Public notice of this proposed action will be published in the Eugene Register Guard on November 2, 2011. The EA will also be available for review on the internet at http://www.blm.gov/or/districts/eugene/plans. The public comment period will end on December 2, 2011. Comments must be submitted in writing to the BLM, Field Manager, Upper Willamette Resource Area by close of business (4:30) on or prior to December 2, 2011. Comments may be delivered using one of the following methods:

Delivery to site address (*Note: DO NOT send mail to this address*):
3106 Pierce Parkway, Suite E
Springfield, Oregon

By mail:
Bureau of Land Management
P.O. Box 10226
Eugene, Oregon 97440

By e-mail:
or_eugene_mail@blm.gov

Comments, including names and street addresses of respondents, will be available for public review at the Eugene District office, 3106, Pierce Parkway, Suite E, Springfield, Oregon, during regular business hours (8:00 a.m. to 4:30 p.m.), Monday through Friday, except holidays, and may be published as part of the EA or other related documents. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses and from individuals identifying themselves as representatives or officials of organizations or businesses will be made available for public inspection in their entirety.

If you have any questions concerning this proposal, please call Christie Hardenbrook at (541) 683-6110.

**NORTH MOHAWK THINNINGS PROJECT**
**UPPER WILLAMETTE RESOURCE AREA**
**BLM EUGENE DISTRICT**
**ENVIRONMENTAL ASSESSMENT**
**DOI-BLM-OR-E060-2011-0002-EA**

## 1.0 INTRODUCTION

The Upper Willamette Resource Area of the Eugene District Bureau of Land Management (BLM) proposes to implement commercial thinning and density management projects on approximately 1,240 acres in the Calapooia and Mohawk River 5th field watersheds. Project actions may include timber harvest, instream habitat restoration, road construction, road improvements and decommissioning. The proposed sale names and locations are as follows:

- **North Line**
  T. 14 S. R. 1 W., Sections 25 and 35; T. 15 S., R. 1 W., Sections 1 and 11
- **Good Chance**
  T. 16 S. R. 1 W., Sections 9 and 21
- **Bickmore Creek**
  T. 14 S. R. 2 W., Sections 20, 21, 25, 28, 34 and 35; T. 15 S., R. 2 W., Section 3

Land Use Allocations for these acres are Matrix (including some Connectivity/Diversity Blocks) and Riparian Reserve. Included in the proposal are Special Areas such as Bald Eagle Habitat Areas (BEHAs) and currently designated or potential Areas of Critical Environmental Concern (ACEC).

## 2.0 PURPOSE AND NEED

The need for action in Matrix and Riparian Reserves has been established through the results of field reviews and stand examinations, which indicate that stands (ages 30-70 years) would benefit from thinning or density management release. Currently, the stands are dense, overstocked and uniform in structure, which results in reduced tree growth and stand vigor. The proposed treatments would aim to increase stand vigor, growth rates, crown differentiation and stand complexity.

The purposes of the actions in Matrix are to produce a sustainable supply of timber; provide habitat for a variety of organisms associated with both late-successional and younger forests and maintain valuable structural components, such as down logs and snags (1995 ROD/RMP, p. 34). Additional direction for road management directs us to provide and manage the road system to serve resource management needs (1995 ROD/RMP, p. 98).

The purposes of the actions in Riparian Reserves are to provide for the conservation of and habitat for Special Status Species as well as other terrestrial species, and to meet Aquatic Conservation Strategy Objectives (1995 ROD/RMP, p. 23).

Project actions may occur adjacent to ACECs. The 1995 ROD/RMP directs us to maintain, protect, or restore relevant and important value(s) of ACECs (pg. 67). Project activities may also occur within or near designated BEHAs. The 1995 ROD/RMP directs us to comply with the Pacific Bald Eagle Recovery and Implementation Plan and existing, site-specific habitat management plans such as Eugene District's, McKenzie Bald Eagle Habitat Management Plan (MBEHMP).

## 2.1 CONFORMANCE

The Eugene District initiated planning and design for this project to conform and be consistent with the Eugene District's 1995 RMP. Following the March 31, 2011 decision by the United States District Court for the District of Columbia in Douglas Timber Operators et al. v. Salazar, which vacated and remanded the administrative withdrawal of the Eugene District's 2008 ROD and RMP, we evaluated this project for consistency with both the 1995 RMP and the 2008 ROD and RMP. Based upon this review, the selected Alternative contains some design features not mentioned specifically in the 2008 ROD and RMP. The 2008 ROD and RMP did not preclude use of these design features, and the use of these design features is clearly

consistent with the goals and objectives in the 2008 ROD and RMP. Accordingly, this project is consistent with the Eugene District's 1995 RMP and the 2008 ROD/RMP.

BLM issued a record of decision in July, 2007 to amend the plans within the Northwest Forest Plan area to remove the survey and manage mitigation measure.

In January, 2008 a lawsuit was filed, and in December, 2009 the presiding judge issued an Order granting Plaintiffs motion for partial summary judgment.

