fish Species

Blue River and Cook, Quentin, Mann, and Wolf Creeks are the main fish-bearing streams in the watershed. The greatest fish diversity occurs in Blue River Reservoir and the 3- 4 miles of Blue River above the reservoir. The Blue River Watershed Analysis (USDA 1996) documented cutthroat and rainbow trout, chinook salmon, sculpin, long nose and speckled dace, redside shiner, and large scale sucker inhabiting these waters. Cutthroat and rainbow trout and sculpin are found in Cook and Quentin Creeks. The rainbow trout are both wild and of hatchery origin. Chinook salmon juveniles have also been found in Cook Creek. They are of hatchery origin and presumably migrate upstream from the reservoir where they are stocked.

The chinook salmon that occur in the watershed above the dam are juveniles from the McKenzie River hatchery and were artificially placed there by the Oregon Department of Fish and Wildlife (ODFW). This practice is no longer being implemented. The last year juvenile hatchery chinook were placed above the dam was 1994 (personal communication, Kurt Kremers, ODFW McKenzie Hatchery). It is not expected that any of these chinook are still surviving in the reservoir, and these hatchery fish are not considered in the official listing of Willamette spring chinook salmon (Federal Register 1999).

Blue River was never utilized by bull trout (a threatened species) for spawning and early rearing because colder water is required for these aspects of their life history (Buchanan et al. 1997). Historically, adult and sub-adult bull trout may have used the lower few miles of the river for foraging, especially in the winter when temperatures were cooler. Their ability to access the watershed is now blocked by Blue River Dam.

The Blue River Dam also blocks spring chinook migration. Historically, chinook salmon were known to migrate as far upstream as a waterfall at approximately river mile 4.5. This waterfall is currently inundated by Blue River Reservoir. Historical stream surveys conducted by the Fish Commission of Oregon (Willis, et al. 1960) documented chinook redds in Blue River, but it is not clear whether those redds were located above or below the falls.

Conditions for habitat vary in this area's streams. In general, Cook and Quentin Creeks are entrenched in bedrock canyons and have moderate gradients (2 - 4 %). Bedrock is a prevalent feature in and along the stream channel, and cobbles and small boulders make up a high percentage of the streambed. Spawning-size gravel for trout is most abundant near concentrations of woody material and in pool tail-outs. Wood is typically found in small jams with scattered individual pieces between jams. The flood events of 1996 had the effect of increasing the number of pools per mile, but caused an average decrease in the residual pool depth. An increase in pool habitat is considered good for rearing trout: residual pool depths were lowered to below three feet, a general pool depth that is considered good and provides cover for fish. The flood events also effectively transported wood from the streams and altered the pool to riffle ratio. The transport of large wood in streams that are bedrock controlled and moderately steep (2 - 4 %) is not surprising, and the pool to riffle ratio is expected to change after major flood events. The changes in Cook and Quentin Creeks can be considered good because of the increase in pool habitats, and riffles were not reduced to the point of causing major reductions in aquatic insect habitats that are important sources of prey for fish.

Wolf and Mann Creeks have had more timber harvest than other subdrainages within the planning area. Wolf Creek flows through a wide range of riparian vegetative conditions due to timber harvest. In general, Wolf Creek provides fair trout habitat and is recovering from timber harvest impacts. However, the amount of large wood in Wolf Creek is considered low, and the pool depths are also low (below 2 feet deep). Mann Creek provides the least favorable fish habitat conditions of all the fish-bearing streams in the planning area. Mann Creek still reflects impacts from road building, timber harvest, slides that occurred during the 1996 floods, and the failure of an earthen dam on private land in the early 1980s. The dam failure simplified the stream channel by depositing sediment and scouring the streambed. This simplification caused a marked decrease in the number of pools. It appears that many of the pools were filled in with sediments or scoured to bedrock. During the 1997 surveys it was noted that these slides deposited sediments that were found in accumulations up to 4 feet deep. The slides also deposited large wood that accumulated in small jams, providing cover habitat for trout.

Data from stream surveys show that the streams within these areas do not appear to suffer from excess embeddedness as a result of these high sediment loads. In fact, many of these streams appear to be deficient in gravel-size sediments that could be used for favorable fish habitat. This is likely a result of historic removal of large wood from streams and riparian areas that would sort and retain sediments, and due to the steep gradients and high water velocities that provide substantial sediment transport capacity.

Riparian Areas

Vegetation has been altered in streamside areas in this watershed, resulting in reduced stream shading and a reduced supply of large wood. The Blue River Watershed Analysis documented that timber harvest has occurred within riparian reserves, but primarily near class IV streams (USDA 1996). Roads have also been constructed in riparian areas. In some cases, large wood has been removed from streams. Both activities can alter stream temperatures,

simplify channel structure, and reduce sediment storage in streams. Mass failures that once deposited a complex mixture of various sized sediments and large wood, now contribute only sediment and often result in debris torrent events that eliminate existing channel structure. This situation is exacerbated by management-related slope failures attributed to poorly located, designed, or maintained roads.

Vegetation Composition and Pattern

Plant Communities

The forests in the planning area include the western hemlock and Pacific silver fir plant series. These forest-types are dominated by conifer species such as Douglas-fir, western hemlock, western redcedar, Pacific silver fir, and noble fir. A few healthy western white pine exist, and Pacific yew is fairly common. Hardwood tree species include big leaf maple, chinquapin, red alder and occasionally bitter cherry and madrone. The most common understory species include vine maple, rhododendron, salal, Oregon grape, swordfern, huckleberry, beargrass, and numerous grass and forb species. The age of the forests in this watershed range from 10 to more than 400 years old. Younger forests are primarily the product of timber harvest and lack many important structural components such as snags and down woody material. A significant portion of the area is mature forest approximately 150 years old from fires in the early to mid 1800's.

Non-forested areas distributed throughout the project area include rock outcrops, grass and forb meadows, talus and talus/shrub communities, and small wetlands. Within the Upper Blue River subwatershed there are approximately 536 acres of non-forested sites, of which 276 acres are rock outcrop and talus.

Plant Species of Concern

Conservation measures for Survey and Manage Species were established in the Northwest Forest Plan (USDA USDI 1994, 2001). These species are either genuinely rare, or, because of a lack of information about them, the agencies did not know whether they would adequately be protected by other elements of the NWFP.

The list of species that have potential habitat within the planning area, and results of site-specific, pre-disturbance surveys of proposed activity areas can be found in Appendix F. Species located in the planning area included the lichens *Pseudocyphellaria rainierensis, Nephroma occultum,* and the fungus *Ramaria stuntzii.*

Other rare plants -- often not associated with older forests -- are compiled on a Regional Forester's Sensitive Species list. These species and their habitats are often rare and limited in distribution. The list of species that have potential habitat within the planning area, and results of site-specific, pre-disturbance surveys of proposed activity areas can be found in the Appendix C. No sensitive species were located in the planning area.

The occurrence of noxious weeds in the planning area is sparse and not of great concern. Three species were observed: bull thistle (*Cirsium vulgare),* Canada thistle *(Cirsium*

arvense), and St. Johnswort *(Hypericum perfoliatum)*. They are primarily confined to roadsides and landings.

Snag and Down Wood Habitat

Current snag levels are estimated to range between 29 and 60 % of the average naturally occurring condition for the western Cascades. The Quentin and Cook subdrainages exceed the Willamette Forest Plan standard of 40 %. The Mann subdrainage is estimated to contain only 29 % snag habitat levels. This snag habitat level is low due to previous timber harvest practices on both private and national forest lands before it was common practice to retain or create these structures.

Down woody material levels are more difficult to estimate on a landscape-level, and they probably vary widely within the planning area. Down wood levels appear to be the lowest in the Mann subwatershed where past logging occurred prior to the mid-1980s, and very little, if any, down wood was left in harvest units.

Pattern

Forested communities are often grouped by their age into broad seral stages: early (0-20 years), mid (20-80 years), and late (80+). Figure 11 displays the pattern of forests within this planning area. Obviously past timber harvest using the "staggered setting" approach has resulted in a fragmented and patchy landscape. The Blue River watershed is about 38 % forest 0-30 years old, a result of timber harvest in the 1960s and 1970s. These openings lie in a matrix of older forest that averages about 140 years old, often with individual remnant old trees greater than 200 years old scattered throughout.

The Cook and Quentin drainages contain the most contiguous stands of late-successional habitat in the watershed. In general, the area has about 19 % early seral stage forested habitat that resulted from timber harvest in the 1970s and 1980s (USDA 1996).

Fire History

Prior to timber harvest, the dominant disturbance process in this area was fire. Weisberg (1998) found this area historically had infrequent, severe fires that often resulted in a homogenous pattern on the landscape. Fires, on average, returned to different zones of this landscape on the order of every 80, 145, or 240 years. Study results indicated that the entire Blue River Watershed had burned over within the last 500 years, with large fire incidents documented in 1849, 1893, 1902, 1918, 1930, and 1935.

Weisberg also found some areas in the watershed where fires returned with a more variable frequency, and the resulting pattern was more fine-scale and patchy. These historical fires were often driven by small-scale features in the area, like small drainages and ridges.

Historically, small fire starts probably smoldered in patches on the landscape over most of the fire season. These small fires grew to be large events only if a combination of fuel and weather reached an optimum condition for fire intensity and spread. During conditions of

INSERT FIGURE 11

extreme drought and/or strong winds, stand-replacing fires can occur in forests of any age. Under less severe conditions, understory burning is more typical, and it results in less overstory mortality.

In comparison, fire records from 1970 to 1994 show an average of four fires per year suppressed in the Blue River watershed. Older records often did not include fires that were remote from roads or residences and may underestimate the number of fire starts. Effective fire suppression coupled with the pattern of timber harvest has significantly altered the size and distribution of early seral forest on this landscape. In general, forest openings are now much smaller and more widely and evenly dispersed across the landscape than historically occurred.

Connectivity

When habitats on a landscape have some degree of "connectivity," plants and animals can more successfully move from one place to another. For example, movement is important for juvenile animals dispersing from their nests, or lichens blowing from tree to tree. Usually, connectedness of older forest is desirable because species associated with that habitat tend to be less flexible in the kinds of corridors they can successfully navigate. The following elements are needed for good connectivity of older forest:

- Areas must be wide enough to provide interior habitat that is not influenced by edge-effect.
- Forested canopy cover is most effective when greater than 60%.
- Shrubs and herbaceous understory vegetation should be intact.
- Snags and logs of various sizes and decay classes should be within the range of natural variability for the plant association.
- Multiple canopy layers should be present to provide niche-rich habitat for species such as fungi, lichens, and bryophytes.

The occurrence of connectivity is a matter of scale. Connectivity could occur where a riparian corridor links two disjunct forested stands. It could also occur on a much larger scale, such as with the Late Successional Reserve System designed for the Northwest Forest Plan (USDA USDI 1994). The Blue River Watershed, particularly the Cook and Quentin drainages, provides the best north-south, older forest habitat connectivity between the South Santiam and Horse Creek Late Successional Reserves (USDA 1998)(Figure 12). The Mid-Willamette Late Successional Reserve Assessment (USDA 1998) recommended improving late-successional connectivity between these reserves by establishing long-term strategies for retaining older forest or enhancing riparian areas. The *BRLS* provides greater connectivity between these LSRs than a matrix/riparian reserve strategy (Cissel et al. 1999).

HERITAGE RESOURCES

The Trapper Project area contains several documented prehistoric archeological sites, none of which have been formally evaluated for National Register of Historic Places (NRHP)

INSERT FIGURE 12

eligibility. Although formal evaluation has not yet occurred, these sites are managed on the assumption that they have the ability to "yield information," one of the NRHP criteria for significance.

The sites include chipped lithic tool and debris scatters (often the only existing remnant of the prehistoric occupations in western Oregon), primarily composed of obsidian artifacts. These stone chips are interpreted as the byproducts of hunting and gathering people's ancient tool maintenance, use and manufacture. It is assumed that most of the debris scatters date to the Middle Archaic period of about 6,000 to 2,000 years ago. The ethnic identity of the tool users is unknown; since the sites are largely on or near ridge top travel routes, the people may have been native to the Cascades or traveling through from the Willamette Valley or central Oregon.

RECREATION AND SCENIC RESOURCES

The Trapper planning area provides dispersed recreational opportunities generally associated with scenic driving, dispersed camping, fishing, rock climbing, and hunting. Forest Service Road 15 provides access along Blue River up to and around the base of Wolf Rock. Blue River is a popular fishing stream in the summer months, and receives a fair amount of challenging kayaking use during winter storm surges. Wolf Rock offers a challenging rock climbing experience. Dispersed camping is concentrated along Blue River and near Wolf Meadows immediately adjacent to the Wolf Rock area. Forest Service Roads 1509, 1513, 1516, and 1517 provide access to the upper elevations. Recreational opportunities in this area include hunting, berry picking and other forest product gathering, as well as scenic driving. The Tidbits Trail is accessed immediately off Road 1509. There are no developed recreation sites or facilities in the area.

Although the over-riding NWFP allocation for the planning area is the Central Cascade Adaptive Management Area, the underlying Willamette Forest Plan allocation along Road 15 is Scenic – Partial Retention Foreground. This scenic area is managed to maintain a near natural setting. Although management activities can be noticeable, they should not dominate the view along major travel routes and recreation sites in this area.

PRESCRIBED BURNING AND FUELS

Fuel Loads

The fuel loading is generally higher in native stands with a history of fire suppression and lower in areas treated with harvest and prescribed burning. Fire occurring under normal fire weather in today's landscape would tend toward the low intensity and small size because the fuel loading is lower in treated areas and the fuel bed is fragmented into small areas. In extreme fire weather, large, high intensity fires would have more severe effects in stands where fire has been excluded and would still have the same catastrophic effect in younger stands.

Air Quality

Air quality is managed under the Clean Air Act to maintain national ambient air quality standards. The Trapper planning area is located more than 10 miles from the Three Sisters Wilderness Area, a designated Federal Class 1 Airshed. The Clean Air Act requires the highest level of air quality and management for visibility in Class I areas.

Prescribed Fire

There are two general scheduling recommendations for use of fire in the *BRLS*:

1. Broadcast burn after regeneration harvest. The main purpose of prescribed broadcast burning after harvest is to reduce fuel loading to levels recommended in the Willamette Forest Plan. Reduced fuel loads translate to more planting spots and improve survival, growth and development of natural as well as planted seedlings through temporary reduction of shrub competition.

2. Light underburn about midway through the longer harvest cycles of Landscape Areas 2 and 3 (after the understory trees are 40 to 60 years old and big enough to survive fire). This can also be applied 2 to 3 decades before a scheduled harvest in native stands. The main purpose of this activity is to act on the recognition that fire plays an important, if not fully understood, role in the ecosystem. There is a desire to maintain its presence, though not to the extent that it occurred naturally. These mid-cycle underburns would also serve to reduce fuel buildup during the longer harvest cycles.

Both uses of fire affect vegetation in similar ways (Walstad et al., 1990). A change in species composition and increased diversity in the understory vegetation results from prescribed fire. Forage quality and quantity increases as older plants re-sprout with tender new shoots. Prescribed burns can decrease the total amount of nitrogen on the site through reduction of downed wood, while increasing the amount of nitrogen available to plants in the short term. Burning increases nitrate-nitrogen and ammonium levels in the forest floor, forms of nitrogen that are readily available to plants. The availability of other nutrients is also increased, as is soil pH. Chemical leachates from charred wood stimulate germination of some seeds, and there are fewer seed predators and pathogens for a period of time after a fire.

Plants have different ways of adapting to fire. Individual plants of some species survive by having thick bark or the ability to re-sprout from dormant buds in the bark or on roots and rhizomes. Other species have developed seeds with characteristics that require fire for germination or release from cones, or seeds that are windborne for easy spread into areas where fire has occurred. These plants may need periodic fires to maintain their presence in the landscape.

The season in which burning takes place may be an important factor in how burning affects vegetation. Each season has a distinct combination of soil moisture, fuel moisture, and plant phenology. Most prescribed burning is scheduled in the spring when soil and fuel moisture conditions are such that the fire will consume only the smaller fuels and leave a portion of the

duff layer intact to protect soils. Natural fires tend to burn more in the summer and fall, when plants are in a different phase of growth. With respect to shrubs, mortality is higher and re-growth is decreased when the shrub is burned after a period of rapid shoot growth (Walstad et al., 1990). Long-term monitoring is a critical part of the *BRLS* and will increase our knowledge of vegetation response to fire at various intensities and timing choices.

THREATENED, ENDANGERED, AND SENSITIVE WILDLIFE; MANAGEMENT INDICATOR SPECIES; MIGRATORY LAND BIRDS; AND SURVEY AND MANAGE WILDLIFE

Threatened, Endangered and Sensitive Wildlife

The Endangered Species Act (ESA), administered by the U. S. Fish and Wildlife Service (USFWS), mandates protection of threatened and endangered species. Listed species typically are habitat-specific with narrow geographic and environmental distributions. Proposed, threatened, endangered, and sensitive species (PETS) have specific requirements under the ESA and Willamette National Plan to maintain viability. Protection includes prohibition of disturbance and managing habitat to minimize impacts. Consultation is required with the USFWS on activities that may affect these species or their habitat.

Table 3-2 below lists the PETS wildlife species on the Willamette National Forest (USDA 2001 Regional Forester's Sensitive Species List) and whether there is potential habitat in the planning area. Proposed, threatened, and endangered species, including the northern spotted owl and bald eagle, occur in this landscape analysis area. A brief discussion of these species and their habitats is provided below. Additional detailed information on these species, as well as sensitive species and other species of concern can be found in the Biological Evaluation (Appendix D).

Table 3-2: Threatened, Endangered, Proposed, and Sensitive Wildlife Species on the Willamette National Forest and potential for their occurrence in the Trapper Project planning area.

Species	Habitat Present in Project Area	Federal Status
AMPHIBIANS AND REPTILES		
Oregon Slender Salamander	Yes	USFS Sensitive
Cascade Torrent Salamander	Yes	USFS Sensitive
Foothill Yellow-legged Frog	Yes	USFS Sensitive
Oregon Spotted Frog	No	USFS Sensitive
Northwestern Pond Turtle	No	USFS Sensitive
BIRDS		
Least Bittern	Yes	USFS Sensitive
Bufflehead	Yes	USFS Sensitive
Harlequin Duck	Yes	USFS Sensitive
Northern Bald Eagle	No	USFWS Threatened
American Peregrine Falcon	Yes	USFS Sensitive

Species	Habitat Present in Project Area	Federal Status
Yellow Rail	Yes	USFS Sensitive
Black Swift	No	USFS Sensitive
Tri-colored Blackbird	No	USFS Sensitive
Northern Spotted Owl	Yes	USFWS Threatened
MAMMALS		
Baird's Shrew	Yes	USFS Sensitive
Pacific Shrew	Yes	USFS Sensitive
California Wolverine	Yes	USFS Sensitive
Pacific Fisher	Yes	USFS Sensitive
Pacific Fringe-tailed Bat	Yes	USFS Sensitive
Lynx	No	USFS Sensitive

Northern Spotted Owl

The spotted owl is a management indicator species for old growth habitat (USDA 1990, p. IV-160). Over 13 years of surveying has documented three northern spotted owl activity centers within 1.2 miles of the Trapper Project. All of the owl activity centers have established 100-acre late successional reserves surrounding them. The entire planning area is located in Critical Habitat Unit OR-16.

The U.S. Fish and Wildlife Service has determined that reduction of suitable spotted owl habitat below 40 % of the median home range (1,182 acres) has a notably higher likelihood of leading to disruption of essential breeding, feeding, and sheltering behaviors (USDI, 1990). The median home range is defined by a 1.2 mile radius around the activity centers. Of the three owl pairs within ½ miles of units in the Trapper Project, two currently have suitable nesting, foraging and roosting habitat available within at least 40 % of their home range.

A number of strategies were used in the development of the *BRLS* that respond to managing spotted owl habitat over time. These strategies included: location of reserves; identification of short-term refugia where regeneration timber harvest would not occur for approximately 40 years; and use of data from a long-term spotted owl research program within the watershed to help with harvest scheduling. More detail on recommendations for spotted owl conservation can be found in the *BRLS*.

Migratory Landbirds

A January 11, 2001 Executive Order and a February 2003 Region 6 Memo outline the Responsibilities of Federal Agencies to Protect Migratory Birds. Habitats vary broadly for this large group of species. The planning area contains populations of land and neotropical migratory birds typical of the western Cascades.

There are 85 bird species recognized as neotropical migrants on the Willamette National Forest. Thirty-five of these species found on the Willamette were identified as "species of concern" in "Neotropical Migrants on National Forests in the Pacific Northwest" by Brian Sharp (1992). These species are associated with old growth, riparian, rocky cliffs, or grass

habitats. Snags in the area may be providing important habitat for Vaux's swifts, Williamson's sapsuckers, and American Kestrels. Old growth stands occupy portions of this landscape, which may be supporting Cooper's hawks, olive-sided flycatchers, western wood-pewee, and mountain bluebirds. Riparian habitat associated with streams in the area that may be providing habitat for riparian-associated species such as willow flycatchers, tree swallows, and red-eyed vireos.

A formal breeding bird survey route was established on Forest Service Road 1516 and has been surveyed for several years.

Management Indicator Species

Management Indicator Species (MIS) were addressed in the Willamette National Forest Plan (1990). They include the spotted owl, pileated woodpecker, marten, elk, deer, cavity excavators, bald eagles, fish, and peregrine falcons. The current conditions for the spotted owl and bald eagle are discussed in the Biological Evaluation (Appendix D). Habitat for elk and deer is discussed in the Elk Emphasis Area Management section in this chapter. Late successional forest, which provides the habitat for pileated woodpeckers, marten, and cavity excavators was discussed under the Vegetation section earlier in this chapter. Several former marten and pileated woodpecker management areas designated under the WNF Plan were retained on the landscape to provide additional habitat. Management indicator fish species found in this area were described previously under "Fish." They include cutthroat and rainbow trout, chinook salmon, sculpin, long nose and speckled dace, redside shiner, and large scale sucker.

Survey and Manage Wildlife Species

Survey and Manage and Protection Buffer Species requirements were established in the Northwest Forest Plan (USDA USDI 1994, 2001). These species are genuinely rare or, because of a lack of information about them, the agencies did not know whether they would be adequately be protected by other elements of the NWFP. The wildlife species listed in Table 3-3 occur on the Willamette National Forest.

Table 3-3: Survey and Manage, Protection Buffer, and Mitigation Measure Wildlife Species on the Willamette National Forest (USDA USDI 2001) and results of project surveys.

Species	Management Strategy	Habitat	Potential in Project Area? Survey Results?
Megomphix hemphilli (Linn County)	A = Rare. Pre-disturbance surveys required. Manage known sites. 172' no-harvest buffer*	Forested areas with a hardwood component and down woody material	Yes. **Surveys did <u>not</u> document presence**
Pristiloma arcticum crateris	A = Rare. Pre-disturbance surveys required. Manage Known Sites. 172' no-harvest buffer.	Forested areas with a hardwood component and down woody material	Yes. **Surveys did <u>not</u> document presence**

Species	Management Strategy	Habitat	Potential in Project Area? Survey Results?
Arthropods	F = Status Unknown. Strategic Surveys Required Only. 172' no-harvest buffer.	Unknown	Unknown. Project surveys not required.
Red Tree Vole	C = Uncommon. Pre-disturbance Survey Required. Manage High Priority Sites. 10-acre protection buffer.	Forested stands >10" DBH	Yes. **Surveys did document presence**
Great Gray Owl	A = Rare. Pre-disturbance Survey Required. 0.25 mile protection buffer on known site.	Mature stands near openings natural openings or human-made openings that provide appropriate foraging habitat	No habitat in planning area.
Fringed myotis, silver-haired bat, long-eared myotis, long-legged myotis, and Townsend's big-eared bat.	Protect caves, abandoned mines, abandoned wooden bridges, and abandoned buildings.	Caves, mines, abandoned wooden bridges, and abandoned buildings.	No habitat in planning area.
Black-backed woodpecker	Manage snags to provide for 100% population levels	High elevation forests.	No habitat in planning area
Pygmy nuthatch	Manage snags to provide for 100% population levels	High elevation pine forests.	No habitat in planning area

* 172' = the potential tree height for a tree in this area

CHAPTER 4.
ENVIRONMENTAL CONSEQUENCES

This chapter analyzes, compares, and explains the effects of the alternatives. Direct, indirect, connected, and cumulative effects are described. An emphasis is placed on resources related to the significant issues. Additional information on the environmental consequences of implementing each alternative can be found in the project analysis file.

EFFECTS ON SIGNIFICANT ISSUES

1. Learning and the Adaptive Management Area

Two key components facilitate successful learning:

> ***Monitoring efforts must be in place. This should include the identification up-front of key questions that, when answered, can benefit future management decisions.***

Alternatives A and B include an extensive monitoring effort. The *BRLS* was approved as an administrative study, which provides a framework and support for testing methods in this area. The monitoring plan includes long-term, multi-scale monitoring to evaluate effectiveness. Monitoring of previous projects (Blue River Face Timber Sale and North Fork Quartz Timber Sale) that followed *BRLS* recommendations has already been initiated. Pre-treatment data has already been gathered for the Trapper area for amphibians, trees, vascular plants, lichens, stream channel morphology, and stream temperature. Numerous other on-going monitoring projects are occurring in the adjacent H.J. Andrews Experimental Forest. The varying scales of monitoring for the *BRLS* were shown in Table 2-4, and Appendix F displays the types of monitoring questions being addressed.

> ***A mechanism should be in place that feeds new information back into an adaptive management framework.***

A critical aspect of projects that result from the *BRLS*, such as Alternatives A and B of the Trapper Project, is the emphasis on adaptive management. The Trapper Project lies in an Adaptive Management Area, and the monitoring questions are designed to feed into an adaptive management model (http://fsl.orst.edu/ccem/brls/brls.html). The adaptive management model followed in this study consists of three phases. In the first phase, new information is assessed to determine its potential relevance to the landscape management and watershed restoration strategy. In the second phase, these findings are evaluated to determine their significance and potential implications. Recommendations for change are identified. In the third phase, adjustments to the *BRLS* would be made based on the information produced from the preceding phases, and any other source of new information.

Learning opportunities under Alternative C (No action) have not been documented in a monitoring plan or adaptive management strategy, but they could include gathering information associated with monitoring natural development of late successional stands. This opportunity is not unique on the landscape, and is occurring in other locations.

2. Water Quality/Aquatic Resources

Sediment

Two distinct processes transport sediment to streams:

- Exposed soil surfaces can be eroded and washed directly into streams during storm events. Sediment introduced to streams in this fashion is generally fine textured, ranging from clay particles to fine gravel.

- Sediment can enter streams during mass wasting events that reach stream channels. Mass wasting includes both rapidly moving events such as landslides and debris torrents, as well as slow moving events such as earthflows and creep. Sediment introduced during mass wasting events may include all size classes from clay particles to boulders. Sediment introduced by slow moving earthflows and creep usually occurs as bank erosion as streams undercut toe slopes.

Once sediment reaches a stream, a variety of effects can occur. Fine sediments such as clay and silt particles can suspend in the water, resulting in increased turbidity. Larger silt and sand-sized sediment can lodge in and around larger bed materials if water flow is not great enough to move them on, resulting in "embeddedness." Still larger sediment, such as gravel, is an important component of aquatic habitat. It is the gravel-sized materials that are used by fish to build spawning beds or redds. And the largest sizes of sediment such as cobbles and boulders create important channel and habitat structure such as hiding cover and pools.

Surface erosion is most common on sites where ground disturbance, such as removal of ground covering vegetation and/or soil compaction, has occurred. Other types of disturbance include puddling and rutting of the soil, displacement of topsoil, and detrimentally burned soils. These impacts typically occur on roads, burned areas, and areas where ground-based timber harvest has occurred. An analysis of potential areas of new soil disturbance from logging, road construction, and prescribed fire that would occur with the Trapper Project is shown in Table 4-1.

Table 4-1: Estimated Acres of New Soil Disturbance with the Trapper Project.

Soil Disturbing Activity	Alternative A	Alternative B	Alternative C (No Action)
Ground-based logging	0.5	3.0	0.0
Skyline logging	3.0	6.5	0.0
Helicopter logging	3.5	2.0	0.0
Prescribed fire	4.0	4.0	0.0
Temporary Road	0.1	0.6	0.0
Total	11.1	16.1	0.0

Under all alternatives, drainages will continue to receive fine sediments from existing road crossings and where roads are in close proximity to streams. The frequency of delivery is dependent on the magnitude and frequency of storm events. Although this analysis indicates that there will be more areas with newly exposed soil following implementation of Alternatives A and B, the net result of management activities on the amount of fine sediment reaching streams during storm runoff is not likely to vary significantly between the action and no action alternatives because of the included mitigation measures in Alternatives A and B:

- Mitigation measures including deep ripping, surface scarification, and construction of water bars would minimize the flow of water over compacted and disturbed surfaces. These mechanical treatments are designed to control all but the most severe storm flows on these sites until the vegetation can establish itself.
- Re-vegetation with native plant species and planting trees on disturbed sites would facilitate the restoration of ground-covering vegetation within 2 to 3 years.
- Ground-covering vegetation is conserved in streamside-areas by prohibiting the use of ground-based equipment within 100 feet of class IV and larger streams.

Alternatives A and B would result in levels of detrimental soil disturbance well below the maximum levels permitted by Forest Service Region 6 standards and Willamette National Forest Soil Quality Standards and Guidelines (FW-081).

Even if some sediment does reach the streams from disturbed soil in this area, high stream gradients and flows provide adequate power to process and transport sediment with little adverse effect to aquatic habitat.

Potential for sediment entering streams from newly constructed temporary roads in Alternative A and B has been mitigated by locating road construction on sites that are stable, low-risk ridgetop sites, where infiltrative adjacent soils minimize runoff, or they are greater than a site-potential tree height from streams (approximately 170 feet). The temporary roads in Alternatives A and B do not require stream crossings.

Maintenance of approximately 11.42 miles of existing roads in Alternatives A and B, including culvert upgrades, resurfacing, and maintenance of ditches and other drainage

features, would reduce the amount of sediment available for transport and reduce the likelihood of water flows on the road surface that are capable of transporting sediment. Alternative B also proposes to decommission 0.4 miles of Road 1508435 and store 0.5 miles of Road 1508426. These treatments would reduce the potential of the road surfaces to yield sediment and eliminate a chronic disturbance pathway from the adjacent managed stands to the aquatic reserves along Wolf Creek and Blue River. Alternative B also proposes to store approximately 0.1 mile of Road 1500613, which would remove several headwater fills from a tributary of Mann Creek. This would eliminate a need for constant monitoring and maintenance, and would reduce the risk that sediment generated by crossing failure would be introduced into Mann Creek.

In Alternative C (No Action), no activity would occur, and therefore there is no potential for additional erosion to occur as a result of timber harvest, prescribed fire, or new temporary road construction. Road maintenance would also not occur, and existing levels of sediment transport associated with roads would not be reduced.

Mass Wasting

Mass wasting is an on-going natural process in the project area (USDA 1996), and it is responsible for the vast majority of the total sediment load that occurs naturally in streams. Mass wasting occurs from rapidly moving events -- such as landslides and debris torrents, as well as from slow moving processes -- such as earthflows and creep. Mass wasting processes can transport to streams all sizes of sediment, from clay and silt to gravel, cobble, and boulder-sized material. Mass wasting is also an important transport mechanism for the movement of large wood from hill slopes to streams.

A substantial body of evidence links poorly designed and/or maintained roads, and to a lesser extent timber harvest, with an increase in the frequency of mass failures. Consequently, all areas in Alternatives A and B proposed for harvest and road construction were evaluated for potential increased mass wasting. Mitigation to avoid sediment inputs from mass wasting essentially included identification and avoidance. Areas of active earthflow were mapped in blocks 20 and 21. These areas, as well as other slopes or landforms that could experience decreased slope stability as a result of harvest activities, were dropped from consideration for timber harvest. Road construction in these areas was not proposed. Fifty-percent canopy retention was prescribed for unit 20-2 to minimize the risk of failure during large storm events through the retention of root strength.

During the storms of 1996 and 1997, management-related slope failures not associated with a road occurred within 5 to 20-year-old regeneration units. Although Alternatives A and B propose regeneration harvest, there is a low probability of failure within the units because of mitigation measures of avoiding unstable slopes, heavy tree retention on headwall areas, and no-harvest buffers or heavier green tree retention along riparian areas below sensitive areas.

Road maintenance proposed for Alternatives A and B could result in a cumulative reduction of the risk of road-related mass failures. Maintaining and restoring ditch lines and drainage features and upgrading culverts would reduce the likelihood of fill saturation that can lead to

failure. Removal of unstable fill material would also reduce the likelihood of failure. These activities would not occur under with Alternative C (No Action).

Temperature

In *An Approach to Water Resources Evaluation of Non-Point Silvicultural Sources* (EPA, 1980), transmission of solar radiation as a function of forest crown closure drops to less than 10 % when crown closures of 70 % or greater are maintained. In *Forest Ecosystem Management: An Ecological, Economic, and Social Assessment* (FEMAT, USDA USDI 1993), cumulative effectiveness of stream-side shading as a function of distance from channel reaches 100 % between one-half and one site potential tree height from the channel.

In Alternatives A and B, this information was used to develop site-specific stream prescriptions for all perennial streams that maintain substantive contributing flows to high value downstream habitat. Implementation of these prescriptions maintains existing water temperatures within these streams, as well as in the high value downstream reaches. Table 2-8 displays the prescriptions for riparian areas.

All other streams in the units proposed for harvest, including intermittent streams and very small perennial streams that flow discontinuously above ground, will be managed with retention ranging from 15-50% canopy closure (See Table 2-8). Water temperature will be maintained in these streams even with this level of harvest because these intermittent streams do not flow during the season when elevated stream temperatures occur. The small perennial streams that have no additional shade protection prescribed are heavily influenced by the cooling effects of ground water, and do not provide substantial flows to down-stream reaches of concern. These streams are being specifically monitored for impacts to temperature under the *BRLS* Administrative Study.

In Alternative C, No Action, there would be no alteration of stream-side habitat, and stream temperatures would not change due to management activities.

Water Quantity and Peak Flows

The alternatives were analyzed using the aggregate recovery percentage (ARP) methodology for the years 2001 and 2011. These dates roughly include implementation through 10 years of recovery.

Analysis of Alternatives A and B indicates a reduction in ARP values for Mann Creek planning subdrainage (Table 4-2). This reduction is primarily the result of the proposed forest harvest. Quentin Creek planning subdrainage post-treatment does not differ significantly from the no action alternative. (Only the prescribed burn units 26 and 71 are in Quentin).