A settlement agreement between the parties was approved by the court on July 6, 2011. The agreement stipulates that projects within the range of the northern spotted owl are subject to the survey and management standards and guidelines in the 2001 ROD without subsequent 2001-2003 Annual Species Reviews as modified by the 2011 Settlement Agreement. The Settlement Agreement modifies the 2001 Survey and Manage species list; establishes a transition period for application of the species lists; acknowledges existing exemption categories (2006 Pechman Exemptions); and, establishes exemptions from surveys for certain activities. The settlement agreement is in effect until the BLM conducts further analysis and decision making pursuant to the National Environmental Policy Act and issues a Record of Decision to supersede the Survey and Manage mitigation measure.

The 2008 RMP revision did not include management objectives or direction for Survey and Manage Species. However, the Settlement Agreement applies to the 2008 RMP until the BLM conducts further analysis and decision making pursuant to the National Environmental Policy Act and issues a Record of Decision to supersede the Survey and Manage mitigation measure.

Judge Pechman's Order from October 11, 2006 directs: "Defendants shall not authorize, allow, or permit to continue any logging or other ground-disturbing activities on projects to which the 2004 ROD applied unless such activities are in compliance with the 2001 ROD (as the 2001 ROD was amended or modified as of March 21, 2004), except that this order would not apply to:

A. Thinning projects in stands younger than 80 years old;

B. Replacing culverts on roads that are in use and part of the road system, and removing culverts if the road is temporary or to be decommissioned;

C. Riparian and stream improvement projects where the riparian work is riparian planting, obtaining material for placing in-stream, and road or trail decommissioning; and where the stream improvement work is the placement large wood, channel and floodplain reconstruction, or removal of channel diversions; and

D. The portions of project involving hazardous fuel treatments where prescribed fire is applied. Any portion of a hazardous fuel treatment project involving commercial logging would remain subject to the survey and management requirements except for thinning of stands younger than 80 years old under subparagraph a. of this paragraph."

Following the Court's December 17, 2009 ruling, the Pechman exemptions are still in place.

The implementation of this project will not have significant environmental effects beyond those already indentified in the 1995 Final EIS/Proposed RMP. Information compiled by the Interdisciplinary Team (ID Team) to analyze effects and is available for review at the Eugene District Office.

### 2.2 SCOPING

Scoping information about the North Mohawk Thinning Project was first provided in the January 2010 Eugene District Planning Update. No scoping comments were received.

## 2.3 ISSUES

The ID Team brought forward additional concerns related to resources that had potential of being affected by the proposed actions. The resource concerns related to the issues are analyzed in Section 3.0: Affected Environment and Environmental Consequences.

Issues identified:

1. What are the effects of the proposed commercial thinning and proposed road actions on water quality and aquatic resources?
2. What are the effects of the proposed project activities on the relevant and important values of nearby ACECs?
3. What are the effects of the proposed commercial thinning and road actions on T&E and special status species?
4. What are the effects of the proposed commercial thinning and road actions on soil compaction and displacement?
5. What are the effects of the proposed commercial thinning and road actions on the spread of invasive species?
6. What are the effects of Logging Systems on the cost of yarding, road construction, maintenance and renovation?

## 3.0 ALTERNATIVES

This section describes Alternatives identified by the interdisciplinary team. Please refer to Appendix A for maps of the project proposal by Alternative. At the end of this section, Table 1 displays the differences between Alternatives by acres treated and miles of road constructed and decommissioned.

## 3.1 ALTERNATIVE 1: NO ACTION

Under this Alternative no project actions would take place. Commercial thinning, road management, and aquatic habitat restoration actions would not occur within the proposed project area.

## 3.2 ALTERNATIVE 2: MINIMIZE IMPACTS TO NEARBY ACECS (AREAS OF ENVIRONMENTAL AND CRITICAL CONCERN)

This Alternative is designed to minimize incursions by motor vehicles into nearby ACECs. This Alternative would not construct roads that would provide access points to the ACECs adjacent to the project area.

Matrix Management

Stands would be thinned from below resulting in a residual basal area ranging from approximately 120 square feet to 180 square feet. Trees selected for harvest would be the suppressed, intermediate, and co-dominant conifer trees, leaving the larger trees. This prescription would result in a stand with a variable spacing of 15 and 35 feet between remaining conifers and hardwoods. All hardwoods and Pacific yew would be retained, except where necessary to accommodate logging systems and for safety.

Riparian Reserve Management

Silvicultural treatments would occur in the outer edges of most Riparian Reserves, and would be treated the same as the uplands. Areas of no harvest, in close proximity to streams and wetlands, would vary between 25 feet and 400 feet.

Logging Systems

Thinning would be accomplished with a combination of cable and ground-based yarding systems. Cable yarding would be proposed for approximately 560 acres and ground-based yarding would be proposed for approximately 664 acres (see maps in Appendix B).

Roads

See Appendix C for road tables (Tables x), which detail much of the following information.

Approximately 5 miles of road would need renovation and/or maintenance including adding crushed rock and culvert replacements. There would be less than 1 mile of proposed temporary road construction and approximately 3 miles of proposed permanent road construction.

Between 15 and 20 stream crossing culverts and 10 to 15 cross drain culverts have been identified for replacement on existing roads.

Approximately 1/2 mile of existing road is not expected to be needed for future management actions within the next 5 years. Portions of Road Nos. 14-2-28.8 and 14-1-26 would be decommissioned. Actions may include tilling of the road bed, entrances barricaded, slopes waterbarred, stream and cross drains removed, stream channels restored, and drain dips constructed.

## 3.3 ALTERNATIVE 3: NO NEW ROAD CONSTRUCTION

This Alternative is designed to use existing roads to treat the project area. Roads would not be constructed under this Alternative.

Silviculture prescriptions for Matrix and Riparian Reserves would not differ from Alternative 2.

Logging Systems

Thinning would be accomplished with a combination of cable and ground-based yarding systems. Cable yarding would be proposed for approximately 337 acres and ground-based yarding would be proposed for approximately 609 acres (see maps in Appendix B).

Roads

Between 15 and 20 stream crossing culverts and 10 to 15 cross drain culverts have been identified for replacement on existing roads.

Approximately 1/2 mile of existing road is not expected to be needed for future management actions within the next 5 years. Portions of Road Nos. 14-2-28.8 and 14-1-26 would be decommissioned. Actions may include tilling of the road bed, entrances barricaded, slopes waterbarred, stream and cross drains removed, stream channels restored, and drain dips constructed.

**TABLE 1: COMPARISON OF ALTERNATIVES 2 AND 3**

| | **Alternative 2** | **Alternative 3** |
|---|---|---|
| Treated Acres (Matrix and RR) | 1224 | 946 |
| Permanent Road Construction | 3 miles | 0 |
| Temporary Road Construction | 0.32 miles | 0 |
| Roads to be Decommissioned (< 5 years) | 3 miles | 0.72 miles |
| Roads to be Decommissioned (>5 years) | 0.37 miles | 0.25 miles |

## 3.5 CONSIDERED BUT NOT ANALYZED IN FURTHER DETAIL

### 3.5.1 An Alternative to Treat Maximum Acres

This Alternative would have analyzed the treatment of an additional 44 acres. Preliminary analysis asserted that proposed project activities may have had the potential to negatively impact these populations, possibly hindering a finding of no significant impact. Therefore, it was dropped from further analyses.

### 3.5.2 Greenhouse Gas Emissions

Carbon analyses have been completed for similar projects (i.e., commercial thinning in conifer stands 30-70 years in age). Those analyses have shown that, in total, the action would result in the

emission of approximately 6,800 tonnes in the short-term and an additional 3,500 tonnes over the long-term, for an approximate cumulative total of 10,300 metric tonnes. This would equate to the emission of approximately 38,000 metric tonnes of carbon dioxide.

Over the next 30 years, continued forest growth following harvest would result in an increase in live tree stand volume of an average 40 cubic feet per acre, or approximately 59,000 cubic feet across the project area. This equates to an increase in storage of approximately 500 metric tonnes of carbon per year. Forest growth would equate to the sequestration of approximately 14,000 metric tonnes of carbon dioxide over the long-term. In conclusion, forest growth 30 years following harvest would result in carbon storage which would exceed the carbon directly and indirectly emitted from harvest, resulting in a net storage of carbon compared to current conditions.

The carbon analyses are incorporated here by reference (2011 Thinnings Project DOI-BLM-OR-E060-0001-EA, pp. 25-26). Other analyses have shown similar results (Hills Camp EA DOI-BLM-OR-E060-2010-0003-EA, pp. 6-8; Long Tom Landscape Plan EA; DOI-BLM-OR-E050-2009-0006-EA, pp. 39-41). This proposed action would result in a similar magnitude of short-term carbon emission and long-term carbon storage as analyzed in those similar projects, because the forest stand conditions and treatments for this proposed action are approximately similar in terms of carbon implications. Because the proposed action would result in only a small amount of carbon dioxide emissions for a small period of time before stand regrowth would result in a net storage of carbon, there is no potential for a significant impact related to greenhouse gas emissions from the proposed action, and this issue does not require more detailed analysis.

## 4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

## 4.1 ISSUE 1: WHAT ARE THE EFFECTS OF THE PROPOSED COMMERCIAL THINNING AND PROPOSED ROAD ACTIONS ON WATER QUALITY AND AQUATIC RESOURCES?

### 4.1.1 Affected Environment

*Watersheds and Major Streams*

This project is located northeast of Springfield, Oregon in the McKenzie River and Upper Willamette River 8$^{th}$ field sub-basins. Table B-7 (in Appendix B) further illustrates hydrologic unit code (HUC) divisions (10$^{th}$ field watersheds and 12$^{th}$ field sub-watersheds), unit locations within those areas, and named streams near the units.

Approximately 120 stream segments exist within or adjacent to the project areas. Most of these are perennial first or second order streams. A few streams are not connected by surface flow, but rather connect hydrologically by subsurface flow. Disconnected streams are common in rotational landslide topography. Eighteen wetlands and three springs/seeps were also identified within or adjacent to the project areas.