In Alternatives A and B, even though ARP is reduced in Mann Creek, the risk level does not drop to midpoint or below upon complete implementation. As with the Alternative C (No Action), 10 years of recovery moves each planning subwatershed substantially further above midpoint. No additional regeneration harvesting is expected in Mann, Quentin, or Cook planning subdrainages in the next 20 years.

Table 4-2: Aggregate Recovery Percentage (ARP) for the Trapper Project Area with Alternatives A and B.

Planning Sub-Watershed	WNFP Midpoint Value	Baseline	Change w/ Alternative A or B (2001)	Estimate following 10 years of recovery (2011)
Mann Creek	65 %	72 %	67 %	78 %
Quentin Creek	70 %	86 %	86 %	95 %

Alternative C (No Action) basically extends the current condition 10 years into the future. As previously discussed, the existing values for each planning subdrainage are above the recommended midpoint values, and 10 years of recovery moves each planning subdrainage further above midpoint (Table 4-3).

Table 4-3: Aggregate Recovery Percentage (ARP) for the Trapper Project Area with Alternative C.

Planning Subdrainage	Baseline	Future (2011)
Upper Lookout	80 %	93 %
Mann Creek	72 %	83 %
Quentin Creek	86 %	95 %
Cook Creek	90 %	97 %

Based on this analysis, it is not likely that either alternative will result in significant increases in peak flows. Consequently, shallow gradient stream reaches where accumulation of large wood and gravel and cobble-size sediments is expected over time are likely to retain these beneficial materials and the channel and habitat complexity that they provide.

Fish Habitat

Much of the supporting analysis for this issue has been discussed above. Additional information can also be found in the Biological Assessment (Appendix B).

Sediment, stream temperatures, peak flows and large wood all have potential to affect aquatic habitat and fish populations.

Sediment

Sediment entering stream channels can affect channel shape and form, stream substrates, the structure of fish habitat, and the structure and abundance of fish populations. Substantial increases in sediment supply from mass movement or surface erosion, bank destabilization, or in-stream storage losses can cause aggradation, pool filling, and a reduction in gravel quality.

Potential for surface erosion is directly related to the amount of bare compacted soil exposed to rainfall and runoff. Road surfaces, landings, skid trails, ditches, and disturbed harvest areas

can contribute fine sediments to stream channels. Not all hillside sediment reaches the stream channel, but roads and ditches form important pathways.

In Alternatives A and B, temporary roads will be built. Sediment routing would only occur during the short life of the road, and increases in sediment are unlikely due to its ridgetop location and absence of stream crossings. Maintenance activities on 11.42 miles of existing permanent roads in Alternatives A and B could deliver small amounts of sediment in the short-term. The long-term effect would be a reduced chance of catastrophic road failure, which could deliver large amounts of fine sediment from road fills. The benefits of road maintenance would not occur under Alternative C.

Since the potential for slope failure is unlikely in Alternatives A or B, it is unlikely that there would be any adverse affects to stream channels such as pool filling or aggradation with its implementation.

No fish-bearing streams exist near areas proposed for prescribed fire. There are intermittent or seasonal streams in these units, and the proposal would allow prescribed fire to burn through the riparian areas. Potential effects to these small streams would be a short-term increase in nutrients delivered from adjacent slopes. Potentially, a few small openings created by the fire in the canopy would increase the stream surface area exposed to sunlight, increasing primary production that would provide more algae/diatoms to grazing aquatic insects. However, these potential effects will most likely not be realized because the fires would be set in the spring when soils are moist, and mortality will be difficult to achieve. The riparian areas will be especially moist and this will make it even more difficult to achieve mortality objectives.

Neither of the action alternatives would have direct or indirect effects on fish-bearing streams or fish. The action alternatives with prescribed fire have the potential to beneficially affect small streams due to increased nutrients, but these benefits would most likely not be realized in the downstream fish-bearing areas due to the distance of proposed fires from fish-bearing streams, and the unlikelihood of achieving mortality objectives due to the need to burn in the spring. Retention trees included as a mitigation measure in alternatives A and B (Table 2-8) should prevent any adverse cumulative effects from occurring.

Temperature

As was previously discussed, temperatures in Cook, Quentin, and Mann Creeks are currently below the designated 64 degree maximum. Resident fish are the primary determinant of water temperature needs for beneficial uses in this area. Both action alternatives retain adequate stream shading that minimizes the potential for stream temperatures to rise above the standard. Stream temperatures will be maintained in important rearing areas of the downstream fish-bearing reaches with either action alternative.

Peak Flows

Substantial increases in peak flows or the frequency of channel modifying flows from increased snowmelt or rain-on-snow events can cause increased bed scour or accelerated bank erosion. This can have negative effects on fish and fish habitat by destabilizing stream

bedloads or inundating spawning gravels with fine sediment. Alternatives A or B are not expected to affect peak flows (see water quantity and peak flows discussion above). Implementation should not result in channel changes that would affect fish habitat. Alternative C (no action) would maintain current conditions and would not affect fish or fish habitat.

Large Wood

Large woody material plays an important role in controlling stream channel morphology, in regulating the storage and routing of sediment and particulate organic matter, and in creating and maintaining abundance of salmonids closely linked with abundance of woody debris, particularly in winter (Hicks et al., 1991). Large woody material creates a diversity of hydraulic gradients that increases microhabitat complexity. This complexity supports the coexistence of multi-species salmonid communities. Loss of stable in-stream woody material by direct removal, debris torrents, or gradual attrition as streamside forests are converted to managed stands of smaller trees will contribute to the loss of sediment storage sites, fewer and shallower scour pools, and less effective cover for rearing fish (Chamberlain et al., 1991). Neither action alternative would directly affect the large wood supply to fish-bearing streams. There are no fish-bearing streams in the areas proposed for harvest or underburning. Table 2-8 in Chapter 2 displays riparian management strategies for Alternatives A and B.

Areas adjacent to non-fish bearing and intermittent streams would be harvested in Alternatives A and B. There could be indirect effects to fish-bearing streams from interception of the supply of large wood that could migrate to the downstream fish-**{** XE "fish" **}**bearing reaches. These effects are difficult to predict and measure since the events that mobilize large wood are also difficult to predict. These indirect effects are not expected to be adverse because areas with potential to provide large woody debris inputs to riparian habitat are protected in no-harvest buffers on earthflow terrain, and on landslide prone terrain, at least 50% canopy is retained to provide large woody material in the future. The assumption that this is adequate is being monitored in the *BRLS* Administrative Study.

Alternatives A and B follow recommendations from the *BRLS* for maintenance of an aquatic reserve system (Figure 4). This system protects several small basins to meet aquatic conservation strategy objectives and to provide contiguous areas of undisturbed habitat for late successional species. One management objective for aquatic reserves is to maintain or establish late-successional forest conditions. The aquatic reserves also include riparian corridors along both sides of all fish-bearing streams. The reserves are essentially linear and occupy the entire valley bottom and adjacent toe slopes. These corridors connect aquatic and riparian areas throughout the watershed and link with the small basin reserves. Along Blue River a streamside reserve was delineated to run from Road 15 on the northwest to two tree-heights on the southeast side of the river. A one tree-height reserve along constrained channels (most of the fish-bearing streams), and a two tree-height reserve along unconstrained segments was designated for all other fish-bearing streams.

With these recommendations in place, neither action alternative would have a negative direct, indirect, or cumulative effect on the recruitment of large wood to fish-bearing streams in the watershed. The aquatic reserve system combined with the retention guidelines, low frequency

harvest, and site specific increases in retention trees to ameliorate fish habitat concerns, will maintain the supply of large wood to streams in the watershed.

Magnuson-Stevens Act

The Magnuson-Stevens Fishery Conservation and Management Act established a new requirement for "Essential Fish Habitat" that requires federal agencies to consult with the National Marine Fisheries Service (NMFS) on activities that may adversely affect essential fish habitat. Essential Fish Habitat for the Pacific coast salmon fishery means those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem.

An analysis of Essential Fish Habitat is available in the Biological Evaluation (Appendix B). The finding shows that none of the alternatives result in an adverse affect to Essential Fish Habitat for salmon for the following reasons:

1. Salmon do not inhabit the Blue River watershed upstream of the dam. The Trapper Project area lies upstream of the dam. Therefore, there will not be a direct or indirect affect from any alternative.
2. Trapper Project does not propose any timber harvest or road construction adjacent to, or directly over, any fish-bearing streams in the watershed.
3. Tree retention guidelines will provide for shade to perennial non-fish bearing streams, assure water quality, and protect bank stability.
4. No barriers to salmon migration will be constructed with any proposed action.
5. Aquatic conservation strategy objectives for riparian reserves in the Adaptive Management Area will be met.

Aquatic Conservation Strategy Objectives

Both action alternatives meet the nine aquatic conservation strategy objectives (Appendix A) from the Northwest Forest Plan. Following recommendations from the *BRLS*, the underlying assumption is that the more the future landscape resembles the historical landscape, the higher the likelihood of retaining native habitats, species, and ecological functions.

To meet the aquatic conservation strategy, the *BRLS* recommended a system of aquatic and small basin reserves and a watershed restoration program. The *BRLS* also recommended desired landscape features and prescriptive elements intended to achieve the desired features.

A discussion of each objective is included in Appendix A. The objectives were first analyzed on a landscape level with the *BRLS*. Desired landscape features were identified that would be important in meeting the objectives; then the actions in Alternatives A and B were evaluated for their ability to meet this desired condition.

Cumulative Effects

Reasonably foreseeable activities that could cumulatively add to the impacts of this project to water quality/aquatic resources include future timber harvest, temporary road construction, road maintenance, and road decommissioning. Approximately 600 acres of commercial

thinning and 72 acres of regeneration harvest may occur over the course of the next 20 years in this planning area. This activity may be supported by less than one mile of temporary road construction. The Blue River Watershed Access and Travel Management Plan (in draft) recommends 49 miles of road be decommissioned to improve watershed conditions. The timing of that activity is unknown. It may take decades because of the limited availability of funding. Key roads identified in the Forest Roads Analysis will continue to be maintained to specified standards. The timber harvest and temporary road construction will likely include mitigation measures similar to the Trapper project, resulting in no significant impacts to sediment input, mass wasting, water quantity and peak flows, temperature, or large wood availability for fish habitat. Continued road maintenance and potential road decommissioning may improve watershed conditions.

3. Logging Economics

Alternatives A and B differ by the logging systems required to harvest forest resources (Table 4-4). Alternative A proposes using a helicopter to log more acres than B, which results in higher unit costs. The sum total of unit costs for Alternative A is $3,683,831.50, compared too $2,710,938.50 for Alternative B. Alternative A requires less construction of temporary road to support the activity because it uses less cable and ground-based systems for logging.

Table 4-4: Logging systems, temporary road construction, and total unit costs proposed in the Trapper Project.

	Alternative A	Alternative B	Alternative C (No Action)
Cable	32.0 acres	64.2 acres	0
Helicopter	116.0 acres	66.0 acres	0
Ground-based	1.0 acres	18.8 acres	0
Temporary Road Constructed	200 feet	1,200 feet	0
Total of unit costs	$3,683,831.50	$2,710,938.50	$0

EFFECTS ON OTHER ISSUES

4. Vegetation Pattern and Composition

Plant communities

Forest proposed for harvest in Alternatives A and B include “mature” stands less than 150 years old, with scattered residual trees less than 250 years old. They are dominated by western hemlock and the Pacific silver fir plant series, which are common in this watershed. The prescription calls for leaving the bigger trees in a scattered and clumped pattern within each unit. Alternatives A and B would result in the creation of early seral forest habitat with abundant structure retained, such as snags and down wood.

Alternatives A and B minimize changes in microclimates within non-forested areas by using no-harvest buffers and by limiting direct physical disturbance. Non-forested sites identified in proposed units include small openings in the forest canopy such as cliff and rock outcrops, open talus slopes, shrub/forb communities, and aquatic habitats.

Alternative C (No Action) would have no direct effects to forest or non-forest sites. "Natural" succession of the plant communities will continue with human suppression of fires.

Plant Species of Concern

Surveys were conducted as required by the USDA USDI 2001 FSEIS for all Category A and C Survey and Manage Species. Known Sites of Category B and D species from the 2001 FSEIS were also identified. Both action alternatives maintain Survey and Manage species. With Alternatives A and B, known sites will be buffered from activities such as harvest, road building, and prescribed fire. Protection follows Regional direction (USDA USDI 2001).

The epiphytic lichen specklebelly (*Psuedocyphellaria rainiersis,* Category A*)* is located in remnant old-growth trees near unit 40-1. The location is within a no-harvest riparian reserve outside the unit. There will be no effects with either action alternative.

The rare coral fungus *Ramaria stuntzii* (Category B) is located in unit 21-2. This fungus is associated with the roots of Douglas-fir and western hemlock. Alternatives A and B provide a 172-foot no-harvest/no disturbance buffer around each site. Within the buffer, the host trees for the fungus will be retained and the soil will not be disturbed. This buffer will also maintain the microclimate of the site. Neither action alternative is expected to have an effect on these sites.

Two locations of the epiphytic, nitrogen-fixing lichen *Nephroma occultum* (Category B) exist within unit 40-1. This lichen is endemic to the Pacific Northwest and occurs almost exclusively in stands greater than 200 years old. Alternatives A and B provide a 172-foot no-harvest/no disturbance buffer around each location. This buffer will maintain the substrate and the microclimate of the site. Neither action alternative is expected to have an effect on these sites.

The green bug moss, *Buxbaumia viridis* (Category D), was identified on old decaying logs on the forest floor near 20-1. Because it is greater than 200' from the unit boundary, it does not require additional protection.

None of the alternatives is expected to have effects on any sensitive plants. Potential habitat exists for 14 sensitive species within the project area, but surveys did not document any populations. Contract clauses C9.52 and C6.25 are included as mitigation in Alternatives A and B to protect populations found after a sale is awarded.

The construction of temporary roads in Alternatives A and B increases the chance of noxious weed introduction, more so in B, especially if equipment and materials are contaminated with seeds and introduced into the project area. To reduce this potential, both action alternatives includes 3 mitigation measures: 1) all equipment must be pressure washed prior to use on the

project; 2) a weed-free source of rock will be required; and 3) existing known populations of noxious weeds in the project area will be pulled prior to implementation. With Alternative C, there would be no introduction of new noxious weeds from road construction or harvest activities. Existing populations of weeds would continue to spread.

Snag and Down Wood Habitat

In the short-term, Alternatives A and B will result in a reduction of existing snags in the areas harvested. To manage safety during operations, numerous existing snags will be felled. These will generally include class II-IV trees, which are the more decayed trees that provide the highest quality habitat. Some of these trees may be protected in no-harvest reserves and by marking them as retention trees when they do not pose safety hazards. In the long-term, Alternatives A and B will significantly increase snag availability. To more closely resemble the effects of a natural fire, approximately 3-24 trees per acre will be converted to snags following harvest. This is a 1.5 to 10-fold the number prescribed in the Willamette Forest Plan to meet habitat objectives for primary cavity excavators. This does not imply that the populations of these species will also increase by that amount, since their territorial nature will control their density. However, they will have the opportunity to be abundant in these units.

Alternatives A and B would not remove any decay class III, IV and V down logs, which provide high quality habitat. Additional trees will be felled and left on the forest floor at the rate of 240 lineal feet (or 3 trees) per acre. This material will be class I or II, and greater than 20" DBH at the small end. This will provide wood into the decay cycle. There is a high likelihood that natural events will topple trees retained for snag habitat, increasing this important component on the forest floor.

The availability of snag and down wood habitat will remain the same with Alternative C (No Action). Forest succession will continue, resulting in natural recruitment over time from insects, disease, and competition. Existing snags and down wood will not be removed or disturbed.

Pattern

The units proposed for harvest in Alternatives A and B lie in a landscape heavily fragmented from previous harvests, most of which occurred between 1970 and 1990. These stands were selected for harvest because they are remnants, meaning they are relatively small patches on the landscape, leaving larger patches in the watershed unharvested. Their conversion to early-seral forest minimizes fragmentation at the landscape scale. Alternatives A and B would decrease the amount of edge in the landscape relative to existing conditions. Following recommendations from the *BRLS* that span 260 years, this strategy will eventually create relatively large forested areas of about the same age, that provide contiguous habitat at a large scale. In time, the pattern and distribution of older forest would return to a more natural state with large patch sizes well-distributed across the landscape (Figure 3).

In Alternative C (No Action), these forested stands would continue on their successional paths. There would be no immediate change to existing levels and distribution of early, mid, or late-successional habitat.

Connectivity

Alternatives A and B does convert existing late successional forest into younger stands, but not in the cook or Quentin drainages. A mixture of retained clumps, areas for riparian protection, and Survey and Manage buffers will provide stepping stones throughout the area, maintaining corridor functions for late successional species, albeit of lower quality.

Alternative C (No Action) would not affect late-successional stands within the Cook and Quentin Creek drainages, which provide the primary connection between the South Santiam**{** XE "Santiam LSR" **}** and Hagan Late-Successional Reserves.

Cumulative Effects

Reasonably foreseeable activities that could cumulatively add to the impacts of this project to vegetation include future timber harvest and re-growth of previously harvested areas. Approximately 600 acres of commercial thinning and 72 acres of regeneration harvest may occur over the course of the next 20 years in this planning area. The timber harvest will likely include mitigation measures similar to the Trapper project, resulting in no significant impacts plant species of concern, snags and down wood habitat. The forest communities and their pattern in this planning area will change over time. The *BRLS* details a long-term plan to aggregate patches of older forest and protect sensitive habitats in this watershed.

5. Threatened Northern Spotted Owl

Alternatives A and B would directly affect spotted owls by reducing habitat. Habitat can be degraded, downgraded, or removed. The following definitions apply to these terms:

- *Degraded: habitat, either suitable or dispersal, where the quality has been affected, but the functionality has not been removed. For example, light thinning or underburn that partially removes the overstory, yet maintains a minimum of 70 % average canopy closure, would maintain suitable foraging habitat. If the treatment retains 40 % canopy closure, the habitat would remain dispersal habitat (Units 26 and 71).*

- *Downgraded: habitat where the functionality has been changed from suitable to dispersal. For example heavy thinning that maintains a minimum of 40 % average canopy closure (Unit 20-2).*

- *Removed: habitat, either suitable or dispersal, where the functionality has been eliminated so there is no longer spotted owl habitat of either type present. For example, regeneration harvest or thinning that reduces canopy closure below 40 % (Units 20-1, 20-3, 21-1, 21-2, 21-3, 40-1).*

Concerns for the future productivity and stability of spotted owl sites increases if habitat is altered near the activity center (i.e. within 0.7 miles), or if habitat is removed within home ranges (out to 1.2 mile radius) and below the critical threshold.

Alternatives A and B would not remove any habitat within 0.7 miles of spotted owl activity centers. Unit 71, which is proposed for a prescribed burn, is within 0.7 miles of a spotted owl habitat activity center. This underburn should have minimal direct effects to spotted owl habitat because very few overstory trees will be burned to the point of mortality, and following the fire, the stand will still function as suitable spotted owl habitat.

There are three spotted owl activity centers located within 1.2 miles of Alternatives A and B. One pair would have habitat reduced below the critical threshold (0871). Effects of the habitat degradation and removal displayed in Table 4-5 include a loss of foraging habitat opportunities near the activity center in unit 40-1. It is unknown how much the owls are currently using these areas for foraging. Abundant large woody material, snags, and large green trees will be retained (or in the case of snags, created after logging) in all units to provide for future habitat quality.

Table 4-5: Effects to Spotted Owls with the Trapper Project.

Spotted Owl Site Number	Existing Habitat Acreage (Alternative C No Action)	Acres Removed Alternatives A & B (<40% canopy retained)	Acres Degraded Alternatives A & B (>70% canopy retained)	Alternatives A & B Post-Treatment Habitat Available
2036	1,696	25	0	1,671
0859	1,655	25	0	1,630
0871	1,149	25	0	1,124

Units 26 and 71 (prescribed underburns), lie within 1.2 miles of spotted owl activity centers. The activity would have short-term negative effects on spotted owls, but likely long-term beneficial effects. Because habitat with more than 70% canopy closure is still considered suitable, degraded acres due to the prescribed underburn are still considered habitat. Opening the canopy closure to 70% may reduce spotted owl habitat quality from current levels, however, canopy closure is expected to recover in 8-10 years, and the patchy understory mortality may benefit the remaining trees by improving their growing conditions due to increased nitrogen and increased sunlight. This may allow trees to grow larger faster, benefiting spotted owls in the long term with the important large-tree component of their habitat.

Alternatives A and B responds to USFWS Conservation Recommendations (USDI 1998) for this species to:

- Minimize the loss or degradation of suitable habitat within 0.7 miles of known spotted owl nest sites.
- Facilitate the development of late-successional forests by maintaining the maximum number of large class I and II logs and standing live and dead trees within regeneration harvest units.

If recommendations from the *BRLS* are followed in the long-term, there are additional measures that will aid in the conservation of this species*:*

- long timber harvest rotation lengths;
- high overstory retention levels;
- use of site-specific owl reproductive information to identify reserves;
- augmentation of select 100-acre late-successional reserves;
- reduced landscape fragmentation in the long- and short-term.

The project was submitted to the USFWS for formal consultation (as part of the Wolfmann DEIS). The Biological Opinion was received on September 29, 1998, with the determination that "*the project is not likely to jeopardize the continued existence of the spotted owl or result in the destruction or adverse modification of spotted owl critical habitat."* The project follows the USFWS Biological Opinion by complying with the terms and conditions that implement the reasonable and prudent measures. These measures include seasonal restrictions within ¼ mile radius of known owl activity centers and reporting requirements to USFWS.

Implementation of Alternative C would not affect northern spotted owl pairs because no suitable habitat would be altered.

Cumulative Effects

Reasonably foreseeable activities that could cumulatively add to the impacts of this project to spotted owl habitat include future timber harvest, re-growth of previously harvested areas, and wildlife habitat improvement projects. Approximately 600 acres of commercial thinning and 72 acres of regeneration harvest may occur over the course of the next 20 years in this planning area. The timber harvest will degrade and/or remove spotted owl habitat, but it will follow guidance from the USFWS, the agency that regulates the management of threatened species. The timber harvest will likely contain mitigation measures to provide key elements of future spotted owl habitat, such as large woody material standing and on the forest floor. Habitat improvement projects planned to occur within the next 5 years include the creation of 1600 snags and supplementing forest habitat with 128 downed trees. Planned thinning in existing plantations is designed to provide spotted owl habitat in the long-term.

6. Heritage Resources

Implementation of Alternative A or B would have no effect on known significant heritage sites. The appropriate sample of high and low probability ground has been surveyed according to the State Historic Preservation Office (SHPO) approved Willamette National Forest Cultural Resource Inventory Plan standards. All significant sites will be protected by avoidance. Several landscape blocks contain heritage resources; these are either outside proposed ground-disturbing units or they have been evaluated as non-significant. In all instances, a minimum one-hundred-foot buffer has been established beyond known site boundaries. Federally recognized tribes with an interest in the area have been contacted, and one, the Siletz Tribe, has made specific preservation recommendations that have been incorporated into the preservation plans.

Non-significant sites are defined as isolates with very limited information potential; thus, they do not meet the criteria for eligibility to the National Register of Historic Places (NRHP). Recording these locations is considered adequate mitigation, and monitoring selected isolate locations during proposed project operations will occur. If any sites are found during proposed project activities, a standard contract provision would be invoked that will protect the new locations until they can be evaluated. Known site locations are not identified in this document; such locations are kept secure for site preservation purposes, and are exempt from the Freedom of Information Act.

Cumulative Effects
Reasonably foreseeable activities that could cumulatively add to the impacts of this project to heritage resources include ground-disturbance from future timber harvest and temporary road construction. Approximately 600 acres of commercial thinning and 72 acres of regeneration harvest may occur over the course of the next 20 years in this planning area. This activity may be supported by less than one mile of temporary road construction. The timber harvest and temporary road construction will require surveys to document and protect heritage resources in accordance with the State Historic Preservation Office (SHPO).

7. Prescribed Burning and Fuels

Fuel Loads and Prescribed Fire

In Alternatives A and B, fuel loading would increase temporarily because harvest activities create slash. Prescribed fire in the year following harvest would reduce fuel loading to below pre-harvest levels. With reduced fuel loading, any fires that started in the stands could probably be suppressed using hand crews. If a fire started, intensity and severity of effects would be less than with no action or no slash burning (Table 4-6). Prescribed fire would occur in Alternative A and B where fuel loadings would exceed forest plan standards and guidelines for material 0 to 3 inches. Post-harvest review will be conducted to check the viability of selected fuel treatment.

Low intensity prescribed burning under spring-like conditions is recommended in Alternative A and B to reduce small size class fuels while minimizing impacts to soils and overstory tree mortality. These conditions occur when soil is still wet, duff is at least damp at the soil interface, large fuels (3 to 9 inches diameter) have a moisture content above 35 %, and mortality of overstory trees is less than 10 %. Burning under these conditions allows for retention of existing ground cover, minimal below-ground heat disturbance, and large woody debris consumption is low. Prescribed fire applied during spring-like conditions would not reduce slash on all acres. Shaded areas will not carry fire as well as the sun-exposed areas, creating a mosaic across the landscape.

Existing fuel profiles within the area have fuel loadings ranging from 9 to 32 tons per acre of 0 to 9 inch material. Natural cycles of vegetative progression would continue to increase these levels to the higher end of that range. Past fuel treatments in this area have included broadcast burning to reduce this fuel loading below pre-activity levels. Prescribed burning creates a fuel profile that meets forest plan hazard reduction standards. Opportunities to efficiently reduce fuel loading and associated risk of larger fires occur following timber

harvest. Delaying prescribed burning lengthens the time when fire could occur and fire resistance to control is highest. Consequences to remnant stands and very young stands are also higher with delayed prescribed burning.

Fireline construction and manual clearing of slash are two ways to protect adjacent or included areas. Reproduction areas, unstable soil areas, some special habitats and private land holdings are some specific areas where fire would be excluded. Fireline use near riparian areas would be limited to protection for some of the above reasons. Landscape project objectives include occasional disturbance of the riparian areas as well. Minimal impacts are expected as a result of harvest and retention near riparian areas and the burning conditions prescribed.

Air Quality

Fuel profiles resulting from this project, total amount of suspended particulate from burning those fuels,**{** XE "fuels" **}** and acres of prescribed fire**{** XE "prescribed fire" **}** in Alternative A and B are displayed in Table 4-6 to demonstrate potential effects of on air quality.

While prescribed fires have proven to be very successful in creating the conditions necessary for healthy forests, there is a troublesome side effect. It is smoke. To ensure smoke dispersion, atmospheric conditions are closely monitored before prescribed fires are ignited. Yet even in favorable conditions, the air will still become smoky. Often, although the air is smoky, it still meets federal and state air quality standards.

To ensure that air quality meets federal and state standards while prescribed fires are being conducted, public land managers must meet the requirements of the Oregon Clean Air Act State Implementation Plan.

Before prescribed fires are ignited, public land managers in Oregon submit their plans to the Oregon Department of Forestry. Their meteorologist reviews weather conditions and determines which prescribed fires can be ignited and which, if any, must be delayed to ensure that air quality meets federal and state standards. If air quality begins to approach unhealthy levels, public land managers may be asked to delay igniting prescribed fires. Measurements of impacts on air quality are based on particulate matter produced by the proposed burns.

Table 4-6: Acres Burned and Smoke Particulate**{** XE "particulate" **}** Produced by Alternative A or B of the Trapper Project.

Unit	Harvest Acres Burned	Slash Tons Per Acre**	Burning Pounds Suspended Particulates PM*-10/ac	Burning Total Pounds Suspended Particulates PM-10	Burning Pounds Suspended Particulates PM-2.5/ac	Burning Total pounds Suspended Particulates PM-2.5
20-1	4	17.31	391	1,564	332	1,328
20-2	23	17.31	391	8,993	332	7,636
20-3	8	17.31	391	2,656	332	2,656
21-1	25	17.94	414	10,350	351	8,775
21-2	44	17.94	414	18,216	351	15,444
21-3	1	17.94	414	414	351	351
40-1	50	34.88	690	34,500	585	29,250
71	25	31.80	85.0	2125	72.1	1,803
26	67	20.90	72.0	4824	60.8	4,074

* PM = Particulate Matter described by size in microns.
** The amount of slash produced is used to predict the total suspended particulates produced. Consumption of slash is estimated from a percentage of fuel burned. This value could vary depending on the time of year treated, fuel moisture, etc. Actual conditions at the time of burning could vary slightly: figures above are estimates.

With the implementation of Alternative C (No Action),**{** XE "Alternative 3" **}** ground-fuel loading would continue to increase, especially the larger size classes, as trees continue to age and natural accumulation of residue exceeds rates of decay. Potential for wildfire would exist. If a large fire**{** XE "fire" **}** occurred, it would create large amounts of smoke. Particulate matter produced in wildfires increases from the 400 to 700 pounds per acre PM-10 produced in spring-like conditions to 1500 to 2000 pounds per acre produced in summer wildfire conditions. Smoke would blanket the nearby Three Sisters or Mount Washington Wilderness areas with major negative effects on air quality. Fire would probably occur in the summer months when most human use of the wilderness occurs. Depending on the wind direction, smoke would probably reach either the Bend or Eugene areas, which are designated federal Class I areas that require the highest level of air quality and management for visibility.

Fire, Travel-Routes, and Escapement

Under Alternatives A and B, maintenance of 11.42 miles of existing roads currently open to public use may improve travel conditions allowing fire suppression personnel to respond more safely to fires that may occur along these roads. Alternative C (No Action) would not improve travel routes for fire suppression.

Prescribed fire has some inherent risk of escaping the desired area. When fuels are in a dry enough condition to burn, adjoining stands will also contain fuels available to burn. Agency requirements for prescribed burn plans (FSM 5142.2) require assessment of prescription

elements compared to resource objectives. Where concerns exist for fire escapement, a risk assessment must be completed and a contingency plan developed to prevent such escape before ignition can begin.

Meeting prescription elements (fuel moisture, temperature, wind speed and direction and relative humidity) for low intensity fire is the main mitigation to fire escape. If, having met the prescription elements, fire should escape, it would most likely not exhibit severe fire behavior that would allow it to significantly intrude into adjacent areas. Measures such as control of ignition pattern, constructing fire lines or fuel breaks, wetting adjacent fuels prior to burning and adding personnel to patrol adjacent areas during the burning are commonly used to reduce the risk of fire escape.

Cumulative Effects

Reasonably foreseeable activities that could cumulatively add to the impacts of this project to forest fuels, air quality, and fire risk include future timber harvest and road decommissioning. Approximately 600 acres of commercial thinning and 72 acres of regeneration harvest may occur over the course of the next 20 years in this planning area. The Blue River Watershed Access and Travel Management Plan (in draft) recommends 49 miles of road be decommissioned to improve watershed conditions. The timing of that activity is unknown. It may take decades because of the limited availability of funding. The timber harvest will increase forest fuels. It is likely that future projects will include mitigation measures similar to the Trapper project, resulting in activities to reduce slash levels and protection of air quality. Potential road decommissioning may reduce vehicular access to fire starts in this planning area.

8. Threatened, Endangered, Sensitive Wildlife, Migratory Landbirds, Management Indicator Species, and Survey and Manage Wildlife

Proposed, Endangered, and Sensitive Species (PETS)

Analysis of impacts/effects to PETS species can be found in the Biological Evaluation in Appendix D. Neither action alternative results in a trend towards federal listing of any sensitive species. Mitigation measures that are part of Alternatives A and B minimize effects to Threatened and Endangered species. The exception is the northern spotted owl: Alternatives A and B may affect, but are not likely to adversely affect the northern spotted owl. This determination means that the actions do not jeopardize this species. Alternative C will have no effect to the northern spotted owl.

Migratory Landbirds

A Memorandum of Understanding was signed between the USFS and USFWS to complement the January 2001, Executive Order. Agreed-to measures include the identification of habitats needed by priority species. The Trapper analysis file contains a summary report of neotropical birds on the Willamette National Forest and their habitat associations. Thirty-five neotropical migrant species of concern listed in Sharp's report (1992) are found on the

Willamette National Forest. These species are associated with old growth, riparian, rocky cliffs, or grass habitats.

Mitigation measures within Alternatives A and B provide for retention of several ecosystem components important for these species: abundant down woody material; abundant snags; retention of large older trees; and retention of stream-side forests. No unique non-forest habitats will be altered with either action alternative.

Alternatives A and B would impact land and migratory birds by removing late successional habitat. While this would negatively impact more sensitive mature and late-successional forest-associated birds, for example Hutton's vireo, golden-crowned kinglet, hermit thrush, and Swainson's thrush, species that use the early seral stage such as winter wrens, American robin, and grouse would benefit. Snag habitat used by migratory birds such as western bluebirds or swallows will be lost in Alternatives A and B due to logging and roadside hazard tree removal. Snag creation activities will mitigate this habitat loss, but it will be several years before green trees left for snag retention become functional.

Alternatives A and B include prescribed low intensity forest underburns, scheduled to occur during the spring. This may impact some species of birds that are nesting in these mature stands. The fire could cause nesting failure in some cases, especially for those birds which nest relatively low to the ground such as hummingbirds, flycatchers, warblers, sparrows, and thrushes. Although juveniles of some species may not be able to fly large distances until late summer, many species are independent much earlier. Most neotropical migrants generally will fledge in June or July, although this can be later when second nest attempts are made.

Alternative C (No Action) does not proposed management activities at this time and therefore would not affect the habitat conditions of land and migratory birds. The existing vegetation conditions would continue along the natural succession pathways and bird populations would respond accordingly.

Management Indicator Species

Management Indicator Species (MIS) include the spotted owl, pileated woodpecker, marten, elk, deer, cavity excavators, bald eagles, fish, and peregrine falcons. All of these species occur in the Blue River Watershed.

- Impacts of the Trapper Project for the spotted owl, bald eagle, peregrine falcon, and fish can be found in Biological Evaluation in Appendix D. This project may affect spotted owls, and has no effect on bald eagles or peregrine falcons.

- Persistence for spotted owls, pileated woodpeckers, and marten were evaluated in the 1994 USDA USDI FSEIS (Appendix J2). That document concluded that persistent populations of these species would be maintained under the NWFP Standards and Guidelines, which are incorporated into both action alternatives of the Trapper Project. Populations of spotted owls will not be jeopardized by this project (USFWS 1998). Pileated woodpeckers and marten may be displaced by harvest activities in this area, but their populations throughout their range have not been identified as being in

decline, as indicated by their absence from the Regional Forester's Sensitive Species List (2001).