*Water Quality*

The Oregon Department of Environmental Quality (DEQ) developed Total Maximum Daily Loads (TMDLs) for temperature, bacteria, dissolved oxygen, and turbidity for the Upper Willamette sub-basin in September 2006. Table 2 shows streams in or below the project area that are water quality limited for temperature. Stream temperature has been addressed in the Salem and Eugene District BLM Willamette Basin Water Quality Restoration Plan approved by Oregon DEQ in July 2008. That plan outlines a comprehensive strategy for implementing, monitoring, and evaluating management to address water quality impairment on BLM lands in the Willamette basin.

**Table 2. Water Quality Limited Waters, Temperature**

| Stream | Stand | Distance to 303(d) Stream (miles) |
|---|---|---|
| Brush Creek | Northline 35 | 2.0 |
| Calapooia River | Northline 35 | 2.0 |
| | Northline 25 | 0.8 |
| | Northline 1 | 2.8 |
| Cartwright Creek | Good Chance 21 | 0.5 |
| Courtney Creek | Bickmore 25 | 0.5 |
| | Bickmore 34, 35 | 2.0 |
| | Bickmore 20,21 | 2.5 |
| | Bickmore 28, 21 | 1.0 |
| Mill Creek | Good Chance 9 | <0.1 |
| Mohawk River | Northline 11 | 2.1 |
| Shotgun Creek | Bickmore 34, 35 | 2.5 |

Calapooia River (located downstream of the Bickmore and Northline units) is included on the 303(d) Water Quality Limited list for dissolved oxygen, E. coli, fecal coliforms, iron, and manganese, as determined by Oregon DEQ. Additionally, Mohawk River (located below Bickmore 3, Northline 11, and Good Chance units) is on the 303(d) Water Quality Limited list for iron.

*Peak Flows*

Annual precipitation in the project area ranges from 52 to 64 inches (1,320 to 1,625 millimeters). The project area elevation ranges from 600 to 2,600 feet. About 200 acres are in the transient snow zone (Northline 1 and Bickmore units 3, 34, and 35). The rest are in the rain dominated zone.

Canopy removal could result in higher soil moisture due to reduction of evapotranspiration until the canopy closes in four to five years. Analysis completed for the Final Environmental Impact Statement for the Revision of the Western Oregon Resource Management Plans (BLM, 10/2008; pp. 4-753 to 4-758) indicates watersheds in the project area would not be susceptible to an increase in peak flows due to timber harvest. This analysis was based on timber harvest assumptions on both BLM-administered lands and non-BLM administered lands.

*Previous Road Impacts to Streams*

Roads and skid roads from past timber harvesting have impacted the stream network in many places throughout the project area. Impacts from past logging activities range from old log culvert stream crossings to skid roads constructed over stream channels. Erosion and sedimentation from these old roads has delivered fine sediment to the channels, undercut stream banks, or buried channels with road or skid road related debris. A few of these old roads now carry water during winter storm events, extending the natural stream system. Some native surface roads are deeply rutted and drain water down the surface of the road.

A road inventory was conducted in the planning area that included an assessment of road and culvert conditions. Some stream crossings and ditch relief culverts on existing roads in this project area are not functioning properly due to being undersized, rusted, or mechanical damage. A few road segments lack ditch relief culverts, increasing flow and sediment delivery to stream crossings and increasing the risk of road or culvert failure. A few roads have degraded surface aggregate, resulting in excessive fines running on the road surface. Some roads run parallel to streams, so fine sediment is delivered to streams by way of runoff in wet winter months and dust in dry weather.

*Fish Species and Distribution*

**Table 3: Displays the fish in area streams.**

| Common Name | Scientific Name |
|---|---|
| Chinook Salmon | *Oncorhynchus tshawytscha* |
| Rainbow Trout | *Oncorhynchus mykiss* |
| Cutthroat Trout | *Oncorhynchus clarkii* |
| Mountain Whitefish | *Prosopium williamsoni* |
| Largescale Sucker | *Catastomus macrocheilus* |
| Sculpin Species | *Cottidae sp.* |
| Dace | *Rhinichthys osculus* |
| Redside Shiners | *Richardsonius balteatus* |

It is assumed most streams in the timber units do not have fish due to limited flow, steep cascades or natural (waterfall) and manmade (culvert) barriers. In general, the streams within the timber sale unit areas are small, first and second order streams that have limited flows and have steep step/pool or cascade habitat types. Some timber units do have lower grade streams and probably provide habitat for fish. All streams would be checked for fish presence/absence in April and May. If fish are found, stream buffers would be adjusted accordingly.

There are several anadromous and resident fish species that occur within these two 5$^{th}$ field watersheds. Cutthroat trout have the widest distribution, followed by steelhead, and then Chinook salmon.

*Listed Fish*

The Upper Willamette River Chinook ESU was listed as threatened under the Endangered Species Act on June 28, 2005. Chinook salmon occupy the Lower McKenzie, and Calapooia River Watersheds and are part of the Upper Willamette River Chinook Evolutionary Significant Unit (ESU). The Final Environmental Impact Statement for the Revision of the Western Oregon Resource Management Plans describes the status of the species, including life history, populations, status and distribution, and key limiting factors for the Upper Willamette River Chinook salmon ESU. (USDI 2008; Appendix J-Fish, pp. 338-342)

Upper Willamette River Chinook salmon critical habitat was designated on August 2, 2005. Approximately 57.6 stream miles within the Mohawk River watershed are occupied by the Upper Willamette River Chinook salmon. Approximately 6.9 miles of streams on BLM are occupied by Upper Willamette Chinook salmon. Approximately 75 stream miles within the Calapooia River watershed are occupied by the Upper Willamette River Chinook salmon. Approximately 0.1 miles of streams on BLM are occupied by Upper Willamette Chinook salmon within the Calapooia River basin.