- Impacts to cavity excavators were evaluated previously under "Vegetation Pattern and Composition." Adequate large wood will be retained or created to provide habitat for these species.

- Impacts to deer and elk were evaluated for the Trapper Project. The results are shown in Table 4-7. The Trapper planning area contains three elk emphasis areas, but there are treatments that affect habitat quality in only one: Quentin. This area is rated as a "moderate emphasis" in the Willamette National Forest Plan. Current conditions were determined by calculating habitat effectiveness (HE) values for big game using a model called HEIWEST. Values were calculated for spacing of habitat, roads, cover, forage and overall habitat effectiveness (Table 4-7).

Table 4-7: Habitat Values For Roosevelt Elk in the Quentin Creek Emphasis Area.

Emphasis Area *(Rating)*	**HE Spacing**	**HE Roads**	**HE Cover**	**HE Forage**	**HEI Overall**
Quentin Creek *Moderate*	0.88 *min. 0.4*	0.36 0.37* *min. 0.4*	0.61 *min. 0.4*	0.32 *min. 0.4*	0.50 *min. 0.5*

Min. = minimum threshold value from the Willamette Forest Plan
* Value with Alternative C.

Use of the HEIWEST model assumes that effective elk management would also provide for the needs of black-tailed deer. Implementation of Alternatives A and B would improve the habitat value for forage, which is currently low. The 15% retention of green trees in units as well as prescribed broadcast and underburning would stimulate growth of grasses and forbs that exist under the canopy. This would not occur with Alternative C (No Action). The road closures in Alternative B helps to increase the availability of secure cover. Additional forage seeding that may be done with KV funding would further improve forage under both action alternatives.

- Impacts to management indicator fish are described in the Aquatic Resources area of this Chapter. There are no fish-bearing streams in the units proposed for treatment. Mitigation measures are prescribed to minimize downstream impacts.

Survey and Manage and Protection Buffer Wildlife Species

Survey and Manage and Protection Buffer Wildlife Species requirements were established in the Northwest Forest Plan (USDA USDI 1994, 2001). Protection for all located wildlife species would follow currently published management recommendations. The analysis of potential habitat for Survey and Manage and Protection Buffer Species was shown in Table 3-3 in Chapter III. Because potential habitat was present, surveys were conducted for *Pristiloma arcticum crateris, Megomphix hemphilli,* and red tree voles. Red tree voles were

found and protected with 10 acre no-harvest and no disturbance buffers. Protection for these species is outlined in Mitigation Measures described in Chapter 2 Table 2-7.

Cumulative Effects
Reasonably foreseeable activities that could cumulatively add to the impacts of this project to TES species, migratory landbirds, MIS, and Survey and Manage wildlife include future timber harvest, temporary road construction, road decommissioning, and wildlife habitat improvement projects. Approximately 600 acres of commercial thinning and 72 acres of regeneration harvest may occur over the course of the next 20 years in this planning area. This activity may be supported by less than one mile of temporary road construction. Habitat for late seral species may be removed or degraded with this activity, and habitat for early seral species may be created. The Blue River Watershed Access and Travel Management Plan (in draft) recommends 49 miles of road be decommissioned to improve watershed conditions for fish. The timing of that activity is unknown. It may take decades because of the limited availability of funding. This activity may result in more secure habitat for management indicator species, including elk. Habitat improvement projects planned to occur within the next 5 years include the creation of 1600 snags, supplementing forest habitat with 128 downed trees, and browse cutback on over 200 acres of young plantations. These activities will improve habitat for some of these species. Planned thinning in existing plantations is designed to encourage the development of diverse, late successional habitat in the long-term, which will benefit many of these species.

INDIRECT, CUMULATIVE, AND UNAVOIDABLE EFFECTS

The above analysis of cumulative effects considered past, present, and reasonably foreseeable future actions on these lands. This Environmental Assessment is tiered to the Final Environmental Impact Statement for the Willamette National Forest Land and Resource Management Plan as amended and the analysis of cumulative effects therein.

Potential changes in the physical and chemical nature of the earth's climate are likely to have impacts on the Nation's agriculture, forest, and related ecosystems. The extent and magnitude of these changes are uncertain at this time. There is a lack of sufficient information to predict and detect changes in health, diversity, and productivity of these systems due to global climatic change. The Department of Agriculture and Forest Service are researching issues of global climate change, and the implications for forest management activities. Current Forest Service direction states that NEPA disclosure documents at the regional or project levels are not the appropriate means for addressing the global climate change issues.

REQUIRED DISCLOSURES

There are no proposed activities on prime farmlands, rangelands, or in floodplains within the planning area, and therefore, there will be no adverse affects to these resources.

American Indian rights, including those covered by the American Indian Religious Freedom Act, would not be affected by the implementation of this project.

Proposed actions would be conducted in a manner that does not exclude persons (including populations) from participation in, deny persons (including populations) the benefits of, or subject persons (including populations) to discrimination because of their race, color, or national origin, as directed by Executive Order #12898.

The proposed action is not likely to adversely affect aquatic systems, recreational fisheries, or designated Essential Fish Habitat. The effects that are likely to occur are based on sound aquatic conservation and restoration principles for the benefit of recreational fisheries, as directed by Executive Order #12962. Since the project is not likely to adversely affect EFH, no further consultation under the Magnuson-Stevens Fishery Conservation and Management Act is required.

The U. S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, religion, sex, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited basis apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's Target Center at 202-720-2600 (voice and TDD). To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue SW, Washington, DC 20250-9410, or call 202-720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

Civil Rights/Environmental Justice

Civil Rights legislation and Executive Order #12898 (Environmental Justice) directs an analysis of the proposed alternatives as they relate to specific subsets of the American population, which include ethnic minorities, people with disabilities, and low-income groups. The Trapper project is not located in a minority community and would not affect residents of low or moderate income. Proposed actions would be conducted in a manner that does not exclude persons (including populations) from participation in, deny persons (including populations) the benefits of, or subject persons (including populations) to discrimination because of their race, color, or national origin.

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APPENDICES

Appendix A –Aquatic Conservation Strategy Objectives Analysis
Appendix B –Biological Assessment For Fish Species
Appendix C –Biological Evaluation for Botanical Species
Appendix D – Biological Evaluation for Wildlife Species
Appendix E – Monitoring Questions
Appendix F – Survey and Manage Species Analysis
Appendix G – Background and Detailed Methods for Implementation (Prescription) for Activities in Alternatives A and B
Appendix H – KV Projects
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Appendix J – REO Support Memo for Blue River Landscape Strategy

TRAPPER APPENDIX A

An Evaluation of the Blue River Landscape Project and Activities Authorized by the Trapper Environmental Assessment for Consistency with the Aquatic Conservation Strategy

Introduction

The Trapper Environmental Assessment analyzes a variety of activities that have been designed to further implement the Blue River Landscape Project. The Blue River Landscape Project is a landscape level design intended to meet the Aquatic Conservation Strategy (ACS), by integrating watershed restoration recommendations from the Blue River Watershed Analysis with the management emphasis outlined for the Central Cascades Adaptive Management Area. Following is a brief discussion of the ACS, and the Central Cascades AMA guidance from the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl - USFS, BLM 1994, (ROD), and a brief description of the Blue River Landscape Project.

The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. A goal of this strategy is to maintain a "natural" disturbance regime. In addition, management activities must comply with nine objectives that are included in the strategy. A variety of tactics to accomplish these goals and objectives are incorporated into four primary components. These components are:

Riparian Reserves
Key Watersheds
Watershed Analysis
Watershed Restoration

These four components, along with Late Successional Reserves, are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems. (Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl - USFS, BLM 1994, (ROD), pages B9-B12)

Adaptive Management Areas (AMAs) are landscape units that were designated to encourage the development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives. The overall objective for AMAs is to learn how to manage on an ecosystem basis in terms of both technical and social challenges, and in a manner consistent with applicable laws. In addition, AMA objectives include scientific and technical innovation and experimentation. Localized approaches that rely on the experience and ingenuity of resource managers and communities should be pursued, rather than the application of traditionally derived and tightly prescriptive approaches. (ROD page D1)

The Central Cascades Adaptive Management Area has several key emphasis items that the Blue River Landscape Project (Blue River Ranger District 1997) is designed to implement. These include:

- Intensive research on ecosystem and landscape processes and its application to forest management in experiments and demonstrations.

- Approaches for integrating forest and stream management objectives.

- Implication of natural disturbance regimes

- Management of young and mature stands to accelerate development of late successional conditions.

(ROD pages D12-13)

The emphases on integration of forest and stream management objectives and the implication of natural disturbance regimes are closely aligned with the goals and objectives of the Aquatic Conservation Strategy.

The Blue River Landscape Project has been designed in response to the goals and objectives of Central Cascades Adaptive Management Area. The landscape management strategy developed for the Blue River watershed represents an integrated, alternative strategy to achieve the aquatic conservation strategy objectives in the ROD. Consideration of landscape dynamics, watershed processes and species habitat needs have been blended to create a strategy that will over the long run lead to landscape patterns that approximate aspects of historical landscapes. Existing conditions and objectives strongly condition the degree to which historical patterns can be approximated. The strategy consists of the following components, each relevant to achieving one or more of the aquatic conservation strategy objectives:

1. A low-intensity timber management regime patterned after historical fire regimes - this results in lower timber harvest frequencies and intensities as compared to Matrix land management in the NWFP.

2. A small-watershed reserve system consisting of 200-600 acre blocks distributed across the watershed, which are intended to meet multiple objectives including maintenance of watershed processes and provision of interior late-successional habitat.

3. A stream corridor reserve system that is patterned differently than the default riparian reserve network in the ROD that better accommodates implementation of silvicultural treatments at spatial and temporal scales and patterns more similar to historical fires.
4. A large wood, coarse sediment and water quality source area management strategy that defines and identifies areas most likely to provide these materials to key stream reaches. These areas are mapped and specific prescriptive elements are provided to ensure continued delivery of these materials to streams.

5. Riparian and lower slope prescriptions including specific prescriptive elements to ensure retention of large trees and hardwoods in riparian and lower slope areas.

6. A timber harvest scheduling strategy that schedules timber harvest over the watershed to act more like a pulse disturbance and less like chronic disturbance.

7. A road restoration strategy, where all roads in the watershed have been evaluated for risks to the aquatic ecosystem, and restoration priorities have been established and integrated with the overall landscape management plan.

8. Watershed restoration, including a variety of restoration activities that are or will be implemented including: addition of large wood to stream channels, encouraging growth of large conifers near streams, and removal of human-placed migration barriers.

The Trapper Environmental Assessment proposes a variety of activities that have been designed to further implement the Blue River Landscape Project.

The Four Components

Riparian Reserves

The Northwest Forest Plan defined Riparian Reserves as "portions of watersheds where riparian-dependant resources receive primary emphasis and where special standards and guidelines apply" (ROD page B12). Riparian Reserves include those portions of a watershed directly coupled to streams and rivers, that is, the portions of a watershed required for maintaining hydrologic, geomorphic, and ecologic processes that directly affect standing and flowing water bodies such as lakes and ponds, wetlands, streams, stream processes, and fish habitats (ROD pgs. B-12 and B-13).

Riparian protection in AMAs should be comparable to that prescribed for other federal land areas. However, flexibility is provided to achieve these conditions, if desired, in a manner different from that prescribed for other areas and to conduct bona-fide research projects within riparian zones (ROD pg. D-9).

The Blue River Landscape Project utilized this flexibility and developed an alternative reserve system to help accomplish the ACS goals and objectives. Aquatic reserves were established to ensure that aquatic habitats and processes were protected, and that management for aquatic features was integrated with upslope management. Reserves took the form of small basin reserves intended to provide contiguous blocks of undisturbed habitat spread throughout the Blue River watershed, across elevation zones, and in the locations of highest aquatic diversity. Reserves also took the form of riparian corridors along both sides of all fish bearing streams. These reserves are essentially linear, and occupy the entire valley bottom and adjacent toe-slopes. These corridors connect aquatic and riparian areas throughout the watershed and link with small basin reserves. Originally, no additional reserves were established for non-fish bearing streams and intermittent streams. The combination of relatively low cutting rates, associated with long rotations, and generally higher green-tree retention levels was thought to provide sufficient large wood input, old forest habitat, and stream bank stability.

Adjustments were made to the basic strategy of aquatic reserves to offer additional protection to streams, to maintain the integrity of these habitats. These adjustments were initially made

on a project and stream basis, rather than a landscape basis, consistent with expectations in the original landscape plan. In later projects, linkages between stream segments and the source areas for cold water, large wood, sediment, and nutrients were explored on a drainage basis. This second iteration of the landscape plan is an attempt to apply some of what has been learned to date from projects that have already been implemented.

Streams within the watershed have been further evaluated to identify which reaches have the highest aquatic habitat value or potential value. The majority of streams in the Blue River watershed have high channel gradients and flow through narrow restricted valleys with little meaningful floodplain area. These streams possess a great deal of power and readily transport large wood and coarse sediment downstream on a semi-annual basis. Most of these streams have little opportunity to store these materials, or to use them to develop complex channels.

Areas with the highest potential to actually store large wood and coarse sediments were identified by evaluation of valley shape. This continued from the original landscape design element that identified unconstrained storage reaches and constrained transport reaches. Then, stream segments that flow through terrain with valley gradients approximately 3 percent or less were identified by evaluation of valley gradient on topographic maps. This process allowed us to focus more tightly on reaches that had both unconstrained valley forms and relatively gentle valley gradients. Reduced stream power in these reaches allow corresponding increases in the stream's ability to store and use large wood and coarse sediment.

After these high value stream reaches were identified and mapped, the surrounding landscape was evaluated and source areas for substrates, large wood, nutrients, and abundant cool flows were identified.

Criteria used to identify landscape blocks that contribute coarse substrate and large wood included blocks with substantial areas prone to land sliding, or blocks with areas situated on earth-flow terrain. Landslide potential was based on steepness of terrain and the presence of shallow soils. The rationale was that slope failure is a natural process for the recruitment of large wood and coarse substrates into these systems. Consequently, management to retain large wood on areas susceptible to failure will insure that large wood will be input to the system along with sediment.

Groupings of blocks with the characteristics needed to provide coarse substrate material and large wood that are located upstream of the low gradient reaches were identified as Substrate source areas, and management prescription elements were developed. These source areas were mapped in relation to the locations of the low gradient stream reaches, and those areas that could be linked to downstream low gradient reaches were identified. Prescriptions were developed for these areas to maintain and restore their ability to produce the materials needed downstream to facilitate the development and retention of desired habitat features in the low gradient reaches.

Prescription elements to be applied in Substrate source areas include:

- Fifty percent retention of evenly spaced mature trees within Blocks designated as Substrate Source Areas.

- Leave tree retention along streams within Substrate Source Areas will be those designated for that Landscape Area.
- Retention trees should not be allocated from elsewhere in the Block, but in addition to the green tree retention as described for that Landscape Area.
- Active earth flows are identified and dropped from the timber base.
- Within identified Landscape Blocks where quaternary earth flow terrain or glacial deposits occur adjacent to perennial and intermittent streams there will be a one-site tree height no harvest buffer.
- Depending on operability, slope, and topographic characteristics, the no harvest buffers may vary in width. Where possible the entire toe of the earth flow should be deferred from harvest in order to maintain the source of large wood.

Criteria used to identify landscape blocks that provide nutrient inputs to the system focused on blocks with substantial wetland habitats. Most wetlands in the Blue River landscape are hardwood dominated, and provide substantial amounts of leaf litter to these streams. Blocks that met this criterion were identified visually by comparing a block map with a GIS overlay of wetland areas in the watershed.

Criteria used to identify landscape blocks that provide substantial quantities of cool water included those blocks that have a relatively high contribution to base flows during the summer period. These blocks were identified by examining a GIS generated map of the watershed that rated the landscape into high, medium, and low potential, based on characteristics of aspect, elevation, precipitation, and soil depth. The presence of wetlands also indicates an ability to provide substantial flows of cool water, so blocks that possess either or both of these traits were selected as candidate source areas for cool water.

Groupings of blocks with the characteristics needed to provide nutrients and abundant cool water that are located upstream of the low gradient reaches were identified as Water Quality source areas, and management prescription elements were developed. These source areas were mapped in relation to the locations of the low gradient stream reaches, and those areas that could be linked to downstream low gradient reaches were identified. Prescriptions were developed for these areas to maintain and restore their ability to produce the materials needed downstream to facilitate the development and retention of desired habitat features in the low gradient reaches.

Prescription elements to be applied in Water Quality source areas include:

- No road construction, ground skidding, or other activity with the potential to affect surface and subsurface water flow should be permitted within two site-potential tree heights of wetlands, unless site specific analysis indicates that surface and subsurface flows will not be affected.
- All perennial streams with substantial flows will have a one site-potential tree height buffer where at least 70% canopy cover will be retained. On streams flowing east to west, the entire buffer will be situated on the south side of the stream. On streams flowing north to south, the buffer will extend for one half site-potential tree height on each side of the stream.
- Silvicultural treatments such as pre-commercial thinning, fertilization, and commercial thinning should be evaluated and utilized to accelerate development of large wood,

shade, and late successional stand structure in existing managed stands, adjacent to perennial streams with substantial flows.

- Use of ground based yarding equipment and road construction should not be permitted within one site potential tree height of wetlands, and use of this equipment or construction of new roads within an additional site potential tree height should only occur if site specific evaluation indicates that alteration of subsurface water patterns will not occur.

This process of identifying sources of large wood, substrate material, nutrients, and substantial base flows of cool water, as well as high value stream reaches, and the spatial relationship was developed during planning for the Wolf Mann DEIS and subsequent Trapper Environmental Assessment, and the prescriptive elements mentioned above were incorporated into the project design.

Key Watersheds

The Northwest Forest Plan created an overlay of Key Watersheds that are intended to provide refugia for at-risk stocks of anadromous salmonids and resident fish species. Refugia are a cornerstone of the conservation strategy for these species, consisting of watersheds that provide high quality habitat or are expected to provide habitat. Two different levels of protection, or tiers, are identified, as well as non-Key watersheds. (ROD page B19) The Blue River Watershed is considered to be a non-Key watershed.

Watershed Analysis

The Blue River Watershed Analysis (BRWA) was prepared by the Blue River Ranger District in 1996. Six primary issues were identified, leading a comprehensive list of Key Questions (BRWA pages 18-24). These issues are:

1. AMA/Research
2. Natural Disturbance
3. Mining
4. Roads
5. Past Harvest Activities
6. People related Issues

After the Key Questions were developed, information on both reference and current conditions was assembled and the results were interpreted.(BRWA Chapters 3&4) Based on the interpretation, findings and recommendations were developed in response to the Key Questions. (BRWA Chapter 5)

Of the original six issues, the Blue River Landscape Project addresses many of the recommendations developed for questions associated with AMA/Research, natural disturbance, roads, and past harvest activities. There are a wide variety of specific recommendations that apply at several different scales. But to summarize, these recommendations support development of a landscape design for the restoration of historic vegetative patterns and structures by mimicking or restoring natural disturbance processes. They also support an analysis of the road system that could be used to identify road restoration needs and priorities.

Specific recommendations are incorporated into the landscape design and the road restoration analysis for implementation where appropriate. None of the specific recommendations however, are precluded from implementation by the Blue River Landscape Project or the Trapper Environmental Assessment.

Watershed Restoration

The Blue River Landscape Project represents an integration of the emphasis items for the Central Cascades Adaptive Management Area (ROD pages D12-13) with restoration recommendations contained in the Blue River Watershed Analysis, Chapter 5.

Many of the recommendations in the Watershed Analysis, especially those associated with the issues of natural disturbance and past harvest, highlight the need to restore stand components, structures, and species diversity where they are outside the natural range of variability. Return of stand patch size and spatial arrangement to within the natural range of variability, as well as restoration of natural disturbance processes are also recommended. Re-establishment of connectivity between riparian and upland areas was a particular emphasis.

To address these recommendations in the context of a mandate to research and demonstrate at a landscape scale, the Blue River Landscape Project utilizes a variety of silvicultural treatments and scheduling strategies, extended over very long time frames.

Over time, vegetative patch size will be increased, reducing the current high level of fragmentation in the watershed. Levels and distribution of snags and down wood will move toward levels within the natural range of variability. Stand conditions will become more accommodating to the re-establishment of natural disturbance processes such as wildfire. Establishment of small basin reserves in critical headwall areas and stream confluence areas will allow re-establishment of connections between hill-slopes and riparian areas. Identification of source areas in the watershed for coarse wood, substrate materials, nutrients, and cool summer base flows, and managing them to preserve connections to stream reaches that can utilize these materials, will allow stream systems to rebuild high quality habitat by natural processes. This could result in reduced need to resort to expensive manipulative treatments to restore aquatic habitat.

The Blue River Watershed Analysis also identified a variety of restoration recommendations focused around the issue of roads (Chapter 5).

Recent research in the H.J. Andrews Experimental Forest and elsewhere in the Blue River watershed has illuminated the effects of roads on hydrology, geomorphology, riparian vegetation, sediment production, and the potential benefits of road restoration. A road restoration strategy has been developed and integrated with the overall landscape management strategy to maximize the effectiveness and efficiency of both strategies. Road restoration projects are developed based on the road and sub-watershed rankings and priorities established in the restoration strategy.

The road restoration strategy identifies priorities for road restoration based on relative risks to aquatic ecosystems. Each road was ranked by a set of aquatic risk indicators, assembled from a field inventory and from GIS analyses. Aquatic risk indicators were summed by dominant watershed processes (mass movement risk, fine sediment risk, hydrologic interaction risk), and

aggregated into one summary rating for each road. Ten sub-drainages within the watershed were also ranked in terms of aquatic ecosystem risks. A composite aquatic risk rating was formed based on both the individual road and the sub-drainage rankings.

Results of the analysis are displayed as a series of maps depicting road and sub-drainage rankings and restoration priorities, individual road and sub-drainage ranking spreadsheets, and analysis process documentation. Specific road projects are in various stages of planning, implementation, and completion. Initial monitoring efforts are underway to evaluate the effect of alternative restoration practices on stream channels.

Aquatic Conservation Strategy Objectives

The previous discussions highlighted the consistency of the Blue River Landscape Project, and projects such as the Trapper Environmental Assessment that are designed to implement the landscape design, with the four components of the Aquatic Conservation Strategy. The approach taken by the Blue River Landscape Project has been peer reviewed by the scientific community, and has been endorsed by the land management and regulatory agencies involved with the Northwest Forest Plan as "resting on a sound scientific base". (Memo, USDA, USDI, USDC, USEPA 2002)

This section will outline how the activities proposed in the action alternatives conform to the nine objectives of the ACS. The information presented is summarized from Chapter 2 and Chapter 4 of the Trapper Environmental Assessment, where greater detail can be found, if needed.

Objective #1

Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

The Blue River Watershed Analysis identified vegetative patchiness, or fragmentation, reduced levels of snag and down wood habitat, and connectivity between hill slopes and riparian habitat, as landscape scale features in need of restoration.

The Trapper Environmental Assessment responds to the concern for fragmentation by concentrating proposed regeneration harvest in the Mann Creek drainage, which currently is highly fragmented. Regeneration of stands in Blocks 20, 21, and 40 will place these blocks on a vegetative trajectory to be managed with surrounding blocks as a larger, less fragmented landscape in the future.

Reduced levels of snag and down wood habitat in all blocks proposed for harvest are addressed by retention of substantial numbers of trees for short and long term snag habitat, and down wood habitat. In the regeneration blocks mentioned above, 15% canopy closure will be retained, consisting of a spectrum of diameter and species classes. Canopy closures in Unit 20-2 will be increased to 50% to accommodate additional stems retained to insure slope stability in headwall areas. In addition, at least three of these sound trees per acre will be placed on the forest floor

within 5 years of harvest to restore the down wood component. Prescribed fire following harvest is intended to kill approximately 5-15% of the remaining live trees to provide short term snag habitat, leaving the remaining trees for longer term recruitment of snags.

It was during analysis of the Wolf Mann DEIS and subsequent Trapper Environmental Assessment that the concept of managing substrate and large wood, and water quality source areas, and their connectivity to important stream habitats was developed as an extension of the original landscape design. Harvest units in Blocks 20, and 21 were designed to comply with the prescriptive elements of water quality source areas, and are connected to important downstream habitats by protected aquatic corridor reserves.

Objective #2

Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

It was during analysis of the Wolf Mann DEIS and subsequent Trapper Environmental Assessment that the concept of managing substrate and large wood, and water quality source areas, and their connectivity to important stream habitats was developed as an extension of the original landscape design. (See detailed discussion under Riparian Reserves beginning on page 3 of this document) Harvest units in Blocks 20 and 21 were designed to comply with the prescriptive elements of water quality source areas, and are connected to important downstream habitats by protected aquatic corridor reserves. Harvest units in Blocks 20, 21, and 40 were designed to comply with the prescriptive elements of substrate and large wood source areas, and are connected to important downstream habitats by protected aquatic corridor reserves.

Critical headwater areas, stream confluences, and floodplains were excluded from consideration for harvest activities, as they are included in the Blue River Landscape Project's network of headwater and corridor reserves.

Objective #3

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

The supply of coarse substrate and large wood to streams from adjacent hill slopes is an important component of the processes that encourage development of healthy aquatic systems. Coarse substrate materials such as cobble and gravels are important aquatic habitat components, and large wood, in addition to being an important component on its own, often plays a key role in promoting the storage of coarse substrate materials. Harvest units in Blocks 20, 21, and 40 were designed to comply with the prescriptive elements of substrate and large wood source areas, and are connected to important downstream habitats by protected aquatic corridor reserves.

Other prescriptive elements apply to all harvest activities proposed in the Trapper Environmental Assessment. These include: retention of all trees providing bank stability, exclusion of all

identified actively unstable areas from harvest, and full suspension of trees where aerial yarding across streams occurs.

Roads are a known potential source of damage to stream habitat, where improper design or location, or inadequate maintenance, result in failures or roadway erosion. The Trapper Environmental Assessment addresses this concern, by minimizing road construction in all alternatives. The only new roads to be constructed are temporary roads located on stable ridge top locations, and all of these will be obliterated or stored following harvest activities. No stream crossings are proposed.

Reconstruction of unstable portions of the existing road network, replacement of undersized or old culverts, drainage improvement, and application of aggregate where necessary, will reduce chronic sources of low amplitude fine sediments from the existing transportation system, and the potential of road related slope failures that have increased the frequency of slope failure beyond the natural range of variability.

Objective #4

Maintain and restore water quality necessary to support healthy riparian, aquatic and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Harvest units in Blocks 20 and 21 were designed to comply with the prescriptive elements of water quality source areas, and are connected to important downstream habitats by protected aquatic corridor reserves. Harvest units in Blocks 20, 21, and 40 were designed to comply with the prescriptive elements of substrate and large wood source areas, and are connected to important downstream habitats by protected aquatic corridor reserves.

Critical headwater areas, stream confluences, and floodplains were excluded from consideration for harvest activities, as they are included in the Blue River Landscape Project's network of headwater and corridor reserves.

Reconstruction of unstable portions of the existing road network, replacement of undersized or old culverts, drainage improvement, and application of aggregate where necessary, will reduce chronic sources of low amplitude fine sediments from the existing transportation system, and the potential of road related slope failures that have increased the frequency of slope failure beyond the natural range of variability.

Objective #5

Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

The supply of coarse substrate and large wood to streams from adjacent hillslopes is an important component of the processes that encourage development of healthy aquatic systems. Coarse substrate materials such as cobble and gravels are important aquatic habitat components, and large wood, in addition to being an important component on its own, often plays a key role

in promoting the storage of coarse substrate materials. Harvest units in Blocks 20, 21, and 40 were designed to comply with the prescriptive elements of substrate and large wood source areas, and are connected to important downstream habitats by protected aquatic corridor reserves.

Roads are a known potential source of sediment to stream habitat, where improper design or location, or inadequate maintenance, result in failures or roadway erosion. The Trapper Environmental Assessment addresses this concern, by minimizing road construction in all alternatives. The only new roads to be constructed are temporary roads located on stable ridge top locations, and all of these will be obliterated or stored following harvest activities. No stream crossings are proposed.

Reconstruction of unstable portions of the existing road network, replacement of undersized or old culverts, drainage improvement, and application of aggregate where necessary, will reduce chronic sources of low amplitude fine sediments from the existing transportation system, and the potential of road related slope failures that have increased the frequency of slope failure beyond the natural range of variability.

In addition, Under Alternative B, the following activities would occur. 0 .4 miles of Road 1508-435 will be decommissioned, and 0.5 miles of Road 1508-426 will be stored, reducing the potential of the road surfaces to yield sediment and eliminating a chronic disturbance pathway from adjacent managed stands to the aquatic reserves along Wolf Creek and Blue River. And finally, 0.1 mile of Road 1500-613 will be stored resulting in removal of several headwater fills from a tributary of Mann Creek. This will eliminate need for constant monitoring and maintenance and will reduce the risk that sediment generated by crossing failure will be introduced into Mann Creek.

These road treatments are consistent with recommendations made in Section 4.3.3.3 of the Willamette National Forest Road Analysis Report. (Willamette N.F. 2003)

Objective #6

Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration and spatial distribution of peak, high, and low flows must be protected.

By furthering the implementation of a landscape design that is intended to restore vegetative structures and landscape patterns to within the range of natural diversity, the Trapper Environmental Assessment will continue the restoration of vegetative patterns within the Blue River Watershed under which historic stream flow conditions developed.

In the short term, potential adverse effects on the timing, magnitude, duration, and spatial distribution of peak and high flows will be minimized by managing the planning sub-drainages within the analysis area to Aggregate Recovery Percentage (ARP) levels that comply with the Willamette National Forest Land and Resource Management Plan (Willamette National Forest, 1990).

Objective #7

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

By furthering the implementation of a landscape design that is intended to restore vegetative structures and landscape patterns to within the range of natural diversity, the Trapper Environmental Assessment will continue the restoration of vegetative patterns within the Blue River Watershed under which historic stream flow conditions developed.

In the short term, potential adverse effects on the timing, magnitude, duration, and spatial distribution of peak and high flows will be minimized by managing the planning sub-drainages within the analysis area to Aggregate Recovery Percentage (ARP) levels that comply with the Willamette National Forest Land and Resource Management Plan (Willamette National Forest, 1990).

Floodplains and substantial wetland areas were excluded from consideration for harvest activities, as they are included in the Blue River Landscape Project's network of headwater and corridor reserves.

Harvest units in Blocks 20 and 21 were designed to comply with the prescriptive elements of water quality source areas. Smaller wetlands in Blocks 20 and 21 were either excluded from harvest activities altogether, or are protected by the prescriptive elements for water quality source areas.

Objective #8

Maintain and restore the species compositions 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.

By furthering the implementation of a landscape design that is intended to restore vegetative structures and landscape patterns to within the range of natural diversity, the Trapper Environmental Assessment will continue the restoration of vegetative patterns within the Blue River Watershed, including wetland areas.

It was during analysis for the Wolf Mann DEIS and subsequent Trapper Environmental Assessment that the concept of managing substrate and large wood, and water quality source areas, and their connectivity to important stream habitats was developed as an extension of the original landscape design. Harvest units in Blocks 20 and 21 were designed to comply with the prescriptive elements of water quality source areas, and are connected to important downstream habitats by protected aquatic corridor reserves. These prescriptions are designed to restore or maintain shade levels on streams with substantial flow, so that thermal regulation is maintained. Harvest units in Blocks 20, 21, and 40 were designed to comply with the prescriptive elements of substrate and large wood source areas, and are connected to important downstream habitats by protected aquatic corridor reserves.

Wetland areas, which are among the most important components in the landscape for nutrient filtering and cycling, were excluded from consideration for harvest activities, as they are included in the Blue River Landscape Projects network of small basin and corridor reserves. In addition, harvest units in Blocks 20 and 21 were designed to comply with the prescriptive elements of water quality source areas. Smaller wetlands in Blocks 20 and 21 were either excluded from harvest activities altogether, or are protected by the prescriptive elements for water quality source areas.

Objective #9

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

By furthering the implementation of a landscape design that is intended to restore vegetative structures and landscape patterns to within the range of natural diversity, the Trapper Environmental Assessment will continue the restoration of vegetative patterns within the Blue River Watershed under which habitats for native species developed.

How the Trapper Environmental Assessment responds to the concern for habitat fragmentation and levels of snag and down wood habitat was discussed under Objective #1

Discussion of how the Trapper Environmental Assessment addresses factors that affect stream and wetland habitats are discussed from a variety of viewpoints under Objectives #1 through #8.

In addition, this project complies with the Northwest Forest Plan, and all of its applicable standards and guidelines. Option 9 was expected to maintain and restore late-successional and old-growth forest ecosystems, and provide adequate viability levels for all late successional species including species listed in the FSEIS ROD Table C-3. The Watershed Analysis for the Blue River Watershed did not identify any need for increased protection above the ROD recommendations. Adequate amounts of snags and down woody debris will be provided on site. This project will not affect the amount or distribution of these habitats or species that use these habitats.

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TRAPPER APPENDIX B

File Code: 2670 Date: March 24, 2003

Route To: Files

Subject: Trapper Biological Assesement / Biological Evaluation

To: Cheryl Friesen – Team Leader

The purpose of this Biological Assessment / Biological Evaluation (BA/BE) is to document the potential effects to aquatic listed species (Endangered Species Act – ESA) and sensitive species (USFS Region 6 list). Two fish species that will be reviewed in the BA/BE are listed as "threatened" and they are: bull trout (*Salvelinus confluentus*), and spring chinook salmon (*Oncorhynchus tshawytscha*). There are currently no aquatic species on the sensitive list, vertebrate or invertebrate, that occur on the McKenzie River Ranger District. Therefore this BE/BA will only review potential effects to bull trout and spring chinook salmon.

Project Area

The actions proposed are located entirely within the Blue River watershed which is part of the Central Cascades Adaptive Management Area (CCAMA), as described in the Northwest Forest Plan.

Legal Description: T. 14 S., R. 5 E., Sections 26 through 36; T. 15 S., R 4 E., Section 1; T. 14 S., R. 4 E., Section 36; T. 15 S., R. 5 E., Sections 1, 2, 4, 5, 11, and 12.

Description of Alternatives

Alternative A

1. This Alternative uses timber harvesting, prescribed fire, and snag creation techniques to approximate the stand structures that resulted from historic stand-replacement fires and partial-stand replacement fires on 155 acres.

All harvest is located within Landscape Area 3 (one of three landscape areas identified by the *BRLS*). The general objective of Area 3 is to approximate key elements of infrequent, high severity (more than 80 % mortality) or mixed severity (more than 40% mortality) fires. The prescriptions for 6 of these areas will result in 15% canopy closure following all treatments. One area would result in 50% canopy closure (Table 1).

There are four stages to this action:

1. Harvest of majority of live green trees for timber products.
2. Understory burn to create some mortality in the retained green trees.
3. Girdle, top, or introduce fungus in retained green trees to create abundant standing dead trees.
4. Fell some of the retained live green trees for down woody material on the forest floor.

In every harvested area, there are two key prescriptive measures to create diversity. One includes retaining or creating an abundance of standing and down dead wood (i.e. snags and logs) following harvest. This would approximate the dead-wood structures historically left after fires on this landscape. The other is the creation of patchiness within each harvested areas. Some areas will be retained intact, while others will be turned into small openings or "gaps."

Table 1: Areas proposed for using timber harvest, prescribed fire, and snag creation techniques to approximate the structures that resulted from historic stand-replacing and partial stand-replacing fires in Alternative A.

Unit	Acres	Volume MBF	Remaining Live Canopy[1]	Snags Created/Retained /acre[2]	Under-burn? [3]	Logging System[4]	Temporary Roads Construct-ed (feet)
20-1, 20-2, and 20-3	36	1.695	15% -13 ac. 50% -23 ac.	20-1 = 16.9/8.3 20-2 = 2.8 20-3= 16.0	Yes	C--11 ac. H--25 ac.	200'
21-1	27	1.994	15 %	15.4	Yes	H	
21-2	46	2.744	15 %	15.4	Yes	H	
21-3	1	0.0236	15 %	15.4	Yes	G	
40-1	39	1.886	15 %	23.7	Yes	C--21 ac H--18	
Total	**149**	**8.343**					**200'**

Volume MBF = Millions of Board Feet

[1] Average across entire stand, including non-harvested retention areas, following timber harvest, prescribed burning, and snag creation.
[2] Approximately 240 lineal feet of down woody material will also be retained.
[3] Underburning occurs following timber harvest.

[4] Logging Systems – H = Helicopter; C = Cable; G = Ground Based

2. ***Prescribed burning would be used on 92 intact- forested acres to approximate the effects of historic low-severity fires.***

   Prescribed under-burning would occur in 2 forested stands within Landscape Area 3 (Table 2) that have not been previously harvested. The fires would be manually lit in the spring under damp conditions. This should result in a creeping ground-fire that occasionally lifts into the canopy. Approximately 10-20% of the tree cover may be killed from the heat and flames. All of the trees that are killed will be left in place to provide important future snag habitat.

Table 2: Areas proposed for using prescribed fire to approximate historic low-intensity fires in Alternative A.

Unit	Acres	Prescribed Fire Acres	Prescription
26	119	67	Low-severity fire. 10-20 % mortality in overstory trees
71	84	25	Low-severity fire. 10-20 % mortality in overstory trees

3. Approximately 200 feet of temporary spur road, located on a ridge top, and without stream crossings, would be constructed. Approximately 11.42 miles of existing roads would be maintained (Table 3).

Temporary road construction is minimal because helicopter logging systems are used for the majority of logging. Decisions for all temporary road construction must be informed by a Forest Roads Analysis, which was completed in 2003 (USDA 2003). The Analysis acknowledges the need for temporary road construction to support timber harvest activities (USDA 2003 pg. 40). Approximately 11.42 miles of road would be maintained, which includes roadside brushing, hazard tree removal, re-establishment of the roadway template and ditch functionality, culvert cleaning and replacement, site repairs to restore 12-foot minimum road width, and surface rock placement. The 1500, 1516, and 1517 roads were identified in the Forest Roads Analysis (USDA 2003) as Key Forest Roads.

Table 3: Road Maintenance associated with Alternative A.

Road	Miles Maintained	Maintained Roads Access These Activities	Key Forest Road
1500-612	1.40	Units 20-1, 20-2, 20-3 to 1500	No
1500-613	0.20	Units 20-1 to 1500-612	No
1500	3.2	Units 20-1, 20-2, 20-3 1500-612 to jct. W/ 1516	Yes
1517-655	1.05	Unit 21-2 to 1517	No
1516	2.84	Units 21-1, 21-2, 21-3 and 40-1	Yes
1517-560	0.24	Unit 40-1 to 1517	No
1517-565	0.19	Unit 40-1 to 1517-560	No
1517	1.5	Units 21-2, 21-2, 21-3, 40-1	Yes

4. An extensive landscape-level and stand-level monitoring strategy would evaluate the effects of these actions.

The *BRLS* has been approved as an administrative study. This includes a long-term, multi-scale monitoring plan to evaluate its effectiveness. Monitoring of previous projects (Blue River Face Timber Sale and N. Fork Quartz Timber Sale) that followed *BRLS* recommendations is occurring. Pre-treatment data has already been gathered for amphibians, trees, vascular plants, lichens, stream channel morphology, and stream temperature in this area. Numerous other on-going monitoring projects are occurring in the adjacent H.J. Andrews Experimental Forest. The varying scales of monitoring for the *BRLS* are shown in Table 4.

Table 4: Scales of Monitoring of the Blue River Landscape Strategy.

Spatial Scales of Monitoring	
Watershed Scale	**Small-stream scale**
Landscape Pattern	Stream-Breeding Amphibians
Northern Spotted Owl Demography	Stream Temperature
Economics	Riparian Vegetation
Subwatershed Scale	Channel Morphology
Stand and Landscape Structure	**Site Scale**
Stream Discharge	Stand Development
Social Acceptability	Non-vascular Plants

	Forest Regeneration
	Erosion
	Forest Regeneration

Alternative B

This alternative is the proposed action. All four of the actions described above for Alternative A would occur with this alternative (Table 5) with these modifications:

1. Road 1508-435 (0.37 miles) would be *decommissioned* (for definition see USDA 2003 pg. 63). This would include activities to make it hydrologically stable on the landscape (Table 6).
2. Road 1508-426 (0.5 miles) would be stored, which includes waterbarring, drain dips, and a berm to close it from vehicle traffic (Table 6).
3. Unit 21-2 would be logged using a combination of cable, ground, and helicopter systems (Alternative A used only helicopter systems for this unit). This type of logging would be facilitated by building 300 feet of temporary road that would be obliterated following logging.
4. Unit 40-1 would be logged using a combination of cable, ground, and helicopter systems. Compared to Alternative A, this Alternative would use less helicopter and more cable and ground systems. This would be facilitated by building 900 feet of temporary road that would be obliterated following logging.
5. Approximately 0.1 mile of Road 1500-613 would be stored following timber sale use. The storage would include water barring, re-vegetation, removal of stream crossing fills below Unit 20-2, and placement of a berm to close it to vehicle traffic (Table 6).

Table 5: Areas proposed for using timber harvest, prescribed fire, and snag creation techniques to approximate the structures that resulted from historic stand-replacing and partial stand-replacing fires in Alternative B.

Unit	Acres	Volume MBF	Remaining Live Canopy[1]	Snags Created/Retained /acre[2]	Under-burn? [3]	Logging System[4]	Temporary Roads Construct-ed (feet)
20-1, 20-2, and 20-3	36	1.695	15% -13 ac. 50% -23 ac.	20-1 = 16.9/8.3 20-2 = 2.8 20-3= 16.0	Yes	C--11 ac. H--25 ac.	200’
21-1	27	1.994	15 %	15.4	Yes	H	
21-2	46	2.744	15 %	15.4	Yes	H, C, G	300’
21-3	1	0.0236	15 %	15.4	Yes	G	
40-1	39	1.886	15 %	23.7	Yes	C, G, H	900’

						H--18	
Total	**149**	**8.343**					**1400'**

Volume MBF = Millions of Board Feet

[1] Average across entire stand, including non-harvested retention areas, following timber harvest, prescribed burning, and snag creation.
[2] Approximately 240 lineal feet of down woody material will also be retained.
[3] Underburning occurs following timber harvest.
[4] Logging Systems – H = Helicopter; C = Cable; G = Ground Based

Table 6: Road Maintenance and decommissioning associated with Alternative B.

Road Maintenance	**Miles Maintained**	**Maintained Roads Access These Activities**	**Key Forest Road**
1500-612	1.40	Units 20-1, 20-2, 20-3 to 1500	No
1500-613	0.20	Units 20-1 to 1500-612	No
1500	3.2	Units 20-1, 20-2, 20-3 1500-612 to jct. W/ 1516	Yes
1517-655	1.05	Unit 21-2 to 1517	No
1516	2.84	Units 21-1, 21-2, 21-3 and 40-1	Yes
1517-560	0.24	Unit 40-1 to 1517	No
1517-565	0.19	Unit 40-1 to 1517-560	No
Road Decommissioning	**Miles Treated**	**Treatment**	**Key Forest Road**
1508-435	0.37	Decommissioned to make it hydrologically stable	No
1508-426	0.5	Water barring, drainage dips, and berming	No
1500-613	0.1	Water barring, re-vegetation, removal of stream crossing fills, berming	No

Mitigation Measures

A number of mitigation measures accompany Alternatives A and B. Mitigation measures help define the alternatives by describing more specifically how the actions would be accomplished and how the resources would be protected. Table 7 shows the mitigation measures planned to protect soil and water, vegetation, Survey and Manage species, non-forest habitats, heritage resources, and wildlife. It also includes operating restrictions, safety measures, and mitigation measures for fire. Though they are not all mentioned here, all applicable Standards and Guidelines from the Willamette Forest Plan (as amended) would also be part of Alternatives A and B.

Table 7: Mitigation Measures Included in Alternatives A and B.

Mitigation Measure	**Objective**	**Location**	**How**
Soil and Water			
Retain trees on localized areas prone to streamside slides	Minimize risk of failure	21-1,2,3	Layout
Full suspension across class III and IV streams in skyline units	Protect water quality, stream bank integrity and channel bed	20-3, 21-2, 40-1	Contract
Construct one water bar for every 200 feet of cable corridors that have bare soils and with slopes less than 40 % along the corridor and two water bars along cable corridors that have bare soils for greater than 100 feet and with slopes greater than 40 % along the corridor.	To reduce the potential of erosion and fine sediment transport	All skyline units	Contract
Road construction and haul on native surface roads will be restricted to dry conditions, generally between July 15 through October 31. Hauling will be restricted when water pools on road surface.	To assure road stability, and limit sedimentation	20-3, 21-2, 40-1	Contract

Mitigation Measure	Objective	Location	How
All ground-based yarding will be restricted to dry conditions. Activities will not occur when water is pooling in skid trails and landings.	To protect site productivity, maintain soil hydrologic characteristic, minimize the potential of soil erosion and transport of fine sediments	All ground-based units	Contract
Use of ground-based equipment should be avoided within 100 feet of all stream channels.	To avoid sedimentation to streams	All ground-based units	Contract
Clean fill (soil or rock free of slash and debris) will be used for new temporary road construction and maintenance.	To assure stable road construction	21-2,40-1	Contract
All native surface roads shall have water bars constructed and shall be stored before seasonal shutdown.	To provide functional drainage and minimize potential road failures		Contract
Skid trails and landings within areas of regeneration harvest with ground-based equipment will be subsoiled. These trails and landings will have water bars constructed where necessary to provide effective drainage and shall be planted with conifers	To re-establish the natural hydrologic pattern and grow trees until the next entry in about 35 years	21-3	Contract
Locate designated skid trails to facilitate drainage following harvest.	To minimize disrupting drainage	21-3	Contract
Place weed-free straw bale sediment traps at class IV and larger streams during winter time haul.	To minimize the potential of soil erosion and transport of fine sediments into streams	Along all haul routes	Contract
Vegetation			

Mitigation Measure	Objective	Location	How
Ramaria stuntzii-fungus will have a 172-foot radius no harvest or ground disturbance buffer. No prescribed fire within buffered site.	To protect site from disturbance and maintain microclimate	21-2	Layout
Nephroma occultum-lichen will have a 172-foot radius no harvest buffer. No prescribed fire within buffered site.	Maintain substrate and microclimate	40-1	Layout
Mechanically remove noxious weeds in landings and along spur roads adjacent to units prior to project implementation.	Reduce the spread of noxious weeds in harvest units and along travel ways	20, 21, 71	Contract or District personnel
Minimize fireline construction; where it is necessary, use hand-construction rather than machine-constructed line.	Reduce the spread of noxious weeds	Entire project area	Fire Plan
All road construction and logging equipment will be pressure washed prior to working on the area.	Reduce the spread of noxious weeds	Entire project area	Contract
A weed free source of rock will be used for all road construction and maintenance.	Reduce the introduction of noxious weeds	Entire project area	Contract
Non-forested sites will be protected with a 50-200' no-disturbance buffer.	Maintain integrity of site	Entire project area	Layout
Heritage Resources			
All known significant heritage sites will be protected from harvest activities. Locate unit boundaries away from heritage resources. If any sites are found during future fieldwork or during activities, contract provisions will be used to protect these new findings until they can be evaluated.	Maintain the integrity of heritage sites	Entire planning area	Layout and contract

Mitigation Measure	Objective	Location	How
Wildlife			
If previously undocumented species of concern are found, project modifications will be made as needed.	Minimize effects to species of concern	Entire planning area	Contract
240 lineal feet (or ≥3 sound trees) per acre of class I-II down woody material will be left in each unit. All existing down logs regardless of decay class will be left.	To provide down wood habitat and emulate effects of residual material following fires	All units with harvest activity	Contract
Snag creation will occur August 1-January 15 (inoculation and girdling) and September 30 - January 15 (blasting). It will not occur during elk rifle season or the first week of deer season (See Appendix G for specifications for retained trees).	To provide snag habitat and emulate effects of residual material following fires	20-1 & 20-3 = 16.9 snags/ac 20-1 w/ 30% canopy retention = 8.3 snags/ac 20-2 = 2.8 snags/ac 21-1,2,4 = 15.4 snags/ac 40-1 = 23.7 snags/ac	Contract
Operating Restrictions			
Restriction on falling trees, ground-based yarding, and helicopter yarding between January 15 to July 31.	Minimize noise disturbance during nesting season of TES raptors	20-1,2,3 and 40-1	Contract

Mitigation Measure	Objective	Location	How
Restriction on falling hazard trees along haul routes April 1 to August 1.	Protect nesting primary and secondary cavity nesters	Haul Routes	Contract
Safety			
A flight safety plan, traffic management plan, and spill prevention and containment plan will be completed as part of contract preparation for the timber harvest and road work.	To maintain safe operations	Entire Project Area	Contract
Require fire equipment during logging operations.	Reduce risk of human caused fire	All units	Contract
Complete a risk assessment and contingency plan before ignition of prescribed fires.	To reduce the risk of fire escapement	All units	Burn Plan
Develop a prescribed fire safety plan.	Reduce risk to humans	All burn units	Contract Burn Plan
Fire Management			
Follow the Oregon Smoke Management Plan.	To control air pollution	All units	Burn Plan
Consult ODEQ to ensure burning will occur within the daily limit on tonnage of logging slash.	To control air pollution	All units	Burn Plan
Verify burn day upper wind direction and airshed condition at the burn site prior to burning.	To control air pollution	All units	Burn Plan
Follow Oregon Smoke Management Plan which encourages burning in spring when fuel moistures are higher.	To control air pollution	All units	Burn Plan

Riparian Management

The riparian management strategy within the *BRLS* includes a network of large, headwater aquatic refugia coupled with fish-bearing stream aquatic reserves. Intermittent and non-fish bearing perennial streams are not included in the reserve system. Interim riparian reserve boundaries in AMA's and non-AMA watersheds can be changed based on watershed analysis and site-specific analysis. The *BRLS* is an update to the Blue River Watershed Analysis that was complete in 1996. The IDT used the recommendations from the *BRLS* as a starting point, but fine-tuned the method of management for streams

in the Trapper planning area based on site-specific analysis. Specific prescriptions for individual streams were based on their location in relation to reserves and their potential to provide high quality fish habitat (Table 8).

The *BRLS* reserve system was designed to meet the objectives of the Aquatic Conservation Strategy over time on a landscape basis. Reserves, coupled with recommendations for long periods between harvest, would limit the extent of disturbance in any one decade. The location of retained trees in harvested areas would emphasize a connection between riparian and upland habitats. The *BRLS* meets the intent of the NWFP standards and guidelines for riparian reserves by providing protection of watershed and riparian processes. Additional detail on the riparian management strategy and its underlying assumptions can be found in the *BRLS* on the web at http://fsl.orst.edu/ccem/brls/brls.html.

Table 8: Stream and Riparian Management within Alternatives A and B.

Harvest Units	**Average Canopy Closure Following Harvest, Prescribed Fire, and Snag Creation**	**Streams in Unit**	**Prescription near Streams**
20-1	15% canopy closure	None	Not applicable
20-2	50% canopy closure	Stream 20A = Class III Stream 20B = Class III	Retain 50% canopy closure the same as the rest of the unit, and retain all bank trees[1]
20-3	15% canopy closure	Stream 20A = Class III Stream 20B = Class III Stream 20C = Class III	20A: Retain all bank trees and retain 30% canopy closure within ½ potential tree height (86') of the active channel. 20B: Retain all bank trees and leave 15% canopy closure. 20C: No harvest within ½ potential tree height (86') of active channel.
21-1	15% canopy closure	Seep	Retain trees within 25' of seep.

Harvest Units	Average Canopy Closure Following Harvest, Prescribed Fire, and Snag Creation	Streams in Unit	Prescription near Streams
21-2	15% canopy closure	Stream 21F = Class IV	Retain all bank trees and leave the same canopy closure as rest of unit (15%); limit disturbance; avoid ground-based logging within 100' of channel
21-3	15% canopy closure	None	None
40-1	15% canopy closure	Stream 40A = Class IV Stream 40B = Class III	Retain all bank trees and leave the same canopy closure as rest of unit (15%).
Prescribed Fire Units:			
26	Understory Burn	Stream 26A = Class IV Stream 26B = Class III Stream 26C = Class IV	Understory burn through creeks. Avoid installing control lines w/ground-based equipment w/in 100' of all streams.
71	Understory Burn	Stream 71A, B, C, D = Class IV	Understory Burn through creeks. Avoid installing control lines w/ground-based equipment w/in 100' of all streams.

1 Bank Trees = Trees that have the potential to provide stability to the stream bank through their root structure, usually all trees within 25'.

Alternative C – No Action

Alternative C, the no action alternative, would not implement recommendations from the *BRLS*. No timber harvest or project-related road maintenance would occur; no road construction, prescribed burning, or monitoring would occur, and on-going studies would be interrupted. This alternative serves as a baseline from which to understand the changes associated with the action alternative.

Effects Analysis

Changes to the sediment regime, stream temperatures, peak flows and large wood supply all have potential to affect aquatic habitat and fish populations.

Sediment

Sediment entering stream channels can affect channel shape and form, stream substrates, the structure of fish habitat, and the structure and abundance of fish populations. Substantial increases in sediment supply from mass movement or surface erosion, bank destabilization, or in-stream storage losses can cause aggradation, pool filling, and a reduction in gravel quality.

Potential for surface erosion is directly related to the amount of bare compacted soil exposed to rainfall and runoff. Road surfaces, landings, skid trails, ditches, and disturbed harvest areas can contribute fine sediments to stream channels. Not all hillside sediment reaches the stream channel, but roads and ditches form important pathways.

In Alternatives A and B, temporary roads will be built. Sediment routing would only occur during the short life of the road, and increases in sediment are unlikely due to its ridgetop location and absence of stream crossings. Maintenance activities on 11.42 miles of existing permanent roads in Alternatives A and B could deliver small amounts of sediment in the short-term. The long-term effect would be a reduced chance of catastrophic road failure, which could deliver large amounts of fine sediment from road fills. The benefits of road maintenance would not occur under Alternative C.

Since the potential for slope failure is unlikely in Alternatives A or B, it is unlikely that there would be any adverse affects to stream channels such as pool filling or aggradation with its implementation.

No fish-bearing streams exist near areas proposed for prescribed fire. There are intermittent or seasonal streams in these units, and the proposal would allow prescribed fire to burn through the riparian areas. Potential effects to these small streams would be a short-term increase in nutrients delivered from adjacent slopes. Potentially, a few small openings created by the fire in the canopy would increase the stream surface area exposed to sunlight, increasing primary production that would provide more algae/diatoms to grazing aquatic insects. However, these potential effects will most likely not be realized because the fires would be set in the spring when soils are moist, and mortality will be difficult to achieve. The riparian areas will be especially moist and this will make it even more difficult to achieve mortality objectives.

Neither of the action alternatives would have direct or indirect effects on fish-bearing streams or fish. The action alternatives with prescribed fire have the potential to beneficially affect small streams due to increased nutrients, but these benefits would most likely not be realized in the downstream fish-bearing areas due to the distance of proposed fires from fish-bearing streams, and the unlikelihood of achieving mortality objectives due to the need to burn in the spring. Retention trees included as a mitigation

measure in alternatives A and B (Table 8) should prevent any adverse cumulative effects from occurring.

Temperature

Temperatures in Cook, Quentin, and Mann Creeks are currently below the designated 64 degree maximum. Resident fish are the primary determinant of water temperature needs for beneficial uses in this area. Both action alternatives retain adequate stream shading that minimizes the potential for stream temperatures to rise above the standard. Stream temperatures will be maintained in important rearing areas of the downstream fish-bearing reaches with either action alternative. Alternative C will maintain shade along stream channels.

Peak Flows

Substantial increases in peak flows or the frequency of channel modifying flows from increased snowmelt or rain-on-snow events can cause increased bed scour or accelerated bank erosion. This can have negative effects on fish and fish habitat by destabilizing stream bedloads or inundating spawning gravels with fine sediment. Alternatives A or B are not expected to affect peak flows. Implementation should not result in channel changes that would affect fish habitat. Alternative C (no action) would maintain current conditions and would not affect fish or fish habitat.

Hydrological analysis found that Aggregate Recovery Percentages (ARP) are above recommended mid-point values. Based on this analysis, it is not likely that any alternative will result in significant increases in peak flows. Consequently, shallow gradient stream reaches where accumulation of large wood, gravel, and cobble size sediments is expected over time and are likely to retain these beneficial materials and the channel and habitat complexity that they provide.

Large Wood

Large woody material plays an important role in controlling stream channel morphology, in regulating the storage and routing of sediment and particulate organic matter, and in creating and maintaining abundance of salmonids closely linked with abundance of woody debris, particularly in winter. Large woody material creates a diversity of hydraulic gradients that increases microhabitat complexity. This complexity supports the coexistence of multi-species salmonid communities. Loss of stable in-stream woody material by direct removal, debris torrents, or gradual attrition as streamside forests are converted to managed stands of smaller trees will contribute to the loss of sediment storage sites, fewer and shallower scour pools, and less effective cover for rearing fish. Neither action alternative would directly affect the large wood supply to fish-bearing streams. There are no fish-bearing streams in the areas proposed for harvest or underburning.

Areas adjacent to non-fish bearing and intermittent streams would be harvested in Alternatives A and B. There could be indirect effects to fish-bearing streams from interception of the supply of large wood that could migrate to the downstream fish-**{** XE "fish" **}**bearing reaches. These effects are difficult to predict and measure since the

events that mobilize large wood are also difficult to predict. These indirect effects are not expected to be adverse because areas with potential to provide large woody debris inputs to riparian habitat are protected in no-harvest buffers on earthflow terrain, and on landslide prone terrain, at least 50% canopy is retained to provide large woody material in the future. The assumption that this is adequate is being monitored in the *BRLS* Administrative Study.

Alternatives A and B follow recommendations from the *BRLS* for maintenance of an aquatic reserve system. This system protects several small basins to meet aquatic conservation strategy objectives and to provide contiguous areas of undisturbed habitat for late successional species. One management objective for aquatic reserves is to maintain or establish late-successional forest conditions. The aquatic reserves also include riparian corridors along both sides of all fish-bearing streams. The reserves are essentially linear and occupy the entire valley bottom and adjacent toe slopes. These corridors connect aquatic and riparian areas throughout the watershed and link with the small basin reserves. Along Blue River a streamside reserve was delineated to run from Road 15 on the northwest to two tree-heights on the southeast side of the river. A one tree-height reserve along constrained channels (most of the fish-bearing streams), and a two tree-height reserve along unconstrained segments was designated for all other fish-bearing streams.

With these recommendations in place, neither action alternative would have a negative direct, indirect, or cumulative effect on the recruitment of large wood to fish-bearing streams in the watershed. The aquatic reserve system combined with the retention guidelines, low frequency harvest, and site specific increases in retention trees to ameliorate fish habitat concerns, will maintain the supply of large wood to streams in the watershed.

Aquatic Conservation Strategy Objectives

Both action alternatives meet the nine aquatic conservation strategy objectives from the Northwest Forest Plan. Following recommendations from the *BRLS*, the underlying assumption is that the more the future landscape resembles the historical landscape, the higher the likelihood of retaining native habitats, species, and ecological functions.

To meet the aquatic conservation strategy, the *BRLS* recommended a system of aquatic and small basin reserves and a watershed restoration program. The *BRLS* also recommended desired landscape features and prescriptive elements intended to achieve the desired features.

The objectives were first analyzed on a landscape level with the *BRLS*. Desired landscape features were identified that would be important in meeting the objectives; then the actions in Alternatives A and B were evaluated for their ability to meet this desired condition.

Cumulative Effects

Reasonably foreseeable activities that could cumulatively add to the impacts of this project to water quality/aquatic resources include future timber harvest, temporary road

construction, road maintenance, and road decommissioning. Approximately 600 acres of commercial thinning and 72 acres of regeneration harvest may occur over the course of the next 20 years in this planning area. This activity may be supported by less than one mile of temporary road construction. The Blue River Watershed Access and Travel Management Plan (in draft) recommends 49 miles of road be decommissioned to improve watershed conditions. The timing of that activity is unknown. It may take decades because of the limited availability of funding. Key roads identified in the Forest Roads Analysis will continue to be maintained to specified standards. The timber harvest and temporary road construction will likely include mitigation measures similar to the Trapper project, resulting in no significant impacts to sediment input, mass wasting, water quantity and peak flows, temperature, or large wood availability for fish habitat. Continued road maintenance and potential road decommissioning may improve watershed conditions.

Endangered Species Act Effects Determination

There are no bull trout or spring chinook salmon located in the Blue River watershed upstream of Blue River Dam (a flood control dam). The Willamette Basin Level One Interagency Consultation Team (Level One Team) has agreed that since no listed fish species occur upstream of the dam no consultation is necessary. This is due to the presence of the dam and reservoir. The dam does not have fish passage facilities and therefore no bull trout or chinook can access the upper watershed. The reservoir also acts as a "sink" which prevents the majority of effects to aquatic physical habitat attributes from being realized downstream of Blue River dam. In addition, as documented in the "effects analysis" of this BA/BE, important aspects of fish habitat (sediment, temperature, peak flows, and large wood) will not be negatively affected due to mitigation measures prescribed for the proposed action (see Tables 7 and 8).

Since bull trout and spring chinook salmon do not occur in the Blue River Watershed upstream of Blue River Dam, there will be **no effect** to these species from project activities. At the time of this report writing there are no aquatic species on the sensitive list, vertebrate or invertebrate, that occur on the McKenzie River Ranger District.

Critical Habitat

Critical habitat has not been designated for bull trout or chinook upstream of Blue River Dam. Since critical habitat has not been designated above the dam, and because the reservoir and dam act as a sink/barrier to physical effects to habitat downstream of the dam, this action **will not destroy or adversely modify critical habitat if/when it is designated**.

In addition, on March 11, 2002 NMFS announced that it is seeking judicial approval of a consent decree withdrawing its current critical habitat designations for 19 salmon and steelhead populations. The spring chinook that inhabit the McKenzie River are included

in this withdrawal request. The NMFS will undertake a new, more thorough analysis consistent with a recent decision of the United States 10th Circuit Court of Appeals and will proceed to re-issue critical habitat designations after the analysis is complete. The authorities of the ESA (Sections 4, 7, 9, and 10) that NMFS primarily relies upon for its enforcement and protection measures will remain in effect.

Magnuson-Stevens Act and Essential Fish Habitat

Essential Fish Habitat (EFH) has been designated in the McKenzie River sub-basin under the Magnuson-Stevens Fisheries Conservation Act (MSA). Typically the upstream extent of EFH ended at impassible dams. For example, EFH was designated in the South Fork McKenzie up to Cougar Dam. Blue River Dam is an impassible barrier for fish, however the dam was not specifically designated as a barrier by the Pacific Fisheries Management Council (PFMC) even though the EFH maps limit the designation to stream reaches below Blue River Dam. The Willamette National Forest has requested that NMFS make their designations consistent.

Given the retention guidelines, and since increased retention was prescribed in areas where stability was a concern and where it was important to retain trees in areas that would provide large wood to downstream fish bearing channels, no mass soil movement is expected and the potential for slope failure is unlikely. These actions maintain stability in a way that would not have occurred during natural disturbances (ie. fire). Historically, fire would not have discrimintated between areas with different risks for erosion, mass movement, or sedimentation. Where such areas occupy steeper slopes, fires may have typically burned with greater severity, making the green tree retention less appropriate from a fire regime perspective. Given the increased retention on these areas, it is expected that the sediment regime will be maintained within the range of natural conditions for the watershed. Therefore there **will not be an adverse affect to EFH.**

/s/Ramon Rivera

RAMON RIVERA

District Fisheries Biologist

References

USDA Forest Service. 1997. Blue River Landscape Strategy.
USDA Forest Service. 2003. Willamette National Forest Roads Analysis.

TRAPPER APPENDIX C

Biological Evaluation for Sensitive Plant Species for the Trapper EA

September 24, 2002

I. Introduction

Purpose:

The purpose of this Biological Evaluation (BE) is to review the Trapper Project in sufficient detail as to determine whether the proposed action will result in a trend toward Federal listing of any sensitive plant species.

Plant Species of Concern:

Current management direction mandates conservation of several categories of rare plants on the Willamette National Forest. Protection of federally listed Threatened and Endangered species is mandated by the Endangered Species Act. No federally listed Threatened, Endangered, or proposed plants, nor suitable habitat for these listed plants are known to occur in the project area. Sensitive species are protected by USDA Forest Service regulations and manual direction (FMS 2672.4).

Prefield reviews were conducted to determine which sensitive species are known from the project area or have suitable habitat present and potentially occur in the project area. Results show no known occurrences of sensitive plant species within the project area. There is potential habitat for 15 sensitive species (see Appendix A).

II. Description of Proposed Project

Three alternatives (two action and one no-action) are described in detail in the Trapper Project EA. Activities include timber harvest, road maintenance, road decommissioning, and prescribed burning.

Location Description:

The proposed projects for the Trap[per EA are located in the in the Blue River Watershed on the Willamette National Forest, Oregon. The legal location for the project is T14S, R04E and R05E, Sections 1, and 25-36 and T15S, R05 Sections 1, 2, and 4-6.

III. Existing Environment

Survey Results:
Field surveys using the intuitive-control method were conducted from August to September 1998, July of 1999, and July of 2001. Concentrated surveys were conducted in areas of suspected suitable habitat for sensitive plants. No sensitive plant species from the 2001 Regional Forester's Sensitive Plant List for the Willamette National Forest were located during the surveys.

IV. Impacts of the Proposed Project

Direct and Indirect Impacts:
This project will cause no direct or indirect effects to sensitive plants because no sensitive plants were observed during surveys of the project area.

Cumulative Effects:
There are no cumulative effects to sensitive plant species because future projects will follow established protocols to locate and protect documented locations.

Compliance with management direction
This Biological Evaluation has documented the completion of the steps outlined in the Regional Office directive in the 2670 section of the Forest Service Manual.

V. Determinations

It is my determination that selection of any of the alternatives will have no effect on sensitive plants or their associated habitat because no sensitive plant species occur within the Trapper project area.

In the event that a sensitive plant population is discovered after the timber sale is sold, Contract Clauses C9.52 and C6.25 will be enforced and project modifications may result.

Prepared by: /s/ Susan Stearns, District Botanist

Reviewed By: /s/ Cheryl Friesen, Resources Staff

Sensitive Plan BE Appendix A

Willamette National Forest 2001 Sensitive Species List

Species	Habitat Present	Species Present
Agoseris elata	Y	N
Arabis hastatula	N	N
Arnica viscose	N	N
Asplenium septentrionale	Y	N
Aster gormanii	Y	N
Botrychium minganeses	Y	N
Botrychium montanum	Y	N
Botrychium pumifola	N	N
Calamagostis breweri	N	N
Carex livida	N	N
Carex scirpoidea var. stenochlaena	N	N
Cimicifuga elata	Y	N
Coptis trifolia	Y	N
Corydalis aqua-gelidae	Y	N
Eucephalus vialis	Y	N
Frasera umpquaensis	N	N
Gentiana newberryi	N	N
Iliamna latibracteata	Y	N
Lewisia columbiana var. *columbiana*	N	N
Lycopodiella inundata	N	N
Montia howellii	N	N
Ophioglossum pusillum	Y	N
Pellaea andromedaefolia	N	N
Polystichum californicum	N	N
Potentilla villosa	N	N
Romanzoffia thompsonii	N	N
Scheuchzeria palustris var. *americana*	N	N
Sisyrinchium sarmentosum	Y	N
Utricularia minor	Y	N
Wolffia borealis	Y	N
Wolffia columbiana	Y	N

TRAPPER APPENDIX D

WILDLIFE BIOLOGICAL EVALUATION

TRAPPER PROJECT

12-18-02

MITIGATION MEASURES – INCLUDED IN ALTERNATIVES A AND B

The following information should be included in the Environmental Assessment, timber sale contract, road contract, and burn plans. Apply seasonal operating restrictions as described in the following chart. If monitoring determines pairs to be non-nesting, the restrictions may be lifted.

Operating Restrictions

Species	Activity Type and Area of Restriction	Seasonal Restriction
Northern Spotted Owls	Fire: southern half of 71	March 1-July 15
TES raptors	Falling trees, ground-based & skyline yarding: 20, 40 Helicopter yarding: 20-1, 20-2, 20-3, 21-1, 21-2, 40-1 Fire: no restrictions	January 15- July 31

Units used were those shown on the map in the EA, and not the logging setting map. If units were not broken down into subunits, then the restriction applies to all subunits. There are also seasonal restrictions on road reconstruction and hazard tree falling.

If changes are made to this project to include additional blasting not previously planned, additional seasonal restrictions may be required, and the wildlife biologist shall be notified.

If Threatened, Endangered, or Sensitive (TES) wildlife species are found in future field work or during activities associated with logging or prescribed fire, and potential

for adverse effects exists, project modifications will be pursued and Contract Provision C6.25 will be implemented.

From 3-24 trees/acre will be retained for snag habitat in units 20, 21, and 40. This will provide adequate numbers of large snags in the units to benefit Pacific fringe-tailed bats, peregrine falcons, and California wolverines, which may be present in the area, as well as cavity nesting species by improving or protecting habitat quality for them or their prey. All existing green trees will be left within forest patches that are retained under green tree retention guidelines in order to provide the microclimate that is appropriate for various organisms that use this substrate.