The Upper Willamette River steelhead ESU was listed as threatened under the Endangered Species Act on January 5, 2006 (71FR834). The Final Environmental Impact Statement for the Revision of the Western Oregon Resource Management Plans describes the status of the species, including life history, populations, status and distribution, and key limiting factors for the Upper Willamette River steelhead ESU. Appendix J-Fish (pages 343-347), of the Final Environmental Impact Statement for the Revision of the Western Oregon Resource Management Plans that describes the status of this species is incorporated here by reference.

Upper Willamette steelhead critical habitat was designated on September 2, 2005. Upper Willamette steelhead critical habitat is limited to the Calapooia and tributaries below on the Willamette River (Molalla River, North and South Santiam River). Less than ¼ mile of stream on BLM-managed lands are occupied by Upper Willamette steelhead (within the Calapooia River).

*Habitat*

Salmon and trout species need cool water temperatures, hiding cover, clean spawning gravels, rearing pools and an adequate food supply for good fish production. Fish production is largely determined by habitat quantity and quality (Meehan 1991).

Pools provide important rearing habitat for juvenile salmon and trout (Nickelson et al. 1992, Rosenfeld et al. 2000) and winter holding habitat for adult fish (Cunjak 1996). Streams with high levels of fine sediments tend to have shallow pools because sediment deposits fill in these areas (Meehan 1991).

As mentioned earlier, numerous culverts remain a high risk of failure, are undersized and block fish passage, and chronic sediment inputs from forest roads continue to be a problem in all watersheds.

*Large Woody Debris (LWD)*

LWD is important for providing cover for fish, forming pools, stabilizing channels, and trapping and sorting fine sediment (Meehan 1991). LWD also provides channel roughness to dissipate stream energy which causes bank erosion and increases channel width (Montgomery and Buffington 1997). Desired LWD levels in the project area are 50 or more pieces per mile; less than 17 pieces per mile is considered low (Moore 1997). Ocular estimations suggests that most stream reaches in the project area are lacking LWD.

*Sediment*

Increased concentrations of suspended sediment and turbidity can also have direct effects on fish behavior, physiology, and growth (Anderson et al. 1996). Oregon Department of Fish and Wildlife (ODFW) considers properly functioning substrates to have <20% fines, sands or sediment. In general, all watersheds have elevated levels of sediment. The average level of sediment in streams surveyed within the McKenzie Watershed is 18.6% with 11 out of 26 streams having sediment levels above 20%. The average level of sediment in streams surveyed within the Upper Calapooia Watershed is 18% with 4 out of 11 streams having sediment levels above 20%.

*Water temperature*

Optimum temperatures for coho salmon, steelhead, and cutthroat trout are 55 to 60$^{o/}$F and temperatures over 84$^{o/}$F are considered lethal (Meehan 1991). There are streams within the project area that have summer temperatures which exceed the Oregon Department of Environmental Quality water quality standard of 64.4$^{o/}$F for fish-bearing streams (see Table 2).

*Riparian Habitat*

Riparian areas are important for fish and the aquatic ecosystem. Riparian vegetation provides LWD for streams and cover for fish. Stream side vegetation provides bank stability, maintains undercut banks, and provides habitat for insects – an important food source for fish. Riparian trees provide a protective canopy layer that helps maintain cool water temperatures (Meehan 1991).

Douglas-fir, white fir, incense-cedar, red alder, bigleaf maple, Oregon ash, and Pacific yew are the dominant overstory species along most stream reaches. Vine maple, ninebark, red-osier dogwood, willow, and hazel are the most common understory species.

*Fish Passage, Roads Utilized during Log Haul and Transportation Infrastructure*

Forest transportation systems can harm salmonids and their habitats because of fine sediments they release to streams (Meehan, 1991). Some roads or road segments (Road Nos. 14-1-35, 14-1-26) within this project are chronic sources of sediment to area streams and would continue to be chronic sources until they are properly fixed.

Connectivity is important for fish production and restoring fish passage is an effective way to increase the availability of habitat (Roni et al. 2002). It is common for fish to move within streams

and between stream systems throughout the year (Kahler et al. 1998). Numerous cross drain and stream culverts were assessed and found to be at risk of failure and preventing fish passage. For more information on the culvert assessment, see the Engineering table that shows which culverts would be upgraded and what roads would be renovated or improved.

Log haul would occur over native, gravel and paved road surfaces controlled by BLM and private industry. All of the log haul routes would run out to main haul routes that are paved. No log haul routes would cross over listed fish habitat on gravel or native surface roads.

Both watersheds have high densities of roads within them. Road densities over 3.5 miles of road per square mile are considered "Not Properly Functioning" (FEMAT, 1993). The Mohawk watershed has approximately 3.95 miles of road per square mile and the Calapooia River Watershed has approximately 3.4 miles per square mile.