Retention of the prescribed amount of down woody material at the rate of 3 trees/acre or approximately 285-310 linear feet/acre will benefit Oregon slender salamander, Baird's shrew, Pacific shrew, California wolverine, and northern spotted owls, if not directly, then by being beneficial to their prey.

Large hollow trees shall be protected in sale units, which provide valuable habitat for Pacific fringe-tailed bats.

Hauling on native surface roads should not occur during wet weather.

Road construction and reconstruction will occur during dry weather using clean dry fill materials.

SUMMARY OF DISCUSSION

The northern spotted owl is known to occur in the Planning Area and this project may affect spotted owls. All alternatives are consistent with the ROD. Formal consultation with the U.S. Fish & Wildlife Service for effects to the northern spotted owl was initiated in 1998. The Biological Opinion dated September 29, 1998 determined that implementation of the FY 1999 Habitat Modification Projects in the Willamette Province, which includes the Trapper Project, is not likely to jeopardize the continued existence of the spotted owl or result in the destruction or adverse modification of spotted owl critical habitat. Seasonal restrictions as shown in the table above are required to comply with this Biological Opinion.

Stream and riparian protection will protect Cascade torrent salamanders and harlequin ducks, which have potential to be present in the planning area, as well as their habitat. The project plans will also protect habitat quality for their prey.

INTRODUCTION

This analysis addresses the potential effects of Alternatives A, B, and C (No action) of the Trapper Project on Threatened, Endangered, or Sensitive (TES) species listed in the U.S. Forest Service Region-6 Sensitive Species List dated November 28, 2000 (Forest Service Manual [FSM] 2672.4), which are documented or suspected to occur

on the Willamette National Forest. This determination ensures compliance with the provisions of the Endangered Species Act (ESA) of 1973, Public Law 93-205 (87 Stat. 884), as amended. The ESA requires Federal agencies to ensure that all actions which they "authorize, fund or carry out" are not likely to jeopardize the continued existence of any TES species. Agencies are also required to develop and carry out conservation programs for these species.

Sensitive species on the current Forest Service Sensitive Species List are given the same management consideration as Federally listed species, with the exception that consultation with the U.S. Fish & Wildlife Service is not required. All actions must be taken to ensure that management activities do not jeopardize the continued existence of sensitive species or result in an adverse modification of their essential habitat (FSM 2670.3, R-6 Supp.41, 4/87).

PROJECT LOCATION AND DESCRIPTION

The Trapper Planning Area is located on the McKenzie River Ranger District. The predominant forest type within the area is mature and old-growth Douglas-fir at the lower elevations, and true firs above 4000 feet. The stands in the Planning Area consist of mature forest and some patches of old-growth. More detailed information about stand types is located in the Trapper Project Analysis File.

Alternatives A and B include using harvesting techniques to approximate the effects of historic stand-replacement fires and partial-stand replacement fires on 132 acres and 23 acres, respectively. Prescribed burning is proposed on 92 acres to approximate the effects of historic low severity fires. An extensive landscape and stand-level monitoring strategy would evaluate the effects of these actions. Alternative A includes new temporary road construction of about 200 feet in block 20-2, maintenance, and hazard tree removal to access units. Alternative B includes new temporary road construction of about 1200 feet, maintenance, and hazard tree removal to access units, and approximately 1.0 miles of decommissioning or closure of existing permanent roads. Alternative C is the No Action Alternative.

RISK ASSESSMENT PROCESS

In addition to the following documents, personal knowledge of the area, professional judgment, and other studies were used to assess the risk of a proposed project adversely affecting a Threatened, Endangered, or Sensitive species.

- Spotted Owls: "A Conservation Strategy for the Northern Spotted Owl", Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl, Thomas et. al, May 1990 (ISC Report).
- Final Environmental Impact Statement on Management for the Northern Spotted Owl in the National Forests, USDA, January 1992.
- U.S. Fish & Wildlife Service Formal Section 7 Consultation on the Willamette Province 1999 Habitat Modification Projects (September 29, 1998).

- Bald Eagles: Risk Assessment Guidelines, 2673-32--3, 10/89 Supplement to the Regional Guide.
- U.S. Department of Interior, Fish and Wildlife Service, 1986. Recovery Plan for the Pacific Bald Eagle. U.S. Fish and Wildlife Service. Portland, Oregon. 160 pp.
- American Peregrine Risk Assessment Guidelines, 2673-32--3, 10/89 Supplement. Falcons: Pacific Coast Recovery Plan for the American Peregrine Falcon, USFWS, 1982.
- Other Threatened or Sensitive Species: Risk Assessment Guidelines, 2673-32-3 10/89, Supplement to the Regional Guide.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

1. SUMMARY

This Biological Assessment consists of a 6-step process to identify Threatened, Endangered, and Sensitive (TES) wildlife species associated with the project area, and evaluates effects and impacts the project may have on these species. The six steps of the Biological Assessment are as follows:

1. **Pre-field Review**: Review of existing documented information.
2. **Field Reconnaissance** or survey of the project area. For some species, this may include the proposed unit locations. Other species' needs require field reconnaissance of a specific area around unit locations, while others require evaluation of a larger area which could extend outside the Planning Area boundaries.
3. **Conflict determination**: Evaluation of the impacts of the project to local populations of TES species.
4. **Analysis of Significance** of the project's effects on local and entire populations of TES species.
5. ***Biological Investigation** is conducted if Step 4 cannot be completed due to lack of information.
6. **Conferencing or Informal/Formal Consultation with USFWS** is initiated at the appropriate stage as outlined in FSM 2673.2--1, or otherwise arranged through formal channels.

* Step #5 pertains only to federally listed species and will not be shown in Tables 1 and 2 except when applicable.

Table 1: Biological Evaluation process for wildlife species for the Trapper Project.

	Step #1	Step #2	Step #3	Step #4	Step #6
SPECIES	**PREFIELD REVIEW; HABITAT PRESENT?**	**FIELD REVIEW**	**CONFLICT DETERMI-NATION**	**ANALYSIS OF SIGNIFICANCE**	**FWS REVIEW**
Oregon Slender Salamander	Yes	Habitat reviewed	No conflict	May impact [1]	Not required
Cascade Torrent Salamander	Yes	Habitat reviewed	No conflict	May impact [1]	Not required
Foothill Yellow-legged Frog	No	Habitat reviewed	No conflict	No impact	Not required
Oregon Spotted Frog	No	Habitat reviewed	No conflict	No impact	Not required
Northwestern Pond Turtle	No	Habitat reviewed	No conflict	No impact	Not required
Least Bittern	No	Habitat reviewed	No conflict	No impact	Not required
Bufflehead	No	Habitat reviewed	No conflict	No impact	Not required
Harlequin Duck	No	Habitat reviewed	No conflict	No impact	Not required
Northern Bald Eagle	No	Habitat reviewed	No conflict	No effect	Not required
American Peregrine Falcon	Yes	Completed and will continue	No conflict	No impact	Not required
Yellow Rail	No	Habitat reviewed	No conflict	No impact	Not required
Black Swift	No	Habitat reviewed	No conflict	No impact	Not required
Tri-colored Blackbird	No	Habitat reviewed	No conflict	No impact	Not required
Northern Spotted Owl	Yes	Completed and will continue	No conflict	May affect, not likely to adversely affect	FY99 Programmatic Consultation
Baird's Shrew	Yes	Habitat reviewed	No conflict	May impact [1]	Not required
Pacific Shrew	Yes	Habitat reviewed	No conflict	May impact [1]	Not required
California Wolverine	Yes	Habitat reviewed	No conflict	May impact [1]	Not required
Pacific Fisher	Yes	Habitat reviewed	No conflict	May impact [1]	Not required

Pacific Fringe-tailed Bat	Yes	Habitat reviewed	No conflict	May impact [1]	Not required
Townsend's Big-eared bat	Yes	Habitat reviewed	No conflict	May impact [1]	Not required
Canada Lynx	No	Habitat reviewed	No conflict	No impact	Not required

[1] May impact individuals, but will not trend species towards federal listing.

Other sensitive species on the R-6 List were considered, and it was determined that their habitat needs were outside the character of this sale area.

Note: The "Pre-field Review" applies to the entire Planning Area. For spotted owls, an area of at least 1.2 mile outside units of all action alternatives was considered. Effects analyzed were for Alternatives A and B.

If the no action alternative (Alternative C) is not specifically mentioned, there are no effects/impacts associated with that alternative. No habitat will be altered and no disturbance will occur. Watershed restoration benefits that may occur from road decommissioning in Alternative B would also not occur.

DISCUSSION

AMPHIBIANS AND REPTILES

Oregon Slender Salamander (*Batrachoseps wrighti*)

Habitat: This salamander is found under loose bark and moss in mature and second growth Douglas fir forests. It also burrows under rocks or logs of moist hardwood forests within coniferous forest landscapes. During the fall and spring when conditions are moist, the Oregon slender salamander is found near the surface, but it retreats underground in late spring and summer.

Pre-field review: This species is found on the west slope of the Cascades from the Columbia River to Southern Lane County.

Field reconnaissance: No Oregon slender salamanders are known from the Trapper Project area. There is potential habitat for this species. Surveys have not been conducted.

Analysis of effects: Opening of the forest canopy, especially in the units planned for 15% green tree retention (20-1, 20-3, 21-1, 21-3, and 40-1) may impact habitat quality by accelerating the timeframe in which the ground and outer part of logs dry out. Salamanders may retreat underground earlier than before. Logging in units with higher levels of overstory retention (unit 20-2) is expected to impact these salamanders less.

Logging and disturbance of existing down woody material may impact individuals of this species. The older down woody material with loose bark will not be removed, so logs used as existing habitat will remain on the ground. Prescribed fire in units 26 and 71 may impact some individuals, although the patchy nature and higher moisture retention surrounding large logs may allow some of them to survive.

Cumulative effects: It is expected that habitat connectivity will continue to allow viable local populations to exist.

Conflict determination/risk assessment: This project may impact individual Oregon slender salamanders, but the localized impacts will not trend the species towards federal listing.

Communications with U.S. Fish and Wildlife Service: Not required

Cascade Torrent Salamander (*Rhyacotriton cascadae*)

Habitat: The Cascade Torrent Salamander can be found under rocks bathed in a constant flow of cold water, in cool rocky streams, lakes and seeps, usually within conifer or alder forests. It is dependent on nearly continuous access to cold water. During wet weather it can be found moving around in forests away from streams.

Pre-field review: This salamander inhabits the Cascade mountains of southern Washington and northern Oregon with a disjunct population in the southern Oregon Cascades.

Field reconnaissance: Cascade Torrent Salamanders have been found in the Blue River Watershed, but have not been located in the Trapper Project Area. Surveys conducted in unit 20 each year between 1998-2001 as part of the Blue River Landscape Strategy monitoring have not resulted in any Oregon slender salamanders being found. Amphibian habitat and presence monitoring began in the summer of 1998 to gather baseline information as part of a larger study in the entire Blue River Watershed. This study will monitor habitat and presence pre and post harvest.

Analysis of effects: The Trapper Project may impact Cascade Torrent Salamanders by modifying habitat near small streams. Buffers will be left on some streams, and abundant down woody material will be retained to provide habitat for this species.

Cumulative effects: It is expected that habitat connectivity will continue to allow viable local populations to exist.

Conflict determination/risk assessment: This project may impact individual Cascade Torrent Salamanders, but the localized impacts will not trend the species towards federal listing.

Communications with U.S. Fish and Wildlife Service: Not required

Foothill Yellow-legged Frog (*Rana boylii*)

Habitat: The Foothill Yellow-legged Frog is found in permanent slow flowing steams in a variety of habitat types, including grassland, chaparral, and coniferous or deciduous forests and woodlands. They prefer streams with rocky bottoms, streamside vegetation, and sloping banks. This frog is most common in and near streams with rocky, gravelly, or sandy bottoms (Leonard 1993). Streams inhabited may dry to a series of potholes connected by trickles in summer. Small adults have been found 50 meters from permanent water on moist outcrops. These frogs range from sea level to at least 1800 feet elevation (Leonard 1993).

Pre-field review/Field reconnaissance: Foothill Yellow-legged Frogs inhabit the Oregon coastal and Cascade mountains. The only known population is on the South Santiam 40 miles from the Trapper Project area.

Analysis of effects: There is no potential for this species in the project area

Cumulative effects: None are expected.

Conflict determination/risk assessment: No impact.

Communications with U.S. Fish and Wildlife Service: Not required

Oregon Spotted Frog (*Rana pretiosa*)

Habitat: The spotted frog is a marsh specialist with a strong preference or requirement for warmer temperatures. This species of ranid is more aquatic than other ranids (Dunlap 1955). Oregon spotted frogs are found either in water, at the edges of water floating on the surface (Dunlap 1955), or resting on aquatic vegetation. They feed primarily on invertebrates both above and below the surface. Spotted frogs are early breeders and need a minimum temperature of 11 degrees C but prefer temperatures near 14 degrees C for breeding (Morris 1969). Egg masses are typically deposited on top of one another in a communal fashion (Morris 1969). These egg masses are not attached to vegetation and are usually deposited in shallow water which makes them especially susceptible to mortality due to freezing or having the water dry up (Licht 1971). Spotted frogs favor lakes and slow moving streams that are associated with a permanent water source where the bottom has a soft muddy bottom. These frogs have disappeared from 80% of their historic range due to several factors: 1) changes in hydrology and flood plain morphology, 2) elimination of shallow water habitat, and 3) high habitat overlap with bullfrogs (ODFW Memorandum).

Pre-field review: The closest known population is located in the Mink Lake Basin, which is in the Three Sisters Wilderness.

Field reconnaissance: Suitable breeding habitat for Oregon spotted frogs does not exist within the Blue River Watershed where the Trapper Project is proposed.

Analysis of effects: There is no potential for this species in the project area

Cumulative effects: None are expected.

Conflict determination/Risk assessment: No impact.

Communications with U.S. Fish and Wildlife Service: Not required

Northwestern pond turtle (*Clemmys marmorata marmorata*)

Habitat: Northwestern pond turtles inhabit ponds, marshes, rivers, and streams, preferring those with rocky or muddy bottoms and aquatic vegetation (watercress, cattails, etc.). These turtles feed on aquatic plants, carrion, and insects. They have been found from sea level to about 3,800 feet elevation, although they are more common below 2,000 feet.

Pre-field review: The closest population is in the McKenzie River 24 miles away. There is no potential for this species in the Trapper Project Area. It is above the known elevation range for this species.

Field reconnaissance: Suitable breeding habitat for the northwestern pond turtle does not exist within the Trapper Project planning area.

Analysis of effects: There is no potential for this species in the Trapper Project Area.

Cumulative effects: None are expected.

Conflict determination/risk assessment: No impact

Communications with U.S. Fish and Wildlife Service: Not required

BIRDS

Northern bald eagle (*Haliaeetus leucocephalus*)

Habitat: Bald eagles require habitat consisting of scattered old-growth conifers near available fish sources, although they also feed on waterfowl. Bald eagles are also known as scavengers, and may feed on deer and elk carcasses, well away from the reservoir and the river on the District. In such instances, the carcasses are in open clearcut units or off roads, as opposed to within timbered stands.

Pre-field review/Field reconnaissance: There have not been any bald eagle sightings in the Trapper Project Area. Blue River and the other creeks in the Planning Area are too narrow to provide suitable bald eagle foraging habitat.

Analysis of effects: There is no potential for this species in the Trapper Project Area

Cumulative effects: None are expected

Conflict determination/risk assessment: No effect.

Communications with U.S. Fish and Wildlife Service: Not required

Northern Spotted Owl (*Strix occidentalis caurina*)

Habitat: The late-successional habitat in the Trapper Planning area is suitable spotted owl habitat by varying degrees. Spotted owl habitat has been defined in various documents: ISC Report, USFWS Critical Habitat Determination, Memorandum Decision and Injunction for Judge Dwyer's Decision, and the FSEIS. General guidelines for suitable spotted owl habitat are Douglas-fir, Western hemlock, Western red cedar, or Ponderosa pine older than 200 years and having a moderate to high canopy closure of 60-80%; an understory of multi-layered conifers and hardwoods open enough to still allow owls to fly within and beneath; moderate to high snag densities; and large logs are also found in typical spotted owl habitat. However, all of the above characteristics do not need to be present for spotted owls to make use of an area, and for habitat to be determined suitable.

Pre-field review: Spotted owl activity is expected to occur primarily in older timber stands. Spotted owls do occur in the Planning Area. There are three activity centers within 1.2 miles of proposed harvest or prescribed natural fire units. The overall habitat condition of the area around these pairs varies from fair (pair 0871) to good (pairs 0859 and 2036). All currently known activity centers have 100-acre late successional reserve cores surrounding them. The U.S. Fish & Wildlife Service determined that reduction of suitable spotted owl habitat below 40% of the median home range (1182 acres) has a notably higher likelihood of leading to disruption of essential breeding, feeding, and sheltering behaviors (USDI, 1990). Two of the pairs affected by this project have suitable nesting, foraging, and roosting habitat levels greater than 40% of the average home range acres. Pair 0871 currently does not have suitable habitat levels greater than 40% of the average home range acres (see Table: Spotted Owl Habitat within 1.2 mile radius).

Field reconnaissance: All of the Trapper Planning Area has been surveyed for spotted owls to protocol standards by the Oregon Cooperative Wildlife Research Unit annually since 1987. There is a history spanning several years for each of the activity centers.

Analysis of effects: Loss and fragmentation of spotted owl and other interior forest species habitat in this planning area is expected to have detrimental effects on existing spotted owls and other interior forest-dependent species. Fragmented habitat increases flight distance and energy consumption for foraging, and increases habitat suitability for predatory and competitive owls (Great Horned owls and Barred owls). This may expose spotted owls to a greater likelihood of encountering these more aggressive owls.

Alternatives A and B will directly affect spotted owls by reducing habitat. Habitat will be either degraded, downgraded, or removed. The following definitions apply to these terms:

- degraded: to affect the quality of, but not remove the functionality of, either suitable or dispersal habitat (very light thinning which partially removes the overstory, yet maintains a minimum of 70% average canopy closure would still be suitable foraging habitat: units 26 and 71). If the thinning still retains 40% canopy closure, the habitat would still be dispersal habitat.
- downgraded: to change the functionality of spotted owl habitat from suitable to dispersal (heavy thinning which maintains a minimum of 40% average canopy closure: units 20-2)
- removed: to eliminate the functionality of either suitable or dispersal habitat such that there is no longer spotted owl habitat of either type present (regeneration harvest or a thinning that reduces canopy closure below 40%: units 20-1, 20-3, 21, 40)

Alternatives A and B will also have indirect effects by reducing prey base habitat for northern spotted owls. Northern flying squirrels are their most common prey item on the McKenzie River Ranger District, and habitat conditions for them are most optimal in older forested stands. Spotted owls also feed on red tree voles, which are associated with older forests.

Effects within 0.7 miles of known owl pairs

Alternatives A and B would not alter through harvesting techniques any forested areas within 0.7 miles of a spotted owl habitat activity center (see Table 1). Unit 71, which is proposed for a prescribed burn, is within 0.7 miles of a spotted owl habitat activity center. The direct effects of the burn are judged to be very low because very few overstory trees will be burned to the point of mortality. The stand will still function as suitable spotted owl habitat after the burn.

Table 1: Acres harvested or burned within 0.7 miles of a spotted owl habitat activity center

	Acres of habitat affected within 0.7 miles	
Activity Center #	**Alternatives A and B**	**Alternative C (No action)**
2036	0	0
0859	25	0
0871	0	0

Effects within 1.2 miles of known owl pairs

There are three spotted owl activity centers located within 1.2 miles of the proposed units of Alternatives A and B whose habitat would be removed or degraded (see Table 2).

All but pair 0871 would continue to exceed 1182 acres after implementation of Alternatives A and B. A total of 25 acres of nesting, roosting, and foraging habitat would be removed within the home range of one pair. Approximately 25 acres would be degraded within the home ranges of two other pairs with the prescribed burn. Effects of this include a loss of foraging habitat opportunities provided by unit 40-1 near an activity center. It is unknown how much the owls are currently using these areas for foraging. Data from the Oregon Cooperative Wildlife Research Unit shows spotted owl presence in unit 40-1.

Table 2: Effects to Spotted Owls Within 1.2 miles of the Trapper Project.

Spotted Owl Site Number	**Existing Habitat Acreage (Alternative C No Action)**	**Acres Removed Alternatives A and B (<40% canopy retained)**	**Acres Degraded Alternatives A and B (>70% canopy retained)**	**Alternatives A and B Post-Treatment Habitat Available**
2036	1696	0	25	1671
0859	1655	0	25	1630
0871	1149	25	0	1124

Units 26 and 71, which are proposed for a prescribed underburn, would have short-term negative effects on spotted owls, but likely long-term beneficial effects. Because habitat with >70% canopy closure is still considered suitable, degraded acres due to the prescribed underburn were not subtracted from the total habitat acres. Opening the

canopy closure to 70% may reduce spotted owl habitat quality from current levels. Canopy closure is expected to recover in 8-10 years, and the patchy understory mortality may benefit the remaining trees by improving their growing conditions due to increased nitrogen and increased sunlight. This may allow them to grow larger and faster, benefiting spotted owls.

Table 3: Summary of Effects of the Trapper Project Within 1.2 Miles of Owl Sites.

Effects	Alternatives A and B	Alternative C (No Action)
# pairs affected within 1.2 miles	3	0
>1182 acres for all spotted owl activity centers within 1.2 miles of units?	Yes for 2 No for 1	Yes for 2 No for 1
Total acres of nesting and foraging habitat altered within 1.2 miles of spotted owl activity centers	25	0
Total acres of nesting and foraging habitat under-burned within 1.2 miles of spotted owl activity centers	25	0

Critical Habitat

The entire Trapper Planning Area is located within critical habitat for the northern spotted owl, but planning and implementing either alternative complies with the Northwest Forest Plan as well as the U.S. Fish & Wildlife Service Biological Opinion for Fiscal Year 1999 Habitat Modification Projects in the Willamette Province.

U.S. Fish & Wildlife Service Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The 1999 Biological Opinion, which applies to activities in Alternatives A and B , provides the following conservation recommendations:

- Minimize the rate of harvest of suitable spotted owl habitat within the matrix and critical habitat outside of LSRs.
- Minimize the loss or degradation of suitable habitat within 0.7 miles of known spotted owl nest sites.
- Facilitate the development of late-successional forests by maintaining the maximum number of large class 1 and 2 logs and standing live and dead trees within regeneration harvest units.

The Trapper Project is located in the Blue River Watershed for which the Blue River Landscape Strategy was developed. The BRLS document discusses how spotted owl populations will be affected by its implementation in the long-term. With AMA designation, an alternative landscape management strategy was developed which is expected to impact the spotted owl population substantially less than under the Northwest Forest Plan matrix management strategy. The longer timber harvest rotation lengths, higher overstory retention levels, incorporation of site-specific owl reproductive information in small watershed reserve designations, augmentation of selected 100-acre LSRs in the small-watershed reserves, provision of future potential activity centers, reduced fragmentation, and minimized disturbance all combine to affect spotted owls less. The BRLS should be viewed as an attempt to maximize the chances of the spotted owls' survival on a landscape where timber production is a major goal. Concerns include the unknown impacts of silvicultural prescriptions (e.g. late-entry thins), and the effectiveness of reproducing historical landscape patterns via timber harvest without historical processes, insofar as these processes affect spotted owls. It is expected that overall wildlife species viability in the area is more likely under the BRLS than the Northwest Forest Plan matrix management strategy.

Cumulative effects/Conflict determination/risk assessment: Spotted owl habitat will continue to decline in the Blue River Watershed if Alternatives A and B is implemented. However, consultation with the U.S. Fish and Wildlife Service resulted in a finding that this project will not jeopardize the population of the northern spotted owl. The overall effects and risk of this project on individual owl pairs is judged to be low to fairly high in the case of pair 0871 due to the low amount of suitable habitat currently available to this pair. No northern spotted owl pairs would be affected by Alternatives A, B and C (No Action), because no suitable habitat would be removed or underburned.

The results of the 11-40 analysis for all quarter townships within which the proposed blocks for this logging entry are located shows that levels of suitable dispersal habitat would remain above 50% for all action alternatives. Connectivity throughout the forest landscape will be adequately met with implementation of all alternatives (see Table 4).

Table 4: Spotted Owl Dispersal Habitat/11-40 Analysis.

Quarter Township and Trapper Project Units	Total Capable Acres	Alternative C (No Action)		Alternatives A and B	
		Dispersal Acres	Percent Meeting 11/40	Dispersal Acres	Percent Meeting 11/40
T14S, R4E, SE (20, 21, 40)	4036	2425	60	2260	56

Units 26 and 71 would still be suitable dispersal and also foraging and roosting habitat after the underburn, so do not appear in the above table.

Seasonal Restrictions: Implement seasonal restrictions as shown on page 1 of this document. These seasonal restrictions are a mandatory term and condition in the Biological Opinion.

Communications with U.S. Fish and Wildlife Service: Alternatives A and B of the Trapper Project May Effect, and is Likely to Adversely Affect the Northern Spotted Owl. Formal consultation with the U.S. Fish & Wildlife Service for effects to the northern spotted owl was initiated in 1998. The Biological Opinion dated September 29, 1998 determined that implementation of this project would not likely jeopardize the continued existence of the spotted owl or adversely modify its designated critical habitat. An incidental take permit was included in the Biological Opinion for the acres of spotted owl habitat affected by the action.

American Peregrine Falcon (*Falco peregrinus anatum*)

Habitat: Peregrine falcon nesting habitat includes sheer cliffs, usually near water, 150 feet (43 meters) or greater in height, with a small cave or overhung ledge large enough to contain three or four full-grown nestlings. The ledge has increased suitability if several holes or ledges are present (USDI Fish and Wildlife Service, 1982; Wilderness Research Institute, 1979). There have been situations however in which peregrines have successfully nested on smaller cliffs. One eyrie was located on a cliff only 75 feet in height. In another unusual situation on the Willamette National Forest, a peregrine nested at the base of a cliff. Peregrine falcons feed almost exclusively on birds, many of which are associated with riparian zones and large bodies of water.

Pre-field review/Field reconnaissance: Two protocol peregrine falcon surveys were conducted in the spring and summer of both 1999 and 2000 at the following cliff locations in the Trapper Planning Area: Quentin Creek Rock Complex, Trapper Arch, Trapper Creek Complex, and Wolf Rock. Wolf Rock was also surveyed intensively in 1997 and 1998, and once in 2001 and 2002, and Trapper Arch was surveyed twice in 2002. Habitat quality ranges from low to excellent at the above locations. Although peregrine fly-bys were observed at Trapper Arch in 2002 and 2000, and they have been seen several times at Wolf Rock, no active nest sites have ever been found. Additional protocol surveys will take place until this project is completed.

Units 20-1, 20-2, 20-3, and 40-1 are located within the secondary zone of a potential peregrine falcon eyrie. Three peregrines were seen at Wolf Rock in 1996, but a nest was never found. Birds have been seen there almost annually since then, but it is suspected they are nesting elsewhere. Wolf Rock is excellent habitat and it is possible that a nest site may show up there or at other nearby rock cliffs in the future.

Analysis of effects: Risk Assessment Guidelines, 2673-32--3, 10/89 Supplement and the Pacific Coast Recovery Plan for the American Peregrine Falcon, USFWS, 1982 were used to determine effects.

Peregrines opportunistically forage on a variety of bird species which use all seral stages, including early and late. 90-95% of all prey items of peregrines are birds which may use riparian areas (Wahl et. al, 1991). Riparian corridors are often favored hunting locations for peregrine falcons, and most nest sites are within 1/4 to 1/2 mile of some form of water.

Alternatives A and B will not jeopardize the integrity of nesting habitat in the Planning Area. Adequate green trees will be left and lost snags will be replaced by snag creation, so good habitat will continue to be available for the peregrine prey base. The creation of more open-structured stands may provide a slightly different prey base in and adjacent to the units proposed for logging, but the overall abundance of prey is not expected to decline. The current prescription in peregrine management plans on the Willamette National Forest provides for riparian reserves at the Northwest Forest Plan interim widths (182' on both sides) on Class III and IV streams within secondary zones, or management of a larger landscape area according to what is thought to be historic conditions which were created by fires. The Trapper Project will provide stream protection which is consistent with the Blue River Landscape Strategy which follows fire history patterns and protects additional areas as needed to provide for water quality objectives.

The planned underburn in units 26 and 71 may change the distribution of birds in the area which could serve as a peregrine falcon prey base. With the resultant green tree mortality approximating 10% of the overstory, populations of wood-boring insects are likely to increase in the underburned stands (Smith, 2000). This will attract birds such as woodpeckers, warblers, and other species, which could provide easier prey base foraging for peregrine falcons in the area.

Alternative C (No Action) will have no impact to peregrine falcons. Stand structure and composition would continue to change naturally over time as forest succession occurs. In the long term, the peregrine falcon prey base may change in composition in response to different stand structures. Whether this change in prey species composition would affect the peregrine falcon is not known, but it is likely that this species has the flexibility to adapt to natural changes in its environment.

Cumulative effects: None/Unknown

Conflict determination/risk assessment: No impact. A seasonal restriction will be required between January 15 and July 31 on the following activities: Hazard tree felling, road reconstruction, road maintenance and all landing work on roads in the potential secondary zone (see attached map) for Wolf Rock. Falling trees, ground-based and skyline yarding: 20, 40. Helicopter yarding: 20-1, 20-2, 20-3, 21-1, 21-2, 40-1.

This restriction may be lifted if the area is determined to be unoccupied, or the birds are non-nesting.

Communications with U.S. Fish and Wildlife Service: Not required

Least Bittern (*Ixobrychus exilis*)

Habitat/ Pre-field review: This species is found on the west coast, from Oregon south to Baja, California. Oregon is the northern limit of its' range. The Least Bittern breeds in freshwater cattail and bulrush marshes east of the Cascades. The least bittern nests on an elevated platform of aquatic vegetation and sticks built by the male with an overhead canopy of cattails and bulrushes, generally < 30 feet (10 m) from open water (Weller 1961, Gibbs et al. 1992).

In western Oregon, it is very rare in the spring through fall in the Willamette Valley at Fern Ridge Reservoir (Crowell and Nehls. 1968), which is just west of the Willamette National Forest. It does not winter in Oregon. This bird is a solitary and secretive species that is rarely seen, inhabiting densely vegetated deep water marshes (Spencer, 2001).

Field reconnaissance: The nearest suitable habitat to the Trapper Project area is at Wolf Meadow which contains a large pond. No least bitterns have been documented from this area.

Analysis of effects: The least bittern would be impacted by marsh drainage, pollution, insecticide spraying, and other human activities (Palmer 1962). Because the Trapper Project is located greater than ½ mile from Wolf Lake, no impacts will occur.

Cumulative effects: None expected.

Conflict determination/risk assessment: No impact.

Communications with U.S. Fish and Wildlife Service: Not required

Bufflehead (*Bucephala albeola*)

Habitat/ Pre-field review: Buffleheads breed from Alaska across Canada and south to Oregon, California, and Wisconsin. Buffleheads nest near mountain lakes surrounded by open woodlands containing snags. In many areas, the preferred nest trees are aspen, but they will also nest in ponderosa pine and Douglas-fir. In Oregon, most Buffleheads nest in artificial nest boxes. Nesting begins in late April, young are fledged in early August. Bufflehead are hunted in Oregon. Only several hundred pair are thought to breed in the state. After the breeding season, Buffleheads can be found on open waters throughout the state, along major rivers, and along the coast.

Field reconnaissance: No records of Buffleheads are known from the Trapper Project area. It is possible that they use Wolf Lake, but it is unknown if nesting occurs there.

Analysis of effects: Because the Trapper Project is located greater than ½ mile from Wolf Lake, no impacts will occur.

Cumulative effects: None expected.

Conflict determination/risk assessment: No impact.

Communications with U.S. Fish and Wildlife Service: Not required

Harlequin duck (*Histrionicus histrionicus*)

Habitat: Harlequin ducks use rivers, streams, and creeks as feeding habitat and commonly nest in bank cavities. Log jams and overhanging vegetation are most important along smaller streams whereas islands and mid-stream boulders are used for security cover on larger rivers (Wallen and Groves, 1989). Harlequin ducks feed on aquatic insects, crustaceans, mollusks, tadpoles, and small fish. Macro-invertebrate levels may play a role in determining harlequin duck population densities.

Breeding ducks appear to require clean, fast-moving water, nearby loafing sites (consisting of exposed rocks, logs, or root wads), dense riparian shrubs and/or timber on the banks, and undisturbed drainages (Cassirer and Groves, 1989). A number of authors have suggested that brood rearing areas do not correspond to nesting locations, and that broods move downstream from nesting areas (Wallen, 1987; Cassirer and Groves, 1989). Broods prefer lower gradient streams not less than 10 m in width, with overhanging vegetation, and plentiful woody material (Cassirer and Groves, 1989).

Several studies have pointed to the need for an absence of human disturbance in harlequin duck breeding habitat (Cassirer and Groves, 1989), or observed an adverse impact of human activities on nesting ducks (Wallen, 1987, Genter, 1992). One study reported 90% of pairs observed within 300m of roads, residences, campgrounds, or trails (Schirato and Sharp, 1992) but it is not yet clear whether this pattern only reflects the increased frequency of observers as opposed to an increased frequency of the duck in these areas.

Pre-field review/Field reconnaissance: Harlequin ducks have been seen with broods in the Blue River Watershed, but not in the Trapper Planning Area. Suitable habitat exists, but the larger Class I and II rivers which are more commonly used are downstream of the proposal.

Analysis of effects: Alternatives A and B projects are not within a disturbance distance of harlequin duck nesting habitat. Harlequin ducks are vulnerable to increases in water temperature, fluctuations in water levels, and sedimentation. These physical characteristics determine the aquatic life situation that this duck feeds upon.

Existing water quality is expected to be maintained with Alternatives A, B, or C (see the Water Quality section in the EA).

Cumulative effects: None expected.

Conflict determination/risk assessment: No impact

Communications with U.S. Fish and Wildlife Service: Not required

Yellow Rail (*Coturnicops noveboracensis*)

Habitat/Pre-field review: This species breeds from central and eastern Canada south to New England and the Great Lakes region. The Oregon populations are extralimital and were thought to have disappeared early this century. They are known from south central Oregon, and have not been reported within the boundaries of the Willamette National Forest. This species is listed as a game species in Oregon, but is not present in fall.

Our subspecies breeds locally in wet meadows in n. U.S. in a tier of states from N. Dakota east to Maine, possibly including Montana, and formerly Ohio (Stern and Popper, 2001). Yellow Rails inhabit freshwater marshes and wet meadows with a growth of sedges, usually surrounded by willows, and often with standing water up to a foot deep during the breeding season. Nesting begins by May in Oregon. The nest is a cup, built of marsh vegetation, and attached to emergent plants above water levels. Yellow Rails are very secretive, and little is known about its habits in Oregon. It is mainly detected through its vocalizations during breeding season. Calling male yellow rails have been found in shallowly flooded sedge meadows at 4100-5000' (1250 m - 1524 m) elevation (Popper and Lundsten 2000). Whether or not the yellow rail is a winter resident of Oregon is unknown.

Field reconnaissance: No records of this species are known from the Trapper Project area. The nearest suitable habitat is at Wolf Lake which is greater than ½ mile from the nearest unit.

Analysis of effects: A potential threat to breeding success in forested habitats would be the alteration of stream flows to wet meadows or marshes, which could result in reduced nesting success (Colorado Natural Heritage Program 1997). This situation will not occur with implementation of Alternatives A or B of the Trapper Project.

Cumulative effects: None expected.

Conflict determination/risk assessment: No impact.

Communications with U.S. Fish and Wildlife Service: Not required

Black Swift (*Cypseloides niger*)

Habitat/Pre-field review: The black swift is a long-distance neotropical migratory bird that breeds in western North America in close association with mountain waterfalls or sea-side cliffs (Knorr 1961, Foerster 1987, Dobkin, 1994). Black swifts have a scattered distribution in western North America and Central America. They breed from southern Alaska south to California and east to Colorado and Utah.

Black swifts nest in cliff faces near or behind waterfalls. In western North America, these situations are usually in deep canyons in wooded areas. The water can vary in degree from a rushing torrent waterfall to a mere trickle (Foerster and Collins 1990). The waterfalls with swifts in East Lane County are 286 feet and about 50 feet tall, at 4,000 feet and 5,700 feet elevation respectively, in a setting of true fir/mountain hemlock and Douglas fir/western hemlock forests (Combs 2001). Critical factors for nest locations in other states appear to be: 1) temperature moderation due to dripping water and little or no direct solar exposure and 2) high humidity (Marin 1997). Usually they nest out of direct sunlight on a protected rock ledge or knob, or in a crevice. The nest shape is a full or half cup, or inverted cone made mostly of moss, but may include seaweed or fern tips. The nest may also be a depression in the mud with no material added (Marin 1997).

The first probable nest site in Oregon was located in 1982 at Salt Creek Falls, East Lane County (Combs 2001). Black swifts have been seen there in subsequent years and it is believed they nest there, but no actual nests, nestlings or fledglings have been seen. In 1998, a new site was located at a waterfall in East Lane County, about 3 miles west-northwest of Diamond Peak. They are strongly suspected to breed in other locations along the coast, in the Cascades, the Columbia River Gorge, and other canyons and mountain ranges in Eastern Oregon. There have been other breeding season (June – mid-August) records outside of Lane County in Oregon, but none have been nest locations. There are many other sites in Oregon that qualify as potential breeding habitat.

Field reconnaissance: No Black Swifts have been documented in the Trapper Project area. There are numerous waterfalls, but none of them are large enough in size to provide suitable nesting habitat for this species.

Analysis of effects: No potential Black Swift waterfall nesting habitat will be impacted because there are no waterfalls in any of the project areas. Due to the small size of the waterfalls in the planning area, it is very unlikely that Black Swifts nest there.

Cumulative effects: None expected.

Conflict determination/risk assessment: No impact.

Communications with U.S. Fish and Wildlife Service: Not required

Tri-colored blackbird (A*gelaius tricolor)*

Habitat/Pre-field review: Found in freshwater marshes with cattails and dense shrubs, grain fields. Feeds on the ground, eating insects, grains, and weed seeds. Nests in large colonies. Nest of coarse reeds and grasses lined with finer material placed in reeds above ground or water. Breeds locally in eastern Rogue Valley, S. Klamath Co, and mainly in north-central Oregon. Scattered summer reports in Willamette Valley. No documented sightings on the McKenzie River RD.

Field reconnaissance: No records of this species are known from the Trapper Project area. Suitable habitat exists in the marshy area at Wolf Lake, which is greater than ½ mile from unit 40-1.

Analysis of effects: There is no potential for this species in the Trapper Project Area

Cumulative effects: None are expected

Conflict determination/risk assessment: No impact.

Communications with U.S. Fish and Wildlife Service: Not required

MAMMALS

Baird's Shrew (*Sorex bairdii permiliensis)*

Habitat: This species of shrew has been found in traps set in an open Douglas-fir forested area with numerous rotting logs (Verts and Carraway, 1998). More specific habitat requirements are lacking. They are active diurnally.

Pre-field review: Baird's Shrew is endemic to Oregon (Verts and Carraway, 1998). This species occurs in the Coast Range from Portland south to Lane County. It also occurs along the west slope of the Cascade Range from the Columbia River south to central Lane County.

Field reconnaissance: No locations of Baird's Shrew are known from the Trapper Project area. Habitat for Baird's Shrew occurs in abundance.

Analysis of effects: The Trapper Project may impact Baird's Shrews by modifying forest habitat. No-harvest retention areas will be scattered in the harvest units, and abundant down woody material will be retained to provide habitat for this species.

Cumulative effects: It is expected that habitat connectivity will continue to allow viable local populations to exist.

Conflict determination/risk assessment: This project may impact individual Baird's Shrews, but the localized impacts will not trend the species towards federal listing.

Communications with U.S. Fish and Wildlife Service: Not required

Pacific Shrew (*Sorex pacificus cascadensis*)

Habitat: This species of shrew is often found in moist forested areas with fallen decaying logs and brushy vegetation (Verts and Carraway, 1998)(Ingles, 1965).

Pre-field review: This species of shrew is endemic to Oregon (Verts and Carraway, 1998). It is distributed as two distinct populations: one in the Coast Range from Cascade Head, Tillamook Co., south to Coos Bay, and the other in the Cascade Range from northeastern Linn Co. to southern Jackson Co. Pacific shrews appear to be adapted for capturing, killing, and eviscerating hard-bodied insects (Verts and Carraway, 1998). Internal organs of insects composed 28.6% by volume of the diet (Verts and Carraway, 1998). Other prey items are unidentified insect larvae, slugs and snails, beetle larvae, and unidentified invertebrates. Numerous dead specimens of the insect *Omus audouini* (Coleoptera) were considered to have been cached by Pacific shrews.

Field reconnaissance: No locations of the Pacific Shrew are known from the Trapper Project area. Habitat for this shrew occurs in abundance.

Analysis of effects: The Trapper Project may impact Pacific Shrews by modifying forest habitat. No-harvest retention areas will be scattered in the harvest units, and abundant down woody material will be retained to provide habitat for this species.

Cumulative effects: It is expected that habitat connectivity will continue to allow viable local populations to exist.

Conflict determination/risk assessment: This project may impact individual Pacific Shrews, but the localized impacts will not trend the species towards federal listing.

Communications with U.S. Fish and Wildlife Service: Not required

California wolverine (*Gulo gulo luteus*)

Habitat: The wolverine has been designated one of North America's rarest mammals and least known carnivores (Banci, 1994). They have been described as solitary, secretive animals that are usually found in areas remote from humans and human developments (Banci, 1994). The most important habitat element for wolverines seems to be the absence of human activity or development (Hash, 1987), lack of road access or extensive habitat modification (Banci 1994). High elevation wilderness areas appear to be preferred in summer, which also acts to effectively separate wolverines and humans in many areas. In winter, wolverines may move to lower elevation "non-wilderness" areas which are snowbound with very limited human activity. A study in Montana found that wolverines appear to select true fir (Abies) cover types throughout the year, especially during summer. Although all exposures

were used, easterly and southerly areas received the majority of consistent use. About 70% of wolverine habitat use occurred in large expanses of scattered mature timber while the remaining were in ecotonal areas. These were small timber pockets, and rocky, broken areas of timbered benches. Wolverines made little use of young, thick timber and open clear-cuts (Hornocker and Hash, 1981). However, heavy use was found in openings which support good winter populations of big game animals, the principle source of carrion which makes up much of the wolverine's diet (Marshall, 1988). Another study found that wolverines commonly crossed areas with sparse overstory such as burned areas or meadows (Copeland, 1996). In addition to carrion, wolverines also opportunistically feed on small prey, including marmots, snowshoe hares, various rodents, insects, insect larvae, eggs and berries (Marshall, 1988).

Natal dens have been associated with snow-covered tree roots, log jams, or rocks and boulders (Hash, 1987)(Copeland, 1996). Habitats that provide the appropriate structures, such as large cavities, large down wood, and old beaver lodges, likely will provide suitable den site habitat (Banci 1994). It is believed that wolverines are extremely sensitive to human disturbance during the denning period.

Pre-field review: Other than trapping, wolverines were likely heavily impacted by the extensive wolf eradication programs early in the 20th century (Zielinski et al., 1996). In Oregon, the wolverine was thought to have been extirpated (Bailey, 1936), but in 1965 a large male was killed on Three-Fingered Jack in Linn Co. (Kebbe, 1966). After this report, a series of wolverine sightings or their tracks in the 1960s and early 1970s were reported secondhand with an additional report from Broken Top Mountain in Deschutes Co. in 1969 (Oregon State Game Commission, 1970). And even as recently as 1990, a wolverine was found as a road kill on Interstate 84 near Starvation Creek State Park in the Columbia River Gorge (The Oregonian, 1990). Historically, wolverines were occasionally taken by trappers in the Cascades. Because one of the individuals taken was a female (Oregon State Game Commission, 1970), the possibility of a self-maintaining population of wolverines in Oregon cannot be discounted, but it seems more likely that those occasionally seen or killed in the state were dispersers from populations further north. At the present time, there is general agreement that wolverines do not occur in high population densities anywhere in the Cascades (Marshall, 1988), but even under near-optimal habitat conditions, low densities of wolverine populations are characteristic of the species (Verts and Carraway, 1998; Banci, 1994). With low population densities, even minimal trapping may have impacted their population disproportionately.

One wolverine sighting has been reported on the McKenzie River Ranger District in 1991 about 15 miles south of the Trapper Planning Area at Frissel Crossing Campground. The Trapper Project Area is relatively secluded and does not receive a high amount of road use, except during the fall hunting season. It is suspected to have moderate suitability for wolverines.

Due to their extreme rarity in the Oregon Cascades, no wolverine studies have been conducted and little information about the distribution and habitat needs of wolverines in the Oregon Cascades is available. Recovery of wolverine in Oregon will likely be dependent on population augmentation (USDA Forest Service, 1994).

Field reconnaissance: Winter track surveys in the snow appear to be the most efficient method for detection of wolverines and other furbearers. However, because of the wetness of the snow on the west side of the Cascade Mountains, the use of snowmobiles to survey large areas for wolverine tracks is difficult to impossible in most years until late winter/early spring when the snow hardens to support snowmobiles. Because wolverines are suspected to be so rare in the Oregon Cascades, it appears that any survey method would be extremely time-consuming and inefficient. Aerial wolverine surveys were conducted each spring between 1998-2001 by Region 6 of the Forest Service and the Oregon Department of Fish and Wildlife in the highest potential habitat, which includes some of the Willamette National Forest. One possible wolverine den was found in the Three Sisters Wilderness, but a summer follow-up could not verify presence. Other possible wolverine tracks that were ground-checked were not positive.

The Wolf Rock area of the Trapper Planning Area, where two regeneration harvest units are planned in Alternatives A and B, provides important elk and deer habitat, and thus would provide possible wolverine foraging habitat opportunities. However, this area has a fairly high road density and does not provide the preferred habitat seclusion. The remainder of the Trapper Planning Area also provides elk and deer habitat, but it is considered to be of lower habitat quality. The lower, un-roaded portions of the Cook-Quentin drainage where the prescribed burn of unit 71 is located is mostly un-roaded and provides a high level of habitat seclusion which is important for wolverines.

Analysis of effects: The edge created between a clearcut and remaining timber is not typical of naturally created edges. Retention of green trees, snags, and logs after logging results in improved hiding cover habitat for wolverine prey such as rodents. Unit 20-2 may provide better habitat conditions for this type of wolverine prey after logging than the other units which will have a more open habitat condition. The regeneration units (20-1, 20-3, 21-1, 21-2, 21-3, 40-1) will leave 15% green tree retention which may be too open for wolverines to travel through and would also provide a lower number of rodent prey species and individuals. Units 26 and 71, which are planned for prescribed fire may provide improved habitat conditions for small mammals after burning (Smith, 2000), which could benefit wolverines indirectly.

Since wolverines scavenge on big game carrion, measures which improve big game habitat characteristics, such as road closures, would also benefit wolverines. All new roads which are constructed for this project will be closed after logging, but there will be a short-term impact to wolverines due to increased use. Road reconstruction may encourage more use by forest visitors and this effect will be relatively long-term and

may impact wolverines. An improvement in elk and deer forage by opening the forest canopy, especially in the three regeneration units, may benefit wolverines slightly.

Cumulative effects: Wolverines appear to be extremely wide-ranging, and no topographical barriers such as mountain ranges, rivers, reservoirs, highways, or valleys appear to limit their movements. For these reasons, Hornocker and Hash (1981) conclude that wolverine populations should be treated as regional rather than local. Whether the habitat in the Trapper Project Area is essential for recovery of wolverine populations is unknown.

Conflict determination/risk assessment: Possible conflict with short-term increased road-building; possible benefit with improved elk forage conditions. Alternatives A and B of the Trapper project may impact individual wolverines, but is not expected to trend the species towards federal listing because of the localized affects.

Communications with U.S. Fish and Wildlife Service: Not required

Pacific Fisher (*Martes pennanti*)

Habitat: This species inhabits widespread, continuous-canopy forests at relatively low elevations, and is most abundant in mountainous regions. It is less abundant in foothill regions. Fishers occupy a wide variety of densely forested habitats at low to mid-elevations (100-1800m). Typical habitats include sub alpine Pacific fir (26%), western hemlock (54%), and Sitka spruce (20%). Aubry and Houstan suggest that habitat for Fishers can be enhanced by minimizing forest fragmentation, both in remaining old growth and second growth; maintaining a high degree of forest floor structural diversity in intensively managed plantations; preserving large snags and live trees with dead tops; maintaining continuous canopies in riparian areas; and protecting swamps and other forest wetlands.

Pre-field review: Pacific Fishers inhabit the boreal forest region in the southern half of Canada with extensions into the United States in the Rocky Mountains, Cascade, Coast, and Sierra Nevada Ranges. Of the three specimens on deposit in systematic collections, two are from Lane County. One sighting of medium confidence has occurred on the McKenzie River Ranger District in the French Pete drainage. No Pacific Fishers have ever been documented in the Trapper Project area.

Field reconnaissance: Habitat for Pacific Fishers exists in the Trapper Project area to varying degrees. The highest quality habitat with the largest expanse of un-fragmented and unroaded forest is in the Cook-Quentin drainage.

Analysis of effects: It is expected that those units which will be logged and have 15% canopy closure (units 20-1, 20-3, 21-1, 21-3, 40-1) remaining may impact fisher more than the remaining units which will have up to 50% canopy retention left (unit 20-2).

Cumulative effects: None expected.

Conflict determination/risk assessment: This project may impact individual fisher, but the localized impacts will not trend the species towards federal listing.

Communications with U.S. Fish and Wildlife Service: Not required

Pacific Fringe-tailed Bat (*Myotis thysanodes vespertinu*)

Habitat: This bat species is found in a wide variety of habitats throughout its range, but it seems to prefer forested or riparian areas. These bats are thought to forage by picking up food items from shrubs or off the ground. They consume beetles, moths, harvestmen, crickets, craneflies, and spiders. Females form maternity colonies of up to several hundred individuals in caves, mines, and buildings (Csuti 1997). This species is migratory and there are only two winter records from Oregon. These bats are very sensitive to disturbance.

Pre-field review: Pacific Fringe-tailed Bats range from western North America, from south-central British Columbia south through the western U.S. to southern Mexico. Most Oregon records for this species are from the western Cascades. No records are known from the Trapper Project area.

Field reconnaissance: No mines or caves are known to occur in or be impacted by the Trapper Project. Suitable foraging habitat for these bats is present throughout the entire area.

Analysis of effects: Foraging habitat may be impacted by harvesting forest habitat under Alternatives A and B. Large green trees will be retained in all harvested units, and abundant snag habitat will be provided. No special habitats that may be rich in food sources for this species will be affected. No roosting or hibernating habitat is in the area.

Cumulative effects: None expected.

Conflict determination/risk assessment: This project may impact individual Pacific fringe-tailed bats, but the localized impacts will not trend the species towards federal listing.

Communications with U.S. Fish and Wildlife Service: Not required

Townsend's big-eared bat (*Corynorhinus townsendii*)

(also known as Pacific western big-eared bat and Western long-eared bat)

Habitat: Caves and cave-like structures are critical habitat for these bats. They migrate locally from cool, not freezing winter hibernacula to warm, well-ventilated summer maternity caves. Townsend’s big-eared bats can use small areas for roosting,

such as 15-20' long mine shafts. These bats are also believed to roost in the bark crevices and hollows of large snags, trees, or rock crevices.

Studies conducted in the southern Washington Cascades found bat activity in old-growth stands to be 3-6 times greater than bat activity in younger stands. It appears that forest patches are not important feeding sites for bats, but old-growth forests offer a higher diversity and/or abundance of day roost sites than younger stands (Thomas, 1988). Townsend's big-eared bats are among those bat species associated more closely with feeding along forest edges, along roads, and small openings, rather than over open water which other bat species seem to prefer.

Pre-field review: Although Townsend's big-eared bats are the most characteristic bat of caves in the western U.S., the small amount of historical population data indicates a decline in numbers (Perkins, 1987). Recent estimates are of an 80% decline in populations west of the Cascades in Oregon (Perkins and Cross, 1989 field notes). Less than 700 individuals are known on the west side. Historical evidence indicates the presence of isolated populations of Townsend's big-eared bats in Lane County and on private land adjacent to the Willamette N.F. (Perkins, 1987). A general survey of Lane Co. and the Willamette N.F. was conducted by Perkins during the summer and winter of 1983-84. In Lane Co., hibernacula of this bat were found on private land adjacent to Willamette N.F. land and on lands adjacent to the Umpqua N.F. These bats have been verified on or are strongly suspected to occur on all Districts of the Willamette National Forest. Presence is known on the McKenzie River Ranger District.

Since the few female Townsend's big-eared bats found in the Cascades were found to be un-reproductive, it is possible that stable bat populations in the Cascades are dependent on immigrants from reproductive Coast Range areas.

Townsend's big-eared bats appear to be sensitive to human disturbance based on Graham's (1966) finding that these bats permanently abandon caves after this type of disturbance. However, bats living in occupied buildings sometimes become accustomed to people, and, as long as they are not unduly disturbed, do not seem to be bothered by their presence (Maser et al., 1981).

According to one study in western Oregon, these bats were found to consume 99.7 percent moths (Lepidoptera) and 0.3 percent bugs (Hemiptera) by volume (Whitaker et al. 1977). Therefore, Pacific western big-eared bat are effective in controlling moth populations, such as the Douglas-fir cone, gypsy, Douglas-fir tussock, western pine shoot borer, and western pine tip moth, which may harm conifer growth. Downed logs and snags are natural production areas for wood-boring insects. Whether these insects contribute significantly to the Pacific western big-eared bat diet in Oregon is unknown.

Field reconnaissance: No caves were noted in or directly adjacent to the Trapper Project Planning area. No large concentrations of bats were noted in the Trapper

Project Area during the planning process, but intensive bat surveys have not been conducted. No Townsend's big-eared bat have been documented in the Trapper Project area.

Analysis of effects: Large snags used by bats may be lost with this project because they may be safety hazards to the logging operation or might burn in the proposed underburn. Retention of the larger snags within the proposed units as possible may reduce the potential for negative effects to these bats. Protection of existing snag habitat and creation of snag habitat as mitigation will continue to provide bat roosting habitat. However, the microclimate of this habitat will be somewhat different due to the more open stand conditions. It will be in a more open, unprotected state, un-buffered by diurnal and seasonal temperature extremes, and the habitat suitability is unknown. Large green trees will also be retained in all harvest units to provide roosting habitat for this species.

Studies of Townsend's big-eared bat have shown that human activities pose potential threats and may directly or indirectly reduce their viability. These potential activities include habitat destruction, human disturbance, pesticide use, and cyanide poisoning. Human disturbance may cause the abandonment of Townsend's big-eared bat roosts. Nearby road noises and vibrations such as those caused by log trucks and recreational traffic may make an otherwise suitable cave uninhabitable by this species.

Cumulative effects: None expected.

Conflict determination/risk assessment: This project may impact individual Townsend's big-eared bats, but the localized impacts will not trend the species towards federal listing.

Communications with U.S. Fish and Wildlife Service: Not required

Canada Lynx (*Lynx canadensis*)

Habitat/ Pre-field review: At this time, the Regional Forester's Sensitive Species list designated the lynx as "suspected" to occur on the Willamette National Forest. This species uses high elevation forested habitats that often coincide with populations of snowshoe hare. Forest conditions are generally lodgepole pine and subalpine fir (Ruggiero 1994).

Field reconnaissance: Field surveys involving hair snare traps were conducted on every district of the Willamette National Forest, including the McKenzie River Ranger District, in 1998 and 1999. There were no positive results from that survey. The Trapper planning area does not contain lodgepole pine or subalpine fir forest.

Analysis of effects: Because there is no habitat for this species in the planning area, there are no expected effects to the lynx from projects proposed.

Cumulative effects: None expected.

Conflict determination/risk assessment: No effect.

Communications with U.S. Fish and Wildlife Service: Not required

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ATTACHMENT 1: LEGEND FOR ANIMAL LIST

Occurrence on Willamette National Forest:

S = Suspected

D = Documented

Oregon State Status:

SE=State listed as Endangered

ST=State listed as Threatened

Sensitive=State listed as Sensitive

Federal Status:

E = Endangered

C=Candidate for listing as Threatened or Endangered

SC=Species of Concern

T = Threatened

ATTACHMENT 2: REGIONAL FORESTER'S WILDLIFE SENSITIVE SPECIES LIST FOR THE WILLAMETTE NATIONAL FOREST (2000).

SPECIES	OCCURENCE ON WNF	OR STATE STATUS	FEDERAL STATUS
AMPHIBIANS AND REPTILES			
Oregon Slender Salamander *Batrachoseps wrighti*	D	Sensitive	None
Cascade Torrent Salamander *Rhyacotriton cascadae*	D	Sensitive	None
Foothill Yellow-legged Frog *Rana boylii*	On adjacent private lands	Sensitive	SC
Oregon Spotted Frog *Rana pretiosa*	D	Sensitive	C
Northwestern Pond Turtle *Clemmys marmorata marmorata*	D	Sensitive	SC
BIRDS			
Northern bald eagle *Haliaetus leucocephalus*	D	ST	T
Northern spotted owl *Strix occidentalis caurina*	D	ST	T
American peregrine falcon *Falco peregrinus anatum*	D	SE	delisted in 2000
Least Bittern *Ixobrychus exilis*	D	Sensitive	SC
Bufflehead *Bucephala albeola*	D	Sensitive	None
Harlequin Duck *Histrionicus histrionicus*	D	Sensitive	SC
Yellow Rail *Coturnicops noveboracensis*	D	Sensitive	None
Black Swift *Cypseloides niger*	S	Sensitive	None
Tri-colored Blackbird *Agelaius tricolor*	S	Sensitive	None
MAMMALS			
Baird's Shrew *Sorex bairdii permiliensis*	S	None	None
Pacific Shrew *Sorex pacificus cascadensis*	S	None	None
California Wolverine *Gulo gulo luteus*	D	ST	SC
Pacific Fisher	D	ST	SC

Martes pennanti			
Pacific Fringe-tailed Bat *Myotis thysanodes vespertinu*	D	Sensitive	SC
Townsend's Big-eared Bat *Corynorhinus townsendii*	D	Sensitive	SC
Canada Lynx (*Lynx canadensis*)	S	Sensitive	SC

TRAPPER APPENDIX E

Monitoring Questions Associated with the Blue River Landscape Strategy and the Trapper Project Alternative A and B

Monitoring{ XE "monitoring" }{ XE "monitoring" } Questions	**Measurement**
Water Temperature	
What are the characteristics of temperature regimes in small streams in un-harvested basins in the Blue River**{** XE "Blue River" **}** watershed? What effect does harvest as recommended in the *BRLS* have on stream temperature regimes over time? What are the effects of changes (if any) in headwater stream temperature regimes to temperature regimes in downstream reaches?	Measure stream temperatures
Riparian and Aquatics	
Did harvest alter the width/depth ratio or sediment load in class IV streams?	Measure stream cross sections
Was water temperature impacted by prescribed activities?	Measure stream temperatures in both treated and untreated areas and compare changes over time.
What effect does harvest have on Class III stream channel morphology and inputs of wood?	Measure stream channel morphology (width, depth, bedrock %, gradient, and steps) and presence of wood by size class, in both treated and untreated areas and compare changes over time.
Amphibians	
Were amphibians impacted by prescribed activities?	Measure stream amphibian presence in both treated and untreated areas and compare over time.
Vegetation	
What effect does harvest as recommended in the *BRLS* have on the plants and dead wood components?	Measure rate of tree regeneration Measure growth and mortality of residual trees Measure log and snag**{** XE "snag" **}** amounts and

Monitoring{ XE "monitoring" }{ XE "monitoring" } Questions	**Measurement**
	persistence Measure vascular plant dominance and diversity, biomass and production
Prescribed Fire{ XE "prescribed fire" }	
What effect does prescribed fire have on understory vegetation and overstory mortality?	Measure level of overstory fire mortality Evaluate ground cover components prior to and following burn.
Did buffers adequately protect survey and manage species?	Presence/abundance of Survey and Manage Species before and after prescribed fire.
What affect did prescribed fire have on non-survey and manage lichens?	Presence/abundance of species before and after prescribed fire.
What affect did prescribed fire have on alleviating legacy pesticide residues?	Measure before and after concentrations in the soils.
Did buffers adequately protect red tree voles?	Presence/abundance of species before and after prescribed fire.

TRAPPER APPENDIX F

Results of Prefield Review and Field Reconnaissance for Protection Buffer and Survey and Manage Plant Species

Willamette National Forest

Project Name: Trapper Project EA Unit #(s): 20, 21, 40, 26, 71

Township: 14S Range: 5E Section(s): 34, 35, 36

Is the project ground disturbing? Yes X (if yes, then conduct survey)
No _____ (if no, then document in project file)

Species	Habitat Present? (Y/N)	Date Surveyed	Surveyor(s) Name(s)	Species Located? (Y/N)	Additional Survey Needs? When and Where?
*[1]*Botrychium minganense*	Y	1998, 1999	CRA	N	N
**Botrychium montanum*	Y	1998, 1999	CRA	N	N
Bridgeoporus nobilissimus	Y	1998, 1999	CRA	N	N
**Coptis trifolia*	N	1998, 1999	CRA	N	N
**Corydalis aqua-gelidae*	N	1998, 1999	CRA	N	N
Cypripedium montanum	N	1998, 1999	CRA	N	N
**Eucephalus vialis*	N	1998, 1998	CRA	N	N
Galium kamtschaticum	N	1998, 1999	CRA	N	N
Hypogymnia duplicata	Y	1998, 1999	CRA	N	N
Lobaria linita	Y	1998, 1999	CRA	N	N
Pseudocyphellaria rainierensis	Y	1998, 1999	CRA	Y	N
Schistostega pennata	N	1999	CRA	N	N
Tetraphis geniculata	Y	1999	CRA	N	N

This list is from the Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, USDA & USDI 2001.

Leptogium cyanescens and *Ramalina thrausta* were added to Category A in January 2001, *Dendriscocaulon intricatulum* and *Nephroma occultum* were added to Category A on June 14, 2002 following the 2001 Annual Species Review. No botanical species were added to the list during the 2002 Annual Species Review. These species are exempt from surveys for this project because the survey

[1] * Starred species are also on the Willamette NF Sensitive Species List

protocols had not been developed at the time of the survey (Survey and Manage ROD and S&G 2001, Pg23).

CRA= Cryptogam Research Associates: Eric Meunch, Ron Hamill, and Tamen Earhart

NOTE: Additional species for which pre-disturbance surveys were not required, but were incidentally located during field work:
Buxbaumia viridis, Category D. >200' beyond boundary on unit 20-1. No additional protection needed.
Nephroma occultum, Category B. Within unit 40-1. Manage known site with 172' radius no-disturbance buffer.
Ramari stuntzii, Category B. Within unit 21-2. Manage known site with a 172' radius no-disturbance buffer.

Signature:

/s/ Susan Stearns March 21, 2003
Botanist Date

Species	Recommendations	Comments
Botrychiumm minganense		
Botrychium montanum		
Bridgeoporus nobilissimus		
Coptis trifolia		
Corydalis aqua-gelidae		
Cypripedium montanum		
Eucephalus vialis		
Galium kamtschaticum		
Hypogymnia duplicata		
Lobaria linita		
Pseudocyphellaria rainierensis	A one tree height no-cut buffer will be placed around each occurrence.	
Schistostega pennata		
Tetraphis geniculata		

Results of Prefield Review and Field Reconnaissance for Protection Buffer and Survey and Manage Animal Species

Willamette National Forest

Project Name: Trapper

Location: T 14S R4E Sec 34,35,36
T 14S R5E Sec 4

Is the project ground disturbing? Yes __X__ (if yes, then conduct survey if required by matrix)

No _____ (if no, then document in project file)

Species	Habitat Present? (Y/N)	Date Surveyed	Surveyor(s) Name(s)	Species Located? (Y/N)	Additional Survey Needs? When and Where?
Megomphix hemphilli Oregon megomphix	Y	1998&1999	White & others	N	N
Pristiloma arcticum crateris Crater Lake tightcoil	Y	1998&1999	Phillips & others	N	N
Strix nebulosa Great gray owl	N	NA	NA	NA	NA
Phenacomys (Arborimus) longicaudus Red tree vole	Y	2000&2002	Britting & others	Y	N

Red tree voles were found in unit 71. Three active nests and one inactive nest were located. A habitat protection area encompassing the nests has been designated in the southern half of unit 71.

/s/ Shane D. Kamrath — 3-24-2003

Wildlife Biologist — Date

TRAPPER APPENDIX G

Background Information and Implementation Details (Prescription) for Trapper Project Alternatives A and B

Block 20

Description:
This 169 acre block includes several clearcuts that were harvested between 1979 and 1984, accounting for almost half (78 acres) of the block. The rest is a mature stand (about 140 years old) with scattered old-growth trees. There are two areas of active earthflow terrain on the SE and NW corners of the block, and these, along with about 13 acres that are unsuited for regeneration, will be removed from the area scheduled for harvest. Slopes range from 30-50% on the West portion to over 90% on the steep headwall area near the center of the block. The aspect is generally SW. Pistol butted trees are common on the steep slopes. Root rot pockets (both *Armillaria* and laminated) are scattered throughout the block, and there are numerous snags present in all decay classes. The elevation ranges from 3,200 feet near Mann Creek, to over 4,500 feet on the divide between the Blue River and McKenzie districts. The upper slopes have more noble fir and Pacific silver fir in the stand, along with Douglas fir and western hemlock. Pacific yew is also present along with a few western redcedar and western white pine. The average net volume is about 50 mbf/acre. Elk use is common throughout the block. A small wetland and pond is located in the southeastern portion of the block. The noxious weeds Canada thistle (*Circium arvense*) and bull thistle (*Cricium vulgare*) are present in this block. The following table summarizes the stand data:

Unit	Total Acres	TPA	Ave. DBH	BA	Age	Elev.	SRI	Plant Assoc.	SI/50	Site Class
20-1	7	85	23.9	264	140	4000	235	CFS651	110	III
20-2	6	85	23.9	264	140	3700	235	CFS151	86	III
20-3	30	85	23.9	264	140	3500	235	CHS352	99	III

The plant associations for the upper slopes of the block are a combination of CFS651 (ABAM/ACCI/TITR) AND CFS151 (ABAM/BENE). These are warm, well drained, moderately productive to very productive sites in the Pacific silver fir zone. Shade from the retention trees will help regeneration of Douglas fir, noble fir and western white pine. Ground vegetation consists of Oregon grape, vine maple, vanilla leaf, Prince's pine, bunchberry, coolwort foamflower, twinflower, swordfern, hazelnut, and in some of the wetter areas along streams and near the pond, devil's club. Areas with more open canopy had regeneration of western hemlock and Pacific silver fir.

The lower slopes and more gentle terrain to the West have a plant association of CHS352 (TSHE/RHMA-BENE). These are warm to moderately cool sites with shallow, rocky, somewhat droughty soils. This is typical of sites with rhododendron, which have less available nitrogen. Regeneration is usually not a problem if trees are established quickly after harvest. Shade from the canopy retention will help seedling survival on south facing slopes. Ground vegetation consists of rhododendron, Oregon grape, and ocean spray. Along the more open western

boundary, which has had some blowdown and been opened, the regeneration is almost completely western hemlock.

Landscape Objective/Desired Landscape Condition:
This block is within Landscape Area 3. The objective is to manage succession based on a history of infrequent, moderate to high intensity fires, on a relatively large scale. The resulting prescription is a 260-year harvest cycle with 15% canopy retention. The regeneration of this block will be completed with this entry.

Block Objectives:

- There are 7 streams within the block. Four of these streams are located in the area of harvest. A pond on the SE border of the block provides water to one of these streams and creates a wet area on the edge of the block. The objective is to manage these streams to produce high water quality for downstream habitat. The most northern stream along the private boundary provides flow and potential large wood to Mann Creek. The objective is to continue providing a source for large wood to the Mann Creek riparian reserve since the existing reserve has been harvested in the past and will not provide large wood for years.

- Maintain the integrity of hydrological processes associated with wetlands and the pond along the block boundary.

- With SRI 252 there is an increase in potential for mass movement with management activities. The objective is to minimize potential for soil movement. Exclude from timber production the area of unstable soil.

- Manage for snag and down wood levels to be representative of the fire history of LA3 (~30% of trees 18" dbh and larger for snags and at least three trees per acre for DWM).

- Provide wildlife trees and DWM in addition to green tree canopy retention levels.

- Minimize invasion and spread of noxious weeds.

- Meet the fuel hazard reduction standard.

- Canopy retention levels will apply only to the areas to be regenerated. Existing plantations will not be considered in the overall canopy retention prescription for the block at this time.