*Aquatic and Riparian Habitat Trends*

Aquatic habitat is improving in the project area because road decommissioning, improvement, and renovation continue to reduce the amount of chronic erosion and improve hydrologic function from forest roads. Culverts have been upgraded to accommodate 100 year flood events resulting in less risk of major washouts and fill failure. LWD restoration projects have increased the habitat complexity and cover for fish. As a result, fine sediment levels have probably lowered and LWD levels are higher than observed in previous ODFW surveys.

Riparian areas are improving throughout the project area because they are no longer managed for timber production on BLM-managed lands. As a result, younger stands are recovering and will eventually provide a good supply of LWD and increased shade levels. Thinning of overstocked riparian areas can help recover riparian health and function by accelerating tree growth for future LWD recruitment and increase canopy structure.

### 4.1.2 Environmental Effects

**Alternative 1: No Action**

Under this Alternative, no harvest related actions, road improvement, road decommissioning, culvert replacement, or aquatic habitat restoration would occur.

*Stream Temperature and Water Quality*

No changes to stream temperature would be expected, since existing shade in the riparian areas would remain unaltered from current conditions. In the long-term, riparian vegetation would continue to grow, providing shade to protect stream temperatures.

Cumulative effects under this Alternative are expected to maintain current watershed conditions. The opportunity to improve aquatic habitat conditions and water quality would be lost or postponed.

*Sedimentation*

Turbidity in streams adjacent to the project area would continue to have the potential for chronic sediment problems due to failing culverts and road drainage issues. Chronic sources of sediment such as Road Nos. 14-1-35 and 14-1-26 would continue to be sources of sediment. Road-stream crossings on Road Nos. 14-2-21.1 and 14-1-35, and Spur BC3T would not be replaced and would continue to be a moderate to high risk of failure. Deteriorating undersized stream crossing culverts could plug, blocking stream flow and the resulting road failure(s) could cause channel scouring down slope from the road.

Road related sedimentation could escalate for three reasons: 1) replacement of stream crossing culverts (log or corrugated metal) would not occur; 2) lead-off ditches or relief culverts would not be properly maintained (or new ones installed); and 3) no additional aggregate would be placed on the local access roads or haul routes and no blading would occur. As a result, direct sediment delivery

to streams via the ditch line from those roads would continue as well as water runoff from rutted gravel roads.

No impacts to peak flows are anticipated since no timber would be removed under this Alternative.

*Fish Passage and Road Drainage*

Under this Alternative some road-stream crossings would continue to be partial to total passage barriers to all life stages of fish and other aquatic species. Due to the culverts being undersized, high and moderate flows would continue to erode downstream channels, thus worsening passage conditions at these sites.

*Riparian and In-stream Large Woody Debris*

This Alternative would have no immediate effect on the level of recruitment of in-stream large woody debris. The recruitment of large wood to the stream channel would continue by natural processes. Currently, overstocked stands have smaller suppressed trees dying and providing wood to riparian areas and streams. The development of large trees and subsequent large woody recruitment to the stream channel would be delayed by not thinning overstocked stands. These stands would not develop until mortality occurred within the stand, allowing the remaining trees to grow faster.

Current levels of in-stream large wood within the project area would remain at low to moderate levels until modified by natural processes. The lack of habitat complexity, rearing habitat and spawning grounds would continue to be limiting factors for salmonid production.

*Cumulative Effects*

This Alternative is expected to maintain or depreciate the current conditions within the project area. The potential to improve aquatic habitat conditions through road decommissioning, undesignated OHV trail closure, replacement of high risk road-stream crossings, road drainage improvements, and increased riparian function from thinning would not occur.

Cumulative effects from a variety of sources of sediment (ditch lines without culverts, etc.) would continue to produce fine sediment into the stream channels and negatively affect downstream fish habitat and fish production. Water quality degradation and impacts to fish-bearing habitat may increase as several road crossings further deteriorate due to the lack of maintenance. Without additional aggregate surfacing and relief drainage, future road conditions would continue to accelerate sediment delivery and surface runoff to streams.

Within riparian areas, in the absence of thinning, smaller suppressed trees would continue to provide input into streams. However, stand complexity and thus large woody debris would develop at a slower rate.

The effective shade would be maintained along streams on BLM land, but timber harvesting on private lands would follow Oregon State Forest Practices and would reduce the effective shade zone in those areas and increase solar radiation to streams flowing onto BLM lands.

**Alternative 2: Minimize Impacts to Nearby ACECs (Areas of Environmental and Critical Concern)**

*Temperature*

Under this Alternative, thinning in the Riparian Reserve is not expected to impact water temperatures since no-harvest stream buffers (ranging from 75 to 400 feet) would be implemented. The primary shade zone along all streams would be maintained by these no-harvest buffers. These no-cut buffers provide protection to unstable stream banks, headwalls, and slump prone side-slopes.

Thinning within the secondary shade zone would maintain at least fifty percent canopy closure. Although thinning in the secondary shade zone may slightly increase direct solar radiation penetrating into the primary shade zone, the primary shade zone would provide sufficient shading to

maintain stream temperatures. Stream crossing culvert replacements may result in the loss of some overstory vegetation, but not to the level of affecting stream temperature.

*Sedimentation*

Treated riparian reserves would have no-harvest buffers widths of a minimum of 75 feet. These buffers would provide protection to over-steepened and/or unstable stream banks and headwalls, and filter out potential sediment transported from cable and ground-based yarding processes, thus, minimizing sediment-related impacts to nearby streams and fish-bearing habitat. Cable yarding landings are generally located on ridge top topography and outside of the stream influence zone, providing added protection to aquatic and riparian habitat features. To minimize adverse effects to stream habitat, relief culvert installation would be installed to reduce direct sediment onto hillsides and not directly into streams. The implementation of project design features would minimize most potential sediment related effects on water quality and aquatic habitat from harvest activities.

There would likely be a pulse of sediment during the construction work of culvert installation, but this is expected to be a short-term impact. Typically, fine sediments disturbed by the equipment are flushed out by seasonal fall rains and some erosion occurs until disturbed soils on the inlets/outlets are stabilized by natural vegetation, mulch, or rip-rap. During the short-term, there would also be a likely pulse of sediment during the harvest time period due to increased road use. After harvest is completed, temporary roads would be tilled to improve infiltration. Temporary road-stream crossings would have the culverts removed and the road fill would be pulled back to natural repose. Under this Alternative, there would be a total of three new permanent road-stream crossings and one new temporary road crossing. In addition, up to 45 (likely 22 to 28) existing culverts would be replaced and five new relief culverts placed. All of these stream crossings would create short-term increases in turbidity that may cause fish (cutthroat trout if they are present) to avoid the area for a short time period (2-3 days during culvert installation and shortly after) until turbidity levels are reduced. Implementation of project design features and on-site design of the crossing sites would minimize most potential impacts to streams and fish-bearing habitat.

Culverts placed at all stream crossings would be sized for 100 year flood events. These replacements would reduce the risk of catastrophic failure during major flood events and impacts to downstream spawning and rearing habitat. Placement of crushed rock aggregate within the Riparian Reserve on roads BC2B, BC2A, BC3A, and BC3F would help to prevent sediment delivery from roads to the stream network.

New permanent road crossings in Bickmore 3 (T. 15 S., R. 2 W.; spurs BC3A, BC35T, and BC3Y) would improve the current condition at one proposed permanent and one proposed temporary road-stream crossing. Currently, the historic crossing where permanent Spur BC3Y would cross stream #8 was abandoned without removing the old log culvert. The road bed and fill are eroding. The historic crossing where temporary Spur BC35T crosses stream #32 is eroding the fill that was left in place after a previous decommissioning effort. Both road-stream crossings are a chronic sediment source. Placing a new culvert in Spur BC3Y would remove a chronic sediment source. Placing and removing a culvert and road fill in Spur BC35T would remove a chronic sediment source and restore sediment transport functions above and below the road.

Increased road use from timber hauling and related activities would result in short-term increases in sedimentation. This project allows for year-round timber haul where impacts vary by season of use. Existing haul routes are predominately gravel surfaced roads leading to paved roads for the majority of the log haul. Dry season use typically results in less sediment production. A road-related inventory identified that some roads within the project area do not have adequate relief drainage or road surfacing aggregate. Road segments with the potential for delivery would receive additional relief culverts and/or replacements and all stream crossings on the haul route would receive road surfacing aggregate that would further reduce any road-related sediment delivery to streams. Implementation of project design features would further minimize sedimentation impacts to project area streams. Therefore, road-related activities would have some increases in sediment delivery to area streams due to disturbance of the road bed, ditch lines and stream crossings; however, long term sediment inputs should be reduced due to limited road runoff and ditch lines being disconnected from streams.

Decommissioning roads no longer needed would also contribute to a reduction in road-related runoff being delivered to the stream system and promote infiltration of surface flow in the project area, resulting in reduced sediment delivery

Under Alternative 2, commercial thinning is not expected to impact current peak flows. As much of the existing young stands of timber mature in the watershed, an improved condition with regard to channel impacts from peak flows should occur.

*In stream Large Wood*

This Alternative would treat most of the outer portions of the Riparian Reserves. Thinning is expected to speed the development of large-diameter (>28 inch diameter) trees, thus resulting in a long-term increase in large woody debris (LWD) levels in streams and riparian areas within the project area. The thinned areas would have a small amount of timber blow down or natural mortality from thinning, and the no cut buffer would continue to supply approximately 90-95% of all LWD to area streams. Some areas within the riparian reserves would have diameter limits (where some larger trees exist) to maintain natural mortality of larger size trees (20 inch dbh and greater). The increase in LWD potential would have long-term benefits to refugia habitat (cover), influence the size and location of pools, the formation of deeper pools, creation of backwater and off-channel habitat, and the deposition and sorting of gravels thereby providing suitable spawning habitat. All of these factors would improve fish habitat and production.

*Fish Passage*

The replacement of fish passage barrier culverts would restore the migration corridors of suitable spawning and rearing habitat for various salmonid fish and other aquatic-associated species. Culverts would be sized to meet the 100 year flow event and would be designed as stream-simulated which would meet the passage criteria for all life stages of fish. Over the long-term, this type and size culvert would greatly reduce upstream and downstream channel erosion, stabilize existing sites, and would eventually mimic the natural stream channel characteristics.