Harvest Details:
Unit 20-1 (20 acres): The objective is a 15% canopy closure, on average, within this stand. Approximately 0.5 acres will be left in clumps to protect existing high quality snag habitat. Approximately 1.0 acre will be converted into gaps. The gaps are usually located around root rot pockets. The range of sizes of the clumps and gaps will be from 0.1 to 0.5 acres.

Unit 20-2 (6 acres): The objective is 50% canopy closure, on average, within this stand to provide soil stability, evenly distributed, without clumps and gaps.

Unit 20-3 (30 acres): The objective is 15% canopy closure, on average, within this stand. One or two clumps totaling approximately 0.7 acres will be left to protect areas of high quality snag

habitat. Approximately 1.4 acres will be in small gaps (0.25 acres or larger). The gaps will be located around root rot pockets.

Green trees retained for future snags and down wood

Unit #	**TPA pre-harvest (>7" dbh)**	**Snag Prescription**			**Down wood/ac (feet/TPA) (>31" dbh)**	**Total TPA snags & down wood**	**Total post-harvest leave trees**	**Desired fire mortality TPA/ acceptable range**
		Species/ Retained Size	**TPA Pre-Harvest**	**Snags per acre**				
20-1, 20-3 areasw/ 15% reten-ion	84	**DF**			~240/3	19.9	24.9	7.5/2.5-12.5 30%/10-50%
		18-24"	17.6	5.3				
		25-30"	16.7	5.0	90% DF and 10% WH/TF			
		31"+	12.9	3.9				
		Total	47.2	14.2				
		WH/TF		1.7				
		18-24"	5.8	0.5				
		25-30"	1.5	0.5				
		31"+	1.5	2.7				
		Total	8.8	5.4				
		Grand Total	56.0	16.9				
20-1 areaw/ 30% reten-ion	84	**DF**			~240/3	11.3	25.9	2.6/0-5.2
		18-24"	17.6	2.65.3				
		25-30"	16.7	2.5				
		31"+	12.9	1.9	90% DF and 10% WH/TF			
		Total	47.2	7.0				
		WH/TF						
		18-24"	5.8	0.9				
		25-30"	1.5	0.2				
		31"+	1.5	0.2				
		Total	8.8	1.3				
		Grand Total	56.0	8.3				

Unit #	TPA pre-harvest (>7" dbh)	Snag Prescription			Down wood/ac (feet/TPA) (>31" dbh)	Total TPA snags & down wood	**Total post-harvest leave trees**	Desired fire mortality TPA/ acceptable range
		Species/ Retained Size	TPA Pre-Harvest	Snags per acre				
20-2 areas w/ 50% reten-tion)	84	**DF**			~240/3	5.8	33.5	1.7/0-3.4
		18-24"	17.6	0.9				
		25-30"	16.7	0.8				
		31"+	12.9	0.6	90% DF and 10% WH/TF			
		Total	47.2	2.3				
		WH/TF						
		18-24"	5.8	0.3				
		25-30"	1.5	0.1				
		31"+	1.5	0.1				
		Total	8.0	0.5				
		Grand Total	56.0	2.8				

DF=Douglas fir; WH=western hemlock; WRC=western redcedar; TF=true fir.

Block 21

Description:

This 168 acre block includes two clearcuts that were harvested in 1963 and 1975, accounting for about 37 acres of the block. The rest is a mature stand (about 140 years old) with a few scattered residual old-growth trees. There is an area of active earthflow terrain in the North central portion of the block, and this, along with about 25 acres that are unsuited for regeneration, will be removed from the area scheduled for harvest. Slopes range from 30-50% on the southern portion to 60-80% on the western and northern portions of the block. The aspect is generally SE. Root rot pockets (both *Armillaria* and *Phellinus*) are scattered throughout the block, and there are numerous snags present in all decay classes. The elevation ranges from 3,500 feet along road 1517, to about 4,000 feet on the ridge. The upper slopes have more noble fir and Pacific silver fir in the mix of species, along with Douglas fir and western hemlock. Pacific yew is also present with a few western white pine and chinquapin. The average net volume is about 45 mbf/acre. Elk use is common throughout the block. Several rock outcrops and crevices are located along the West edge of the stand. The noxious weeds Canada thistle (*Cirvium arvense*) and bull thistle (*Circium vulgare)* are present this block. The following table summarizes the stand data:

Unit	Total Acres	TPA	Ave. DBH	BA	Age	Elev.	Plant Assoc.	SI/50	Site Class
21-1	31	86	23.9	269	140	3800	CFF152	115	III
21-2	49	86	23.9	269	140	3600	CHS114	114	III
21-4	1	86	23.9	269	140	3450	CFF152	115	III

The plant association in the northern half of the block is CFF152 (ABAM/TITR). These are moist, cool sites with relatively fertile soils. This association is one of the most productive and easily regenerated in the Pacific silver fir zone. Noble fir and western white pine grow well along with Douglas fir. Ground vegetation consists of coolwort foamflower, vanilla leaf, red huckleberry, vine maple, rhododendron, Prince's pine, Oregon grape, and beargrass.

The southern portion of the block is CHS114 (TSHE/BENE-ACTR). This is the relatively dry and cool portion of the western hemlock series. Regeneration may be a problem on some sites due to rocky soils, competition, and summer drought, but once established, trees grow very well. Ground vegetation includes Oregon grape, vanilla leaf, Prince's pine, vine maple, huckleberry, bunchberry, and rhododendron.

Landscape Objective/Desired Landscape Condition:
This block is within Landscape Area 3. The objective is to manage succession based on a history of infrequent, moderate to high intensity fires, on a relatively large scale. The resulting prescription is a 260-year harvest cycle with 15% canopy retention. The regeneration of this block will be completed with this entry.

Block Objectives:

- The objective is to manage the 9 streams in this block to produce high water quality for downstream habitat. Five of the streams are located in the area of harvest. Since stream 21D and it's tributaries 21C, 21E, and 21I are displaying bank and channel instability and are carrying large sediment loads associated with earth flow activity, large wood in these channels is important to retain existing stability. Stream 21D flows directly into a Class 2 Riparian Reserve that has potential for spawning habitat below the confluence of Stream 21D.

- With SRI 235 there is an increase in potential for mass movement with management activities. The objective is to minimize potential for soil movement

- Maintain survey and manage species and their habitat.

- Minimize invasion and spread of noxious weeds.

- Manage for snag and down wood levels at levels representative of the fire history of LA3 (~30% of trees 18" dbh or larger, and three trees/acre for DWM).

- Provide wildlife trees and DWM in addition to green tree canopy retention levels.

- Meet the fuel hazard reduction standard.

- Canopy retention levels will apply only to the areas to be regenerated. Existing plantations and areas of unsuited soils will not be considered in the overall canopy retention prescription for the block.

Harvest Details:

Unit 21-1 (31 acres): The objective is 15% canopy closure, on average, within this stand. Several clumps totaling about three acres (9% of the stand) will be left to protect areas of high quality snags. Twice that area (6 acres) will be in small gaps, usually around root rot pockets. Clumps and gaps can range in size from 0.1 to 1.0 acre. The remaining 22 acres will be at about 8% canopy closure to bring the stand average to 15%.

Unit 21-2 (49 acres): The objective is 15% canopy closure within this stand. Four acres (9% of the stand) will be clumps to protect survey and manage species and areas of high quality snag habitat. Twice that area will be in gaps located around root rot pockets. Clumps and gaps can range in size from 0.1 to 1.0 acre. The remaining 37 acres will have a canopy closure of 9% to balance the stand at 15% overall.

Unit 21-4 (1 acre): Same marking guide as 21-1, with no clumps or gaps.

Green trees retained for future snags and down wood

Unit #	**TPA pre-harvest (>7" dbh)**	**Snag Prescription**			**Down wood/ac (feet/TPA) (>31" dbh)**	**Total TPA snags & down wood**	**Total post-harvest leave trees**	**Desired fire mortality TPA/ acceptable range**
		Species/ Size	**TPA Pre-Harvest**	**Snags Retained per acre**				
21-1, 2, 4	87	**DF**			~240/3	18.4	22.7	6.8/2.3-11.4 30%/10-50%
		18-24"	14.4	4.3				
		25-30"	15.5	4.7	95% DF and 5% WH/TF			
		31"+	17.7	5.3				
		Total	47.6	14.3				
		WH/ TF						
		18-24"	2.2	0.7				
		25-30"	0.4	0.1				
		31"+	1.0	0.3				
		Total	3.6	1.1				
		Grand Total	51.2	15.4				

DF=Douglas fir; WH=western hemlock; WRC=western redcedar; TF=true fir.

Block 40

Description:

This 118 acre block includes two clearcuts that were harvested in 1979 and 1990, accounting for about 41 acres of the block. The rest is a mix of old growth (24 acres) and a mature stand (51 acres, about 140 years old) with a few scattered residual old-growth trees. There is also a small area of unsuited 310 soils (2 acres) in the northwest corner of the block. Slopes range from 20-80%. The aspect varies from East to South to West around the nose of a South-facing ridge. Root rot pockets are scattered through the block, and there are numerous snags present in all decay classes. Several areas of blowdown are present along edges of existing clearcuts. The elevation ranges from 2,680 feet along road 15, to about 3,360 feet on the ridge. The upper slopes have more noble fir and Pacific silver fir in the mix of species, along with Douglas fir, western hemlock and western red cedar. Dwarf mistletoe is common in the hemlock. The average net volume is about 50 mbf/acre. The noxious weeds bull thistle (*Circium vulgare*) and St Johnswort (*Hypericum perforatum*) are located within this block. The survey and manage lichens *Pseudocyphelleria rainierensis* and *Nephroma occultum* are present in this block. Red tree vole and Survey and Manage mollusk surveys were conducted and none were found. The following table summarizes the stand data:

Unit	Total Acres	TPA	Ave. DBH	BA	Age	Elev.	Plant Assoc.	SI/50	Site Class
40-1	30	222	17.5	372	140	3300	CFS253	85	III
	20	222	17.5	372	140	3120	CHS125	105	III

The plant association in the northern half of the block is CFS253 (ABAM/VAAL/COCA). These are moist, cool sites with moderately productive soils. Regeneration is usually not difficult. Noble fir and western white pine grow well along with Douglas fir. Ground vegetation consists of red and blue huckleberries, bunchberry, swordfern, vine maple, rhododendron, Prince's pine, and Oregon grape. Regeneration includes Pacific silver fir and western hemlock.

The southern portion of the block is CHS125 (TSHE/BENE). These are warm, well drained, moderately productive sites with moderately deep soils. Tree growth is good. Ground vegetation includes Oregon grape, vanilla leaf, Prince's pine, vine maple, huckleberry, bunchberry, and rhododendron. Regeneration of hemlock and western redcedar is present.

Landscape Objective/Desired Landscape Condition:
This block is within Landscape Area 3. The objective is to manage succession based on a history of infrequent, moderate to high intensity fires, on a relatively large scale. The resulting prescription is a 260-year harvest cycle with 15% canopy retention. The regeneration of this block will be completed with this entry.

Block Objectives:

- The objective for this block is to continue to produce high quality water for downstream habitat, and maintain stream bank stability.

- With SRI 252 there is an increase in potential for mass movement with management activities. The objective is to minimize potential for soil movement on the northeast slope.

- In the WNF the Management Allocation is AMA with partial retention foreground along Road 15.
- Manage for snag and down wood levels at levels representative of the fire history of LA3 (~30% of trees 18" dbh or larger, and three trees/acre for DWM).
- Maintain Survey and Manage species and their habitat.
- Minimize the invasion and spread of noxious weeds.
- Provide wildlife trees and DWM in addition to green tree canopy retention levels.
- Meet the fuel hazard reduction standard.

Harvest Details:

Unit 40-1 (50 acres): The objective is an average of 15% canopy closure, on average, within this stand. A few clumps totaling about two acres (4% of the stand) will be left to protect areas of high quality snags and survey and manage species. An equal area will be in small gaps around root rot pockets. Clumps and gaps can range in size from 0.1 to 1.0 acre. A larger opening of about 8 acres on the west slope will be created to balance the higher retention levels on the southern slope, which is visible from Road 15. The remaining 38 acres will be at about 14% canopy closure to bring the stand average to 15%. Two retention areas will be placed near the western stream.

Green trees retained for future snags and down wood

Unit #	TPA pre-harvest (>7" dbh)	Snag Prescription			Down wood/ac (feet/TPA) (>31" dbh)	Total TPA snags & down wood	Total post-harvest leave trees	Desired fire mortality TPA/ acceptable range
		Species/ Size	TPA Pre-Harvest	Snags Retained per acre				
40	222	**DF**			~240/3	26.7	33.3	10/3.3-16.7
		18-24"	41.6	12.5				30%/10-50%
		25-30"	16.0	4.8				
		31"+	11.0	3.3	100% DF			
		Total	68.6	20.6				
		WH						
		18-24"	6.8	2.0				
		25-30"	3.6	1.1				
		31"+	0.0	0.0				
		Total	10.4	3.1				
		WRC						
		18-31"+	0	0				
		Grand Total	79.0	23.7				

DF=Douglas fir; WH=western hemlock; WRC=western redcedar; TF=true fir.

Block 26

Description:
This 77 acre block is a mature stand (about 140 years old) with a few scattered residual old growth trees. There are several areas of rock outcrops and talus slopes, particularly along the eastern edge. Slopes range from 30-60% overall. The aspect is generally West. The elevation varies from 3,100 feet, above the riparian reserve along Trapper Creek, to about 4,100 feet at the northern boundary which is adjacent to a section of private land. The upper slopes have more noble fir and Pacific silver fir in the mix of species, along with Douglas fir, western hemlock and western red cedar. Botanical Survey and Manage surveys were conducted, no survey and manage species were found with in burn units. The following table summarizes the stand data:

Unit	Total Acres	TPA	Ave. DBH	BA	Age	Elev.	Plant Assoc.	SI/50	Site Class
26	34	86	24	270	140	3800	CFS651	110	III
26	34	86	24	270	140	3600	CFS653	80	IV

The plant association for the southern portion of this block is CFS653 (ABAM/RHMA/XETE). These are relatively dry, cool environments. Snowpacks are persistent. As in other rhododendron dominated plant associations, productivity is relatively low. The duff layer contains most of the available nitrogen and should be conserved. Forage is abundant and big game use can be high. Ground vegetation consists of rhododendron, Oregon grape, beargrass, big huckleberry and twinflower.

The plant association for the upper slopes of the block is CFS651 (ABAM/ACCI/TITR). These are warm, well drained, moderately productive to very productive sites in the Pacific silver fir zone. Forage is limited and big game use this more as a travel corridor. Ground vegetation consists of Oregon grape, vine maple, vanilla leaf, Prince's pine, bunchberry, coolwort foamflower, twinflower and swordfern. Areas with more open canopy had regeneration of western hemlock and silver fir.

Landscape Objectives:
This block is within Landscape Area 3. The objective is to manage succession based on a history of infrequent, moderate to high intensity fires, on a relatively large scale. The resulting prescription is a 260-year harvest cycle with 15% canopy retention. As a part of the long-term prescriptions, low-severity fires are prescribed throughout the landscape area to help maintain ecosystem processes and historical plant and animal habitats. Application is scheduled to emulate the aerial and spatial distribution of fire effects in the historical pattern found in this area. Prescribed fire will reduce fuel loading, reset brush and herb species, and cause 10-20% mortality in overstory tree species. Natural post-fire recovery processes can then occur for several decades or more prior to timber harvest. The regeneration of this block is scheduled for 35-55 years from now.

Block Objectives:
- Return fire to a more natural role in the ecosystem.
- Manage for naturally occurring snag and down wood levels in LA3 by inducing tree mortality.
- Burn within the riparian area of the class III and IV streams within the block.
- Create horizontal and vertical diversity in the stand.

- Reduce fuel loading.
- Release nutrients.
- Improve big game forage quality and quantity.
- Minimize invasion and spread of noxious weeds.

Prescribed Burn Details:
The conditions at the time of the prescribed burn should reduce the ground vegetation and small fuels. There will also be 10-20% mortality within the stand of trees. Most of this will occur in the smaller size classes and thin-barked species like western hemlock and western red cedar that are less resistant to fire. In the Douglas fir, mortality will tend to be lower (about 10%) and will be mostly in the 11-13 inch diameter class. In the cedar and hemlock, mortality will be higher (about 20%), and occur mostly in the 7-10 inch diameter class. The effects may be similar to a light thin, but will be more patchy.

Block 71

Description:
This 108 acre block is a mature stand (about 140 years old) with residual old growth trees. There are two existing clearcuts (43 acres) that were harvested in 1987. Slopes range from 30-60% overall. The aspect is generally southwest. The elevation varies from 2,200 feet, above the riparian reserve along Quentin Creek, to about 3,100 feet at the northeastern boundary. The overstory is mostly Douglas fir, with western hemlock and a few western red cedar. Pacific yew is also present. Botanical Survey and Manage surveys were conducted, no survey and manage species were found within burn units. The following table summarizes the stand data:

Unit	Total Acres	TPA	Ave. DBH	BA	Age	Elev.	Plant Assoc.	SI/50	Site Class
71	25	193	19	390	140	2700	CHS124	101	III
71	25	193	19	390	140	3000	CHS114	114	III

The plant association on upper slopes and side ridges of the block is CHS114 (TSHE/BENE-ACTR). This is the relatively dry and cool portion of the western hemlock series. Regeneration may be a problem on some sites due to rocky soils, competition, and summer drought, but once established, trees grow very well. Most big game use occurs during the summer. Ground vegetation includes Oregon grape, vanilla leaf, Prince's pine, vine maple, huckleberry, bunchberry, and rhododendron.

On the lower slopes and in some of the draws on the upper slopes, the plant association is more like CHS124 (TSHE/BENE-GASH). The higher amounts of salal indicate drier conditions. Soils are generally resistant to the effects of a moderate slash fire. Wildlife use is low to moderate. Ground vegetation includes Oregon grape, salal, vine maple, red huckleberry, swordfern and twinflower.

Landscape Objective:
This block is within Landscape Area 2. The objective is to manage succession based on a history of relatively frequent, moderate to high intensity fires, on a moderately large scale. The resulting prescription is a 180-year harvest cycle with 30% canopy retention. Over time, this area will develop into a two-aged stand with an overstory of 200 to 400 year old trees (or older) and an understory managed on a 180 year regeneration cycle. As a part of the long-term prescriptions,

low-severity fires are prescribed throughout the landscape area to help maintain ecosystem processes and historical plant and animal habitats. Application is scheduled to emulate the aerial and spatial distribution of fire effects in the historical pattern found in this area. Prescribed fire will reduce fuel loading, reset brush and herb species, and cause 10-20% mortality in overstory tree species. Natural post-fire recovery processes can then occur for several decades or more prior to timber harvest. The regeneration of this block is scheduled for 35-55 years from now.

Block Objectives:

- Return fire to a more natural role in the ecosystem.
- Manage for naturally occurring snag and down wood levels in LA3 by inducing tree mortality.
- Burn within the riparian area of the class III and IV streams within the block.
- Create horizontal and vertical diversity in the stand.
- Reduce fuel loading.
- Release nutrients.
- Minimize invasion and spread of noxious weeds.
- Improve elk forage quality and quantity.

Prescribed Burn Details:

The conditions at the time of the prescribed burn should reduce the ground vegetation and small fuels. There will also be 10-20% mortality within the stand of trees. Most of this will occur in the smaller size classes and thin-barked species like western hemlock and western red cedar that are less resistant to fire. In the Douglas fir, mortality will tend to be lower (about 10%) and will be mostly in the 11-13 inch diameter class. In the cedar and hemlock, mortality will be higher (about 20%), and occur mostly in the 7-10 inch diameter class. The effects may be similar to a light thin, but will be more patchy.

TRAPPER APPENDIX H

KV Projects Associated with the Trapper EA

Project	Unit
Wildlife	
Forage Seeding	
Down wood	
Snags	
Landscape Study Monitoring	
Monitor effectiveness of Survey and Manage Species buffers.	
Trees, Vascular Plants	20, 21, 40, 75
Amphibians	20, 40
Stream Temps	20, 40
Streamside Retention	40, 71
Fisheries:	
Large wood Placement	40-1
Soil and Water	
Slide Restoration	40-1
Slide Restoration Monitoring	40-1
Store road 655 following fuelwood harvest	
Road cut stabilization on road 1617655 and 1617	
Store roads 1517560 and 15560	
Subsoil compacted areas	
Vegetation	
Prune 235 acres	
Precommercial Thin 723 acres	
Fertilization 17 acres	
Plant Douglas-fir and White Pine	

TRAPPER APPENDIX I

Trapper Unit 21 Before Harvest, Underburning, and Snag Creation

<u>Trapper Unit 21 After Harvest, Underburning, and Snag Creation</u>

Trapper Appendix J

USDA Forest Service	USDI Bureau of Land Management	USDI Fish & Wildlife Service	USDA Pacific NW Research Station	USDI Geological Survey BRD Service	USDC National Marine Fisheries	U.S. Environmental Protection Agency

Date:	March 14, 2002
To:	Robert Iwamoto, Acting Forest Supervisor, Willamette National Forest Julia Dougan, Eugene District Manager, Bureau of Land Management Fred Swanson, Corvallis Forestry Science Lab, Forest Service John Cissel, Blue River Ranger District, Forest Service Kemper McMaster, State Supervisor, U.S. Fish & Wildlife Service Allan Henning, Envir. Protection Specialist, U.S. Environmental Protection Agency
Subject:	Continued Support for the Blue River Landscape Management Plan

The Blue River landscape management plan in the Central Cascades Adaptive Management Area (AMA) rests on a sound science base and is an excellent opportunity to evaluate an alternative science-based management strategy. The direction in the Northwest Forest Plan Record of Decision specific to the Central Cascades AMA directs "intensive research on ecosystem and landscape processes and its application to forest management in experiments and demonstrations at the stand and watershed level; approaches for integrating forest and stream management objectives and on implications of natural disturbance regimes (USDA and USDI 1664, page D-12)."

We encourage you to continue with implementation of the Blue River Landscape Management Plan. Continue to learn from its implementation and your monitoring of its effects. We commit our support to this adaptive management experiment. We recognize that your units are helping us all learn from this evaluation.

HARV FORSGREN
Regional Forester, Region 6
Forest Service

ANNE BADGLEY
Regional Director
U.S. Fish and Wildlife Service

ELAINE ZIELINSKI
State Director, OR/WA
Bureau of Land Management

MIKE CROUSE
Acting Representative
National Marine Fisheries Service

JOHN D. BUFFINGTON
Regional Director, Western Region
Geological Survey

DAVE POWERS
Regional Manager, Forests & Rangelands
U.S. Environmental Protection Agency

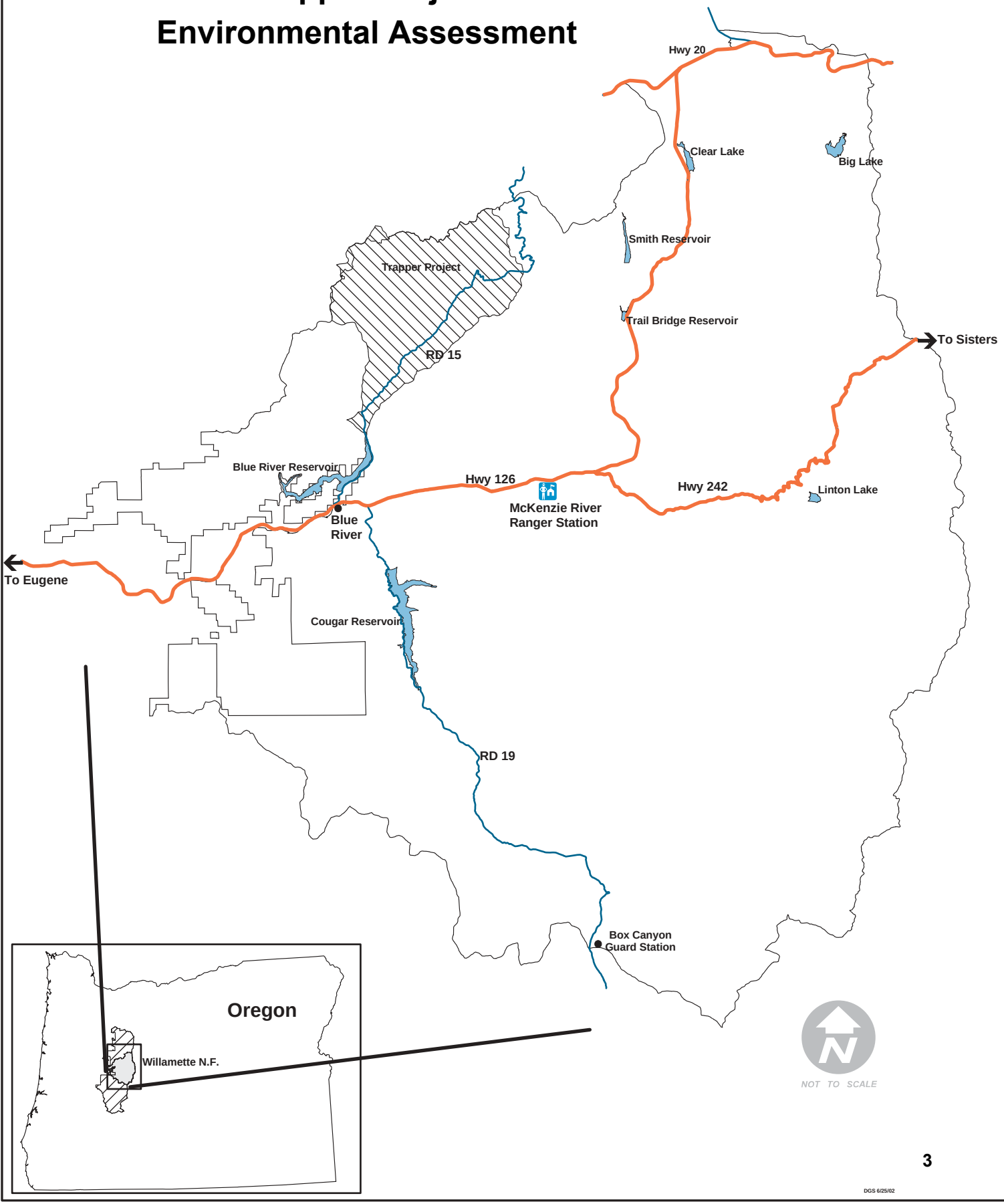
THOMAS MILLS
Station Director, Pacific Northwest
Forest & Range Experiment Station
Forest Service

cc: RIEC, REO
1723/ly

Vicinity Map

Figure 1

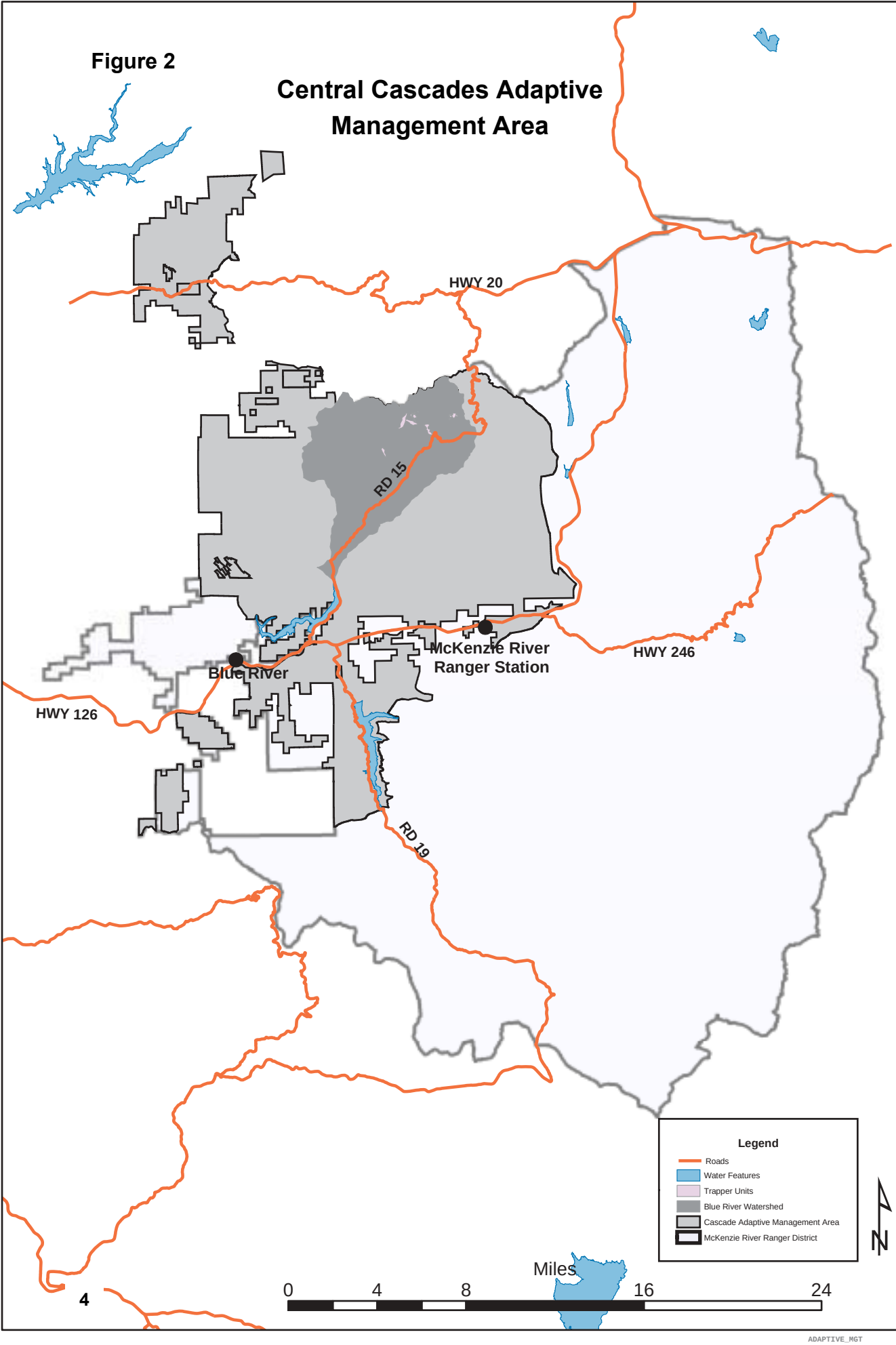
Trapper Project
Environmental Assessment