*Effects to listed Fish Species*

Upper Willamette River Spring Chinook salmon have critical habitat downstream of one thinning unit (Good Chance section 9) approximately 350 to 450 feet. However, the first order streams (intermittent) on BLM have a no-cut buffer of 75 feet, and then they flow down to a flat cow pasture. Therefore, even if overland flow carries small amounts of sediment downstream, it is unlikely to be transported to critical habitat in Mill Creek through the low gradient field or be measurable if it reaches critical habitat. The only other project elements that are in close proximity to listed fish habitat are haul routes. All haul routes near or over listed fish are on paved roads or far above listed fish on gravel roads. Therefore, these haul routes have no causal mechanism to increase road related sediment where listed fish may reside. A full analysis is available at the Eugene District.

*Cumulative Effects*

Implementation of Alternative 2 is expected to create short-term increases of turbidity in both watersheds at specific stream crossings where culverts would be installed or replaced and new road construction in Riparian Reserves would take place. This Alternative combined with on-going and planned road renovation on BLM and privately-owned lands, would result in a long-term reduction of road-related sediment and surface water runoff delivery to streams and fish-bearing habitat due to improved road drainage. However, increases in permanent road construction would also create more road miles to maintain, with the existing infrastructure not receiving adequate maintenance at this time and creating chronic sediment sources.

Protective streamside buffers on BLM land and the utilization of standard best management practices (BMPs) would maintain existing sediment rates to streams. The addition of potential large wood to the system would help regulate the sediment regime and add to hydraulic complexity. A higher diversity of riffle and pool habitat is expected to develop over time, thus influencing the physical and biological characteristics of the stream system and creating productive habitats for

salmonid fish. Large woody debris entering the stream system from BLM lands would be distributed downstream over time by natural processes, thereby providing benefits beyond the project area.

Replacement of fish passage barrier culverts would result in an increase in the amount of suitable spawning and rearing habitat available for salmonids within the watersheds. In addition, replacement of deteriorated and/or undersized stream crossing culverts would greatly reduce the risk of mass wasting and the chronic erosion and sedimentation, thus providing benefits to the overall health of the aquatic ecosystem within the watershed.

Maintaining primary shade zones along streams would protect water temperatures on BLM land. Such standards are not used on private lands; therefore, sediment and temperature increases elsewhere in the watershed are expected to occur at the current rate.

**Alternative 3: No New Road Construction**

Under Alternative 3, new roads would not be constructed within the project area nor would new stream crossings on permanent or temporary spur roads be constructed. This would eliminate the short-term increase of sediment input created by culvert installation and road use during the harvest period. However, this would also forestall the removal or replacement of two chronic sediment producing historic crossings (i.e. Spurs BC3Y and BC35T) in the long-term. Excessive erosion would occur at these historic crossings until stream gradients are restored over the long-term.

Some units would not be thinned and would continue on the same stand trajectory they are currently on and would not receive a growth benefit and increase in LWD potential. See Table 1, which shows differences in road construction by Alternative and the number of acres that would be thinned to compare Alternatives.

## 4.2 ISSUE 2: WHAT ARE THE EFFECTS OF THE PROPOSED PROJECT ACTIVITIES ON THE RELEVANT AND IMPORTANT VALUES OF NEARBY ACECS?

### 4.2.1 Affected Environment

*Areas of Critical Environmental Concern (ACEC)*

Adjacent to several of the Bickmore and Northline units are parcels that make up the Coburg Hills Relict Forest Island (RFI), Oak Basin Prairies and Grassy Mountain ACECs.

The Coburg Hills Relict Forest Island ACEC was designated under the 1995 Eugene District Resource Management Plan to “provide examples of old growth and mature forest ecosystems on the fringes of the Willamette Valley” (pg. 68). The parcels are old-growth stands at the top of the Coburg Hills. “These areas provide late successional refugia for animals, plants, bryophytes, lichens and other species. These species may later recolonize adjacent lands” (1995 RMP/ROD, pg. 68). These stands are important as raptor habitat, provide ecological diversity in the landscape and serve as refugia for old-growth species. The parcels adjacent to units in the proposed action are RFI 7 (T. 14 S., R. 2 W., Sec. 35), RFI 8 (T. 14 S., R. 2 W., Sec. 28), RFI 9 (T. 14 S., R. 2 W., Sec. 28), RFI 10 (T. 14 S., R. 2 W., Sec. 33), RFI 11 (T. 15 S., R. 2 W., Sec. 3).

RFI 8 contains a population of Tall Bugbane (*Cimicfuga elata*, Bureau Sensitive), RFI 9 contains a population of Wayside Aster (*Eucephalus vialis*, Bureau Sensitive) and a population of Tall Bugbane (*Cimicfuga elata*, Bureau Sensitive). RFI 10 containds Kincaid’s Lupine (*Lupinus sulphureus ssp. kincaidii*), Fender’s Blue butterfly ***(****Plebejus icariodes fender****)***, Wayside Aster (*Eucephalus vialis*, Bureau Sensitive) and a population of Tall