DGS 6/25/02

Figure 2

Central Cascades Adaptive Management Area



ADAPTIVE_MGT

Figure 3

Blue River Landscape Strategy Map

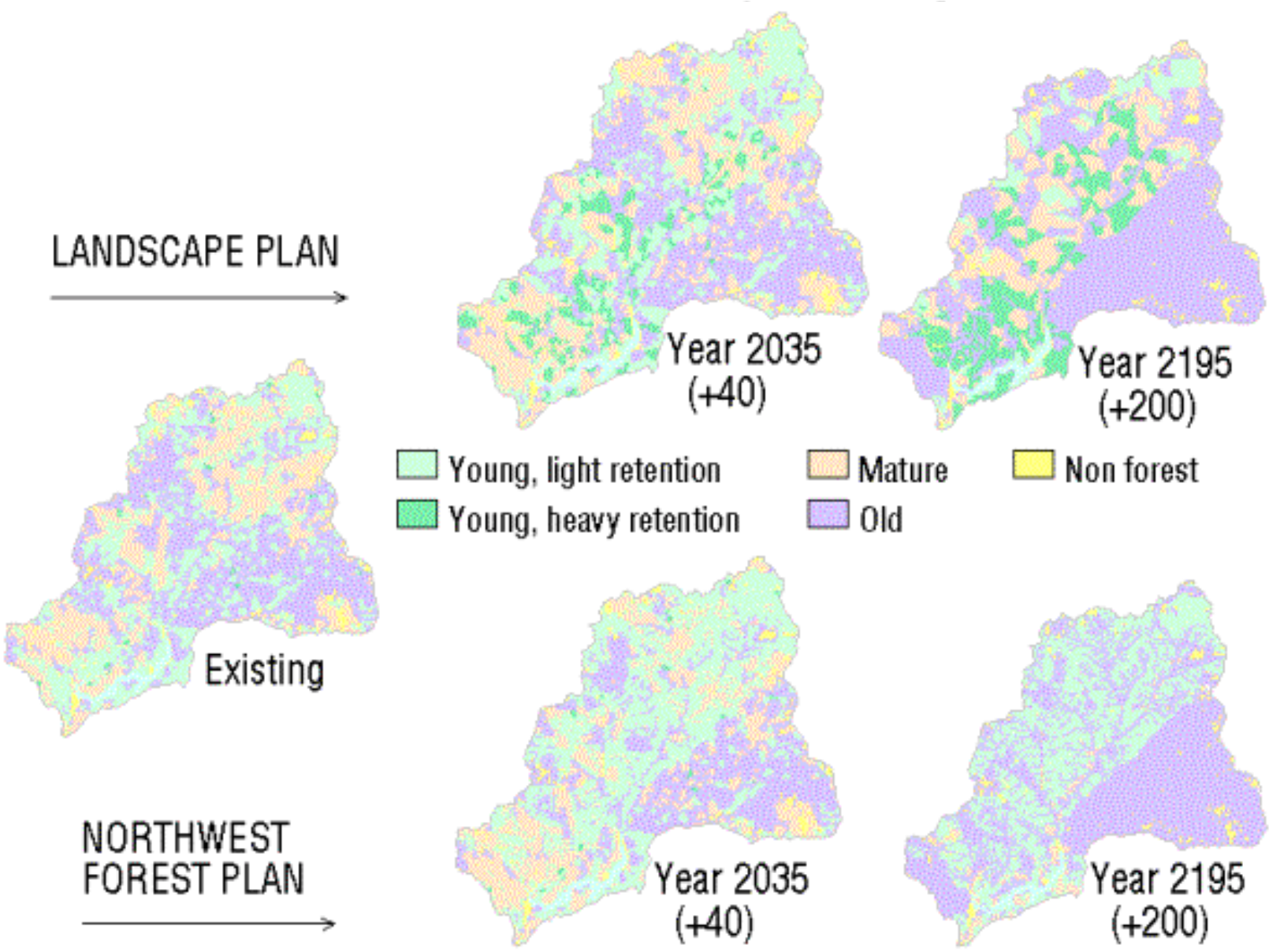


Figure 4

Blue River Landscape Strategy Recommendations for the Trapper Planning Area

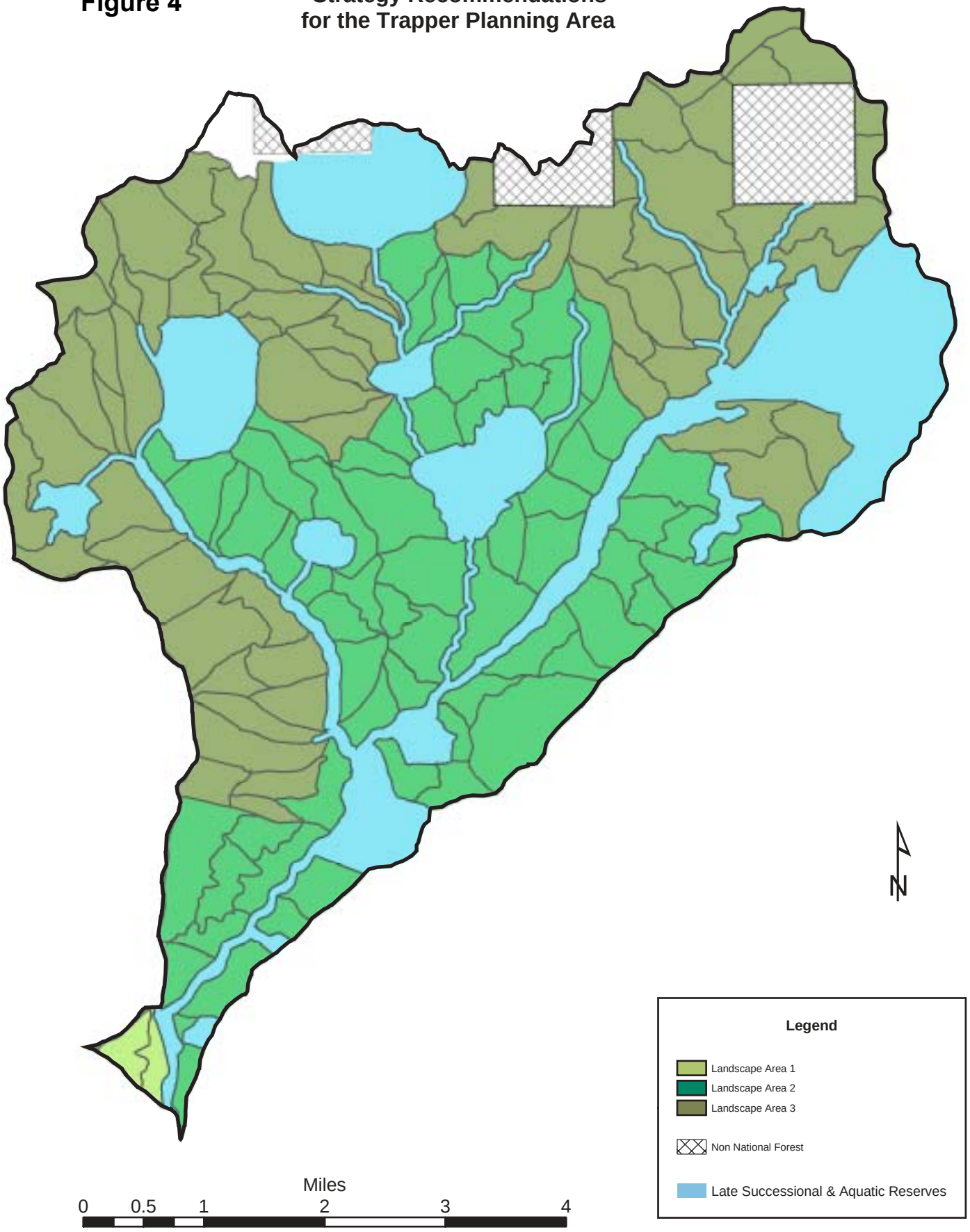
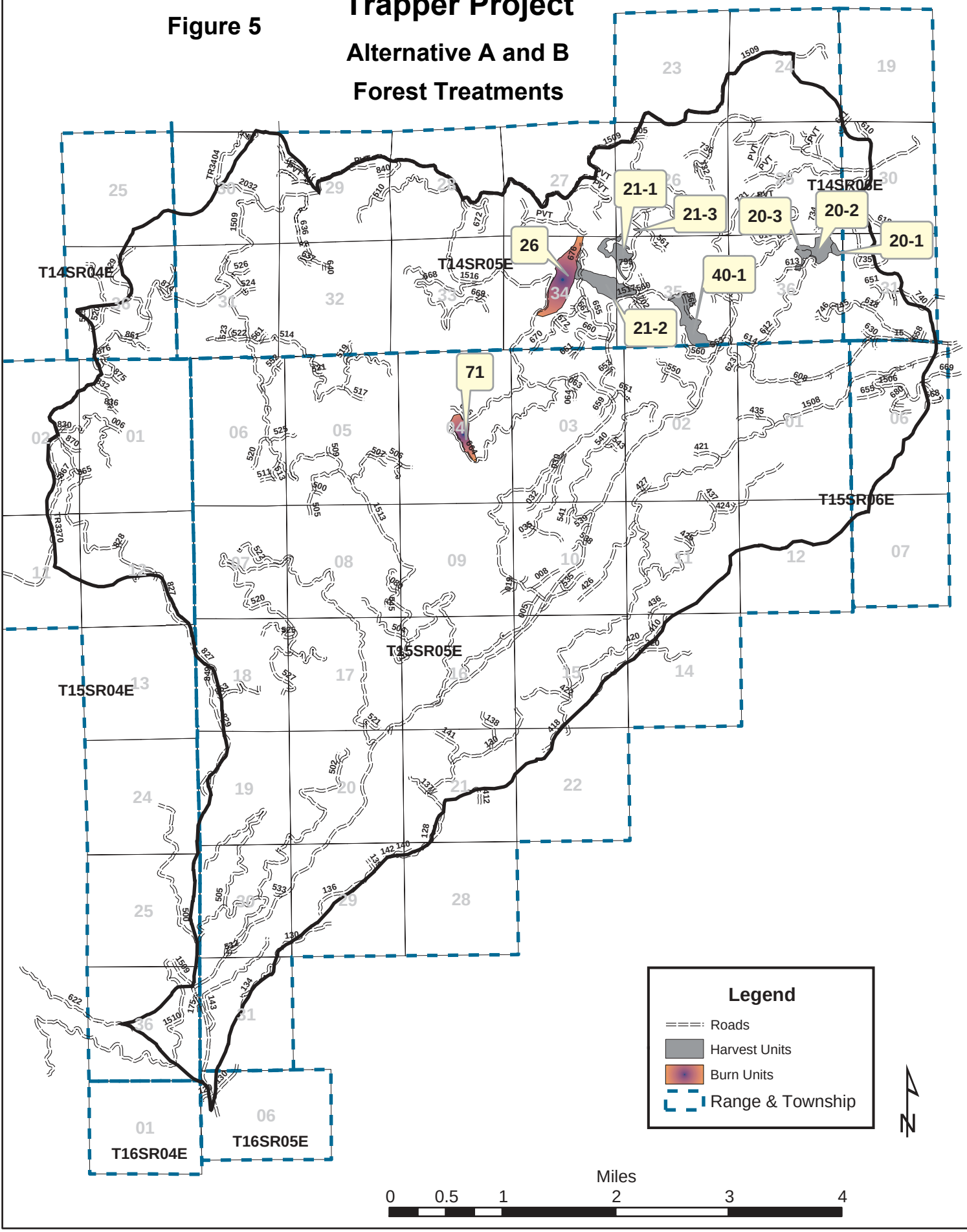


Figure 5

Trapper Project

Alternative A and B

Forest Treatments



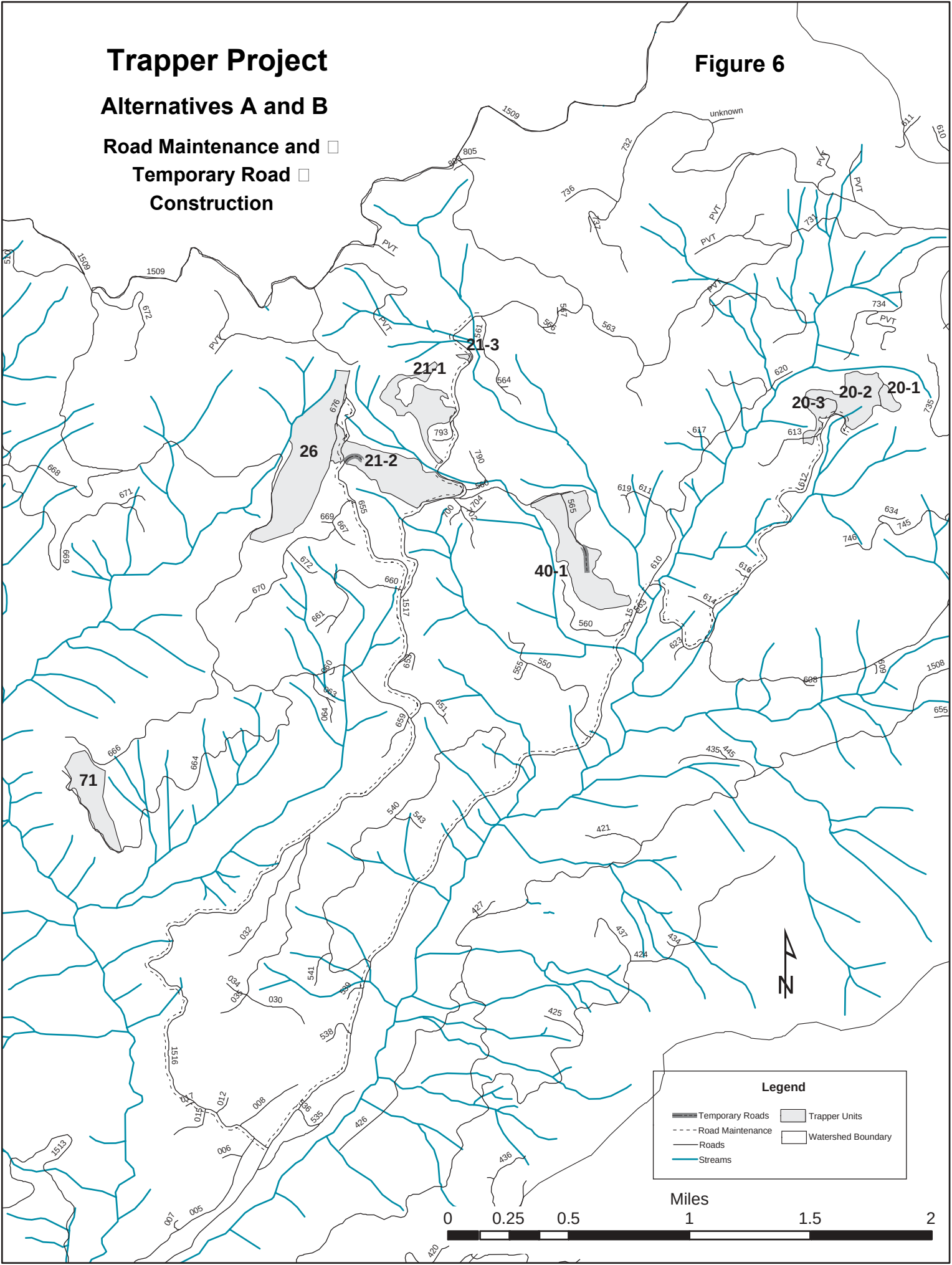
Units_trap.mxd

Trapper Project

Alternatives A and B

Road Maintenance and Temporary Road Construction

Figure 6



Trapper Project

Figure 7

Alternative B

Road Storage and Decommissioning

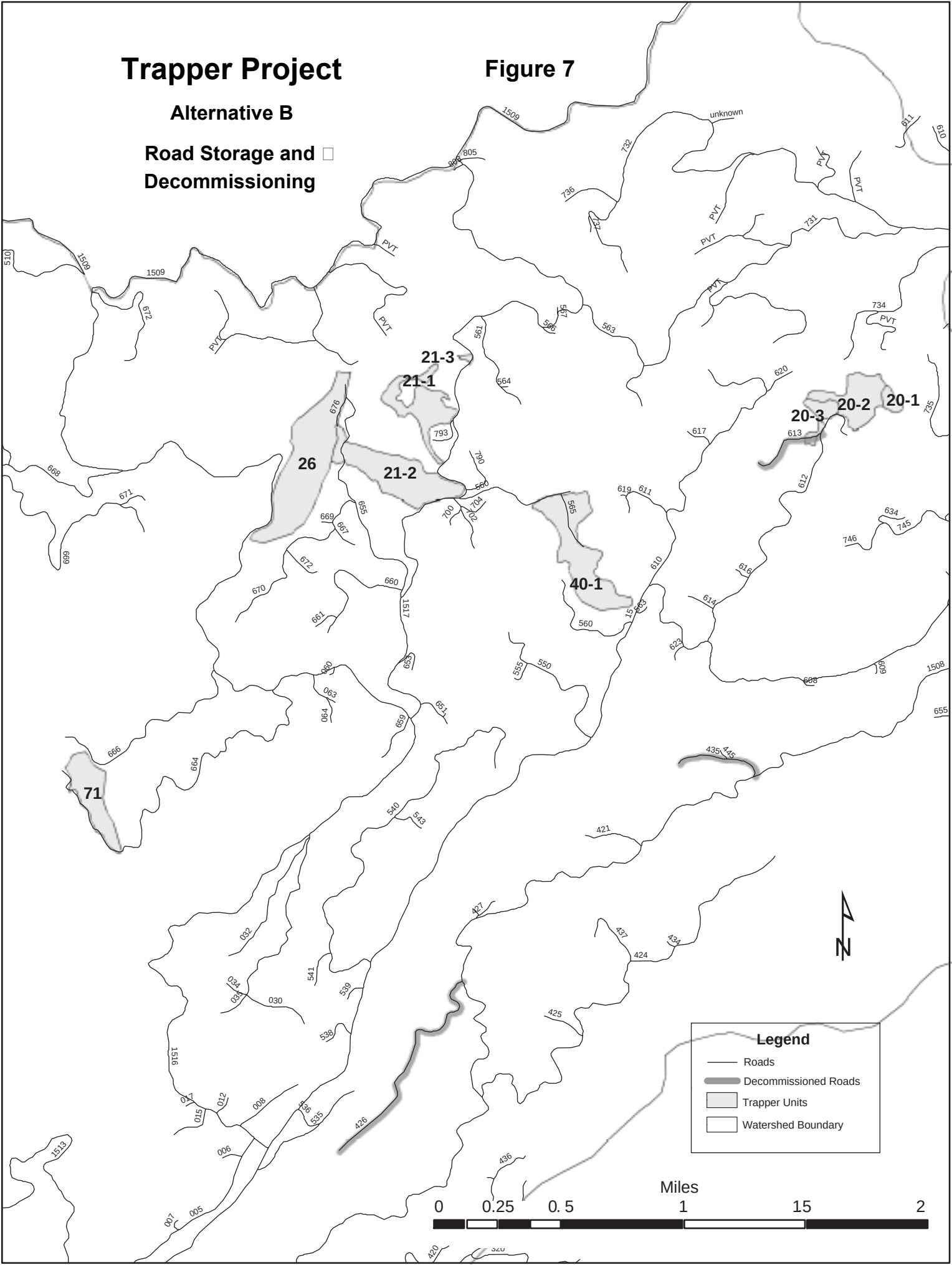
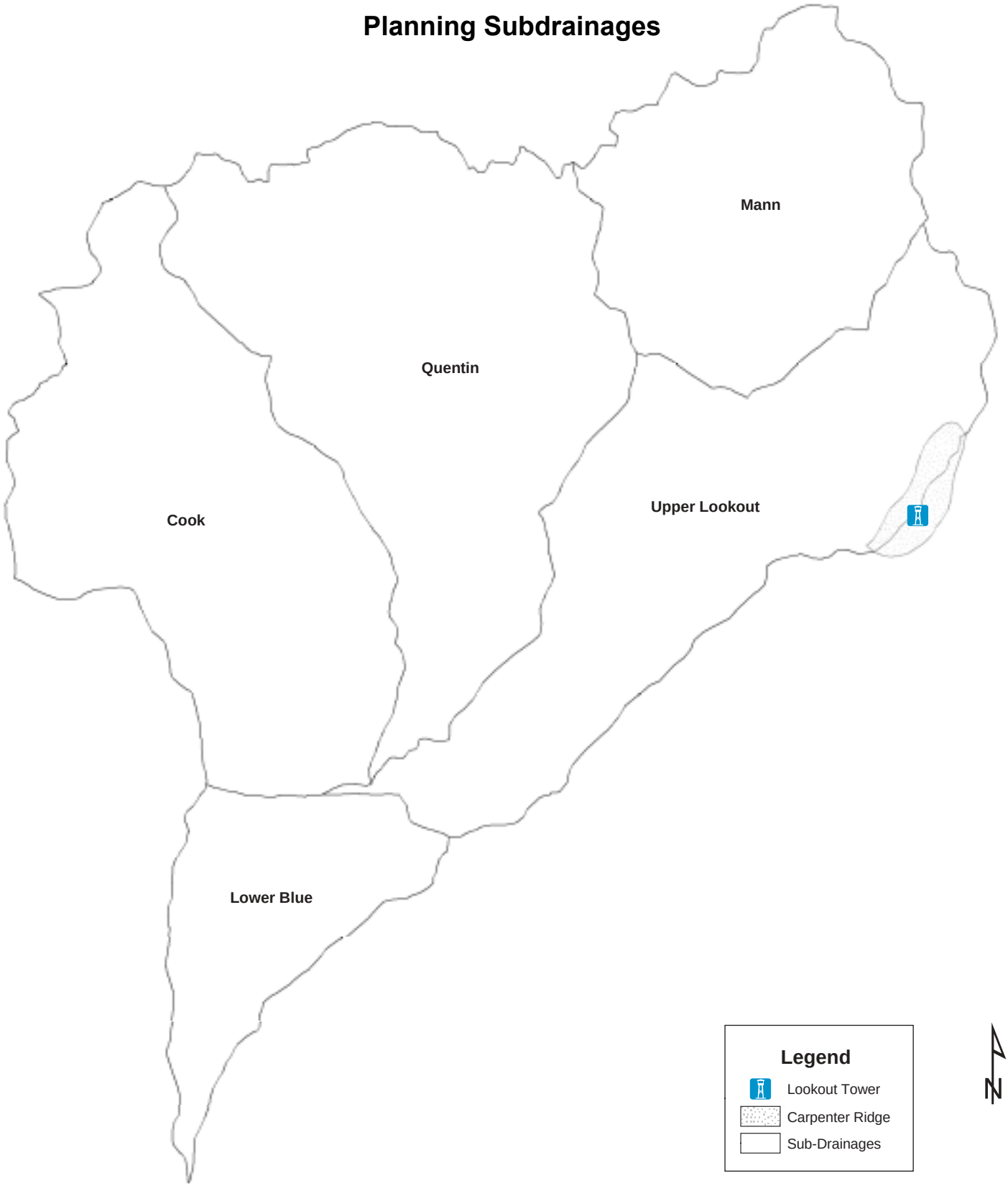


Figure 8

Trapper Project

Planning Subdrainages



Trapper Project

Figure 9

Source Areas for Material Important to Aquatic Systems

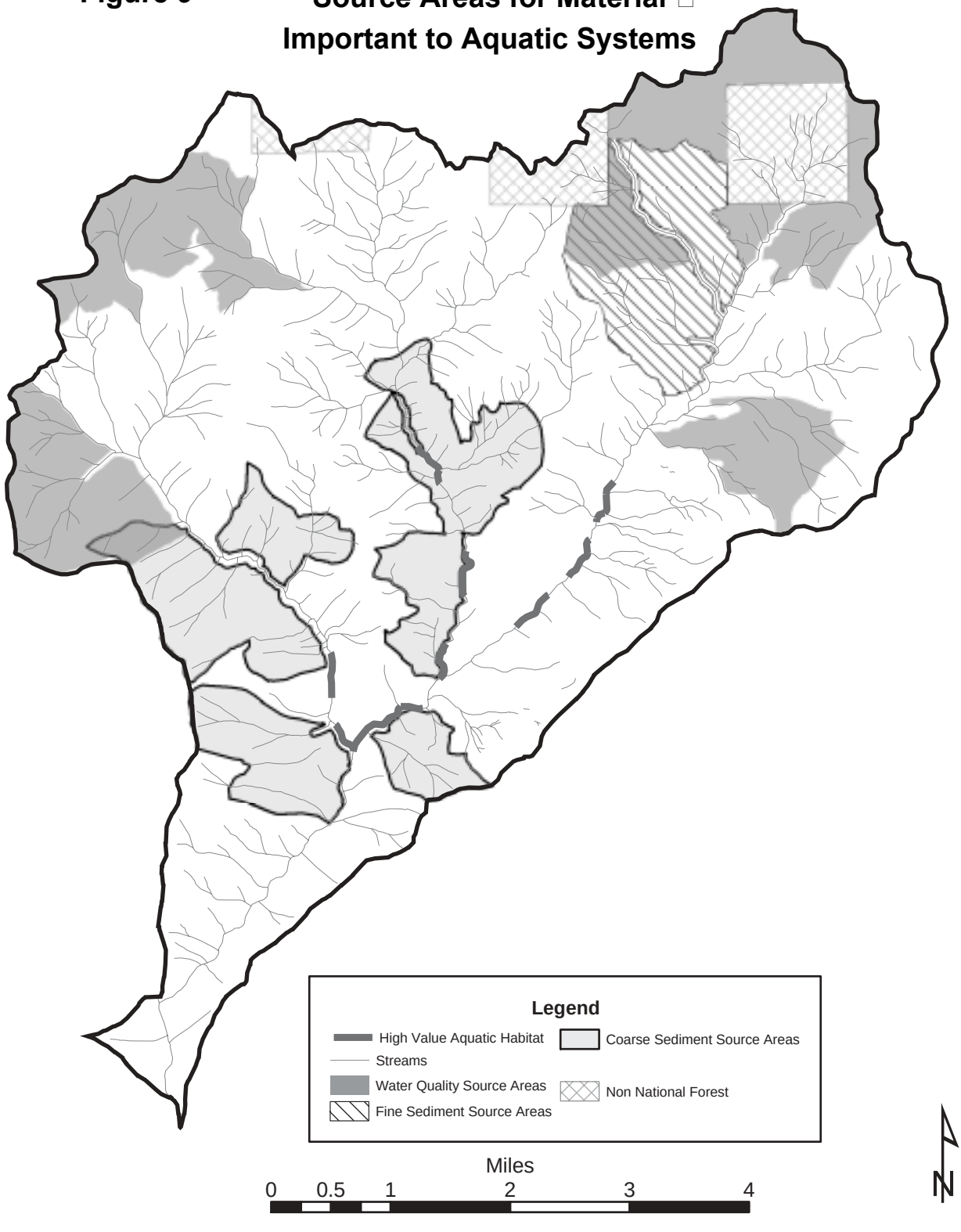


Figure 10

Trapper Project

Slope Stability Map

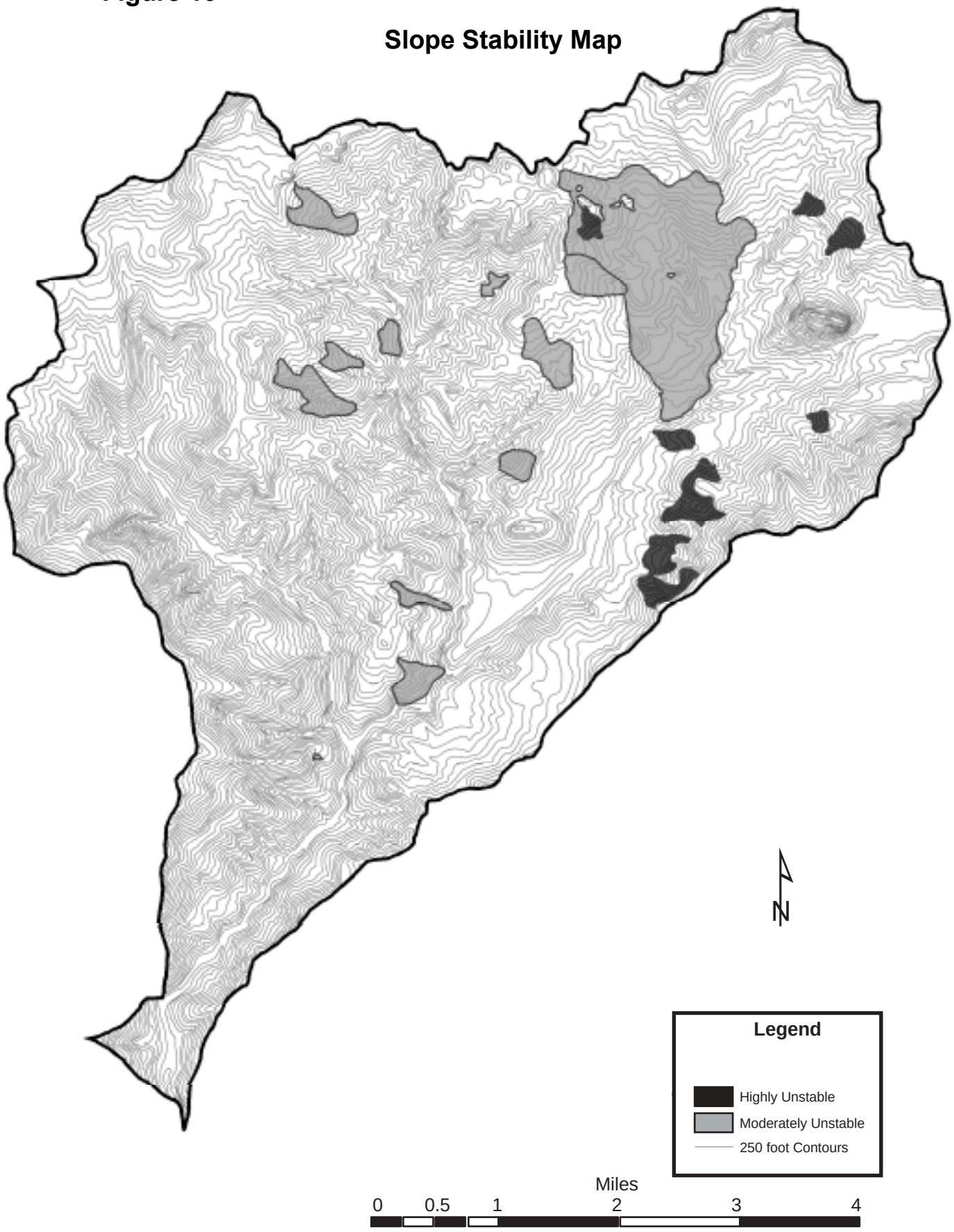
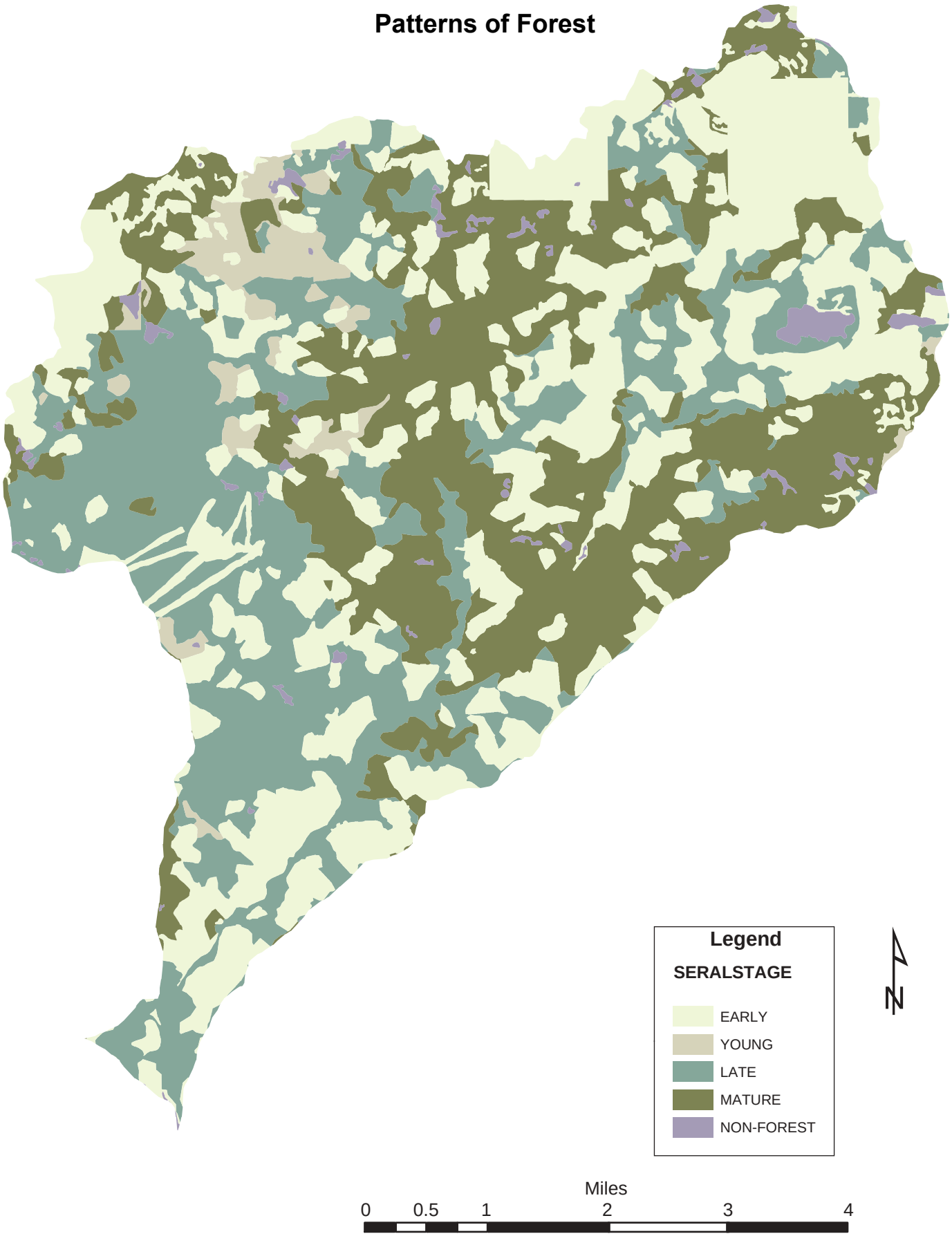
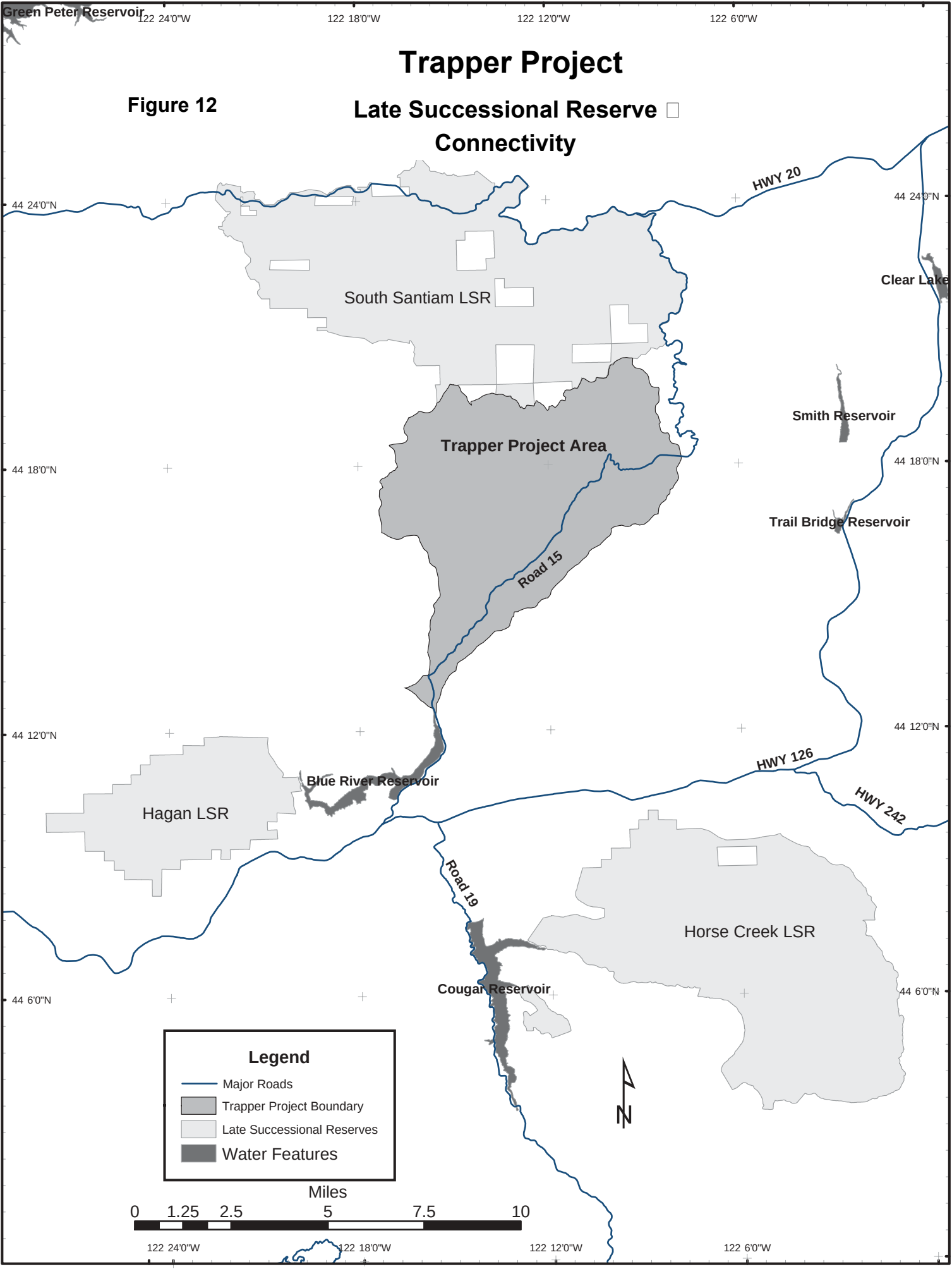


Figure 11

Trapper Project

Patterns of Forest




Trapper Project
Figure 12
Late Successional Reserve
Connectivity
Green Peter Reservoir
122 24'0"W
122 18'0"W
122 12'0"W
122 6'0"W
44 24'0"N
44 18'0"N
44 12'0"N
44 6'0"N
HWY 20
South Santiam LSR
Clear Lake
Smith Reservoir
Trapper Project Area
Trail Bridge Reservoir
Road 15
Blue River Reservoir
Hagan LSR
HWY 126
HWY 242
Road 19
Horse Creek LSR
Cougar Reservoir
Legend
Major Roads
Trapper Project Boundary
Late Successional Reserves
Water Features
Miles
0
1.25
2.5
5
7.5
10
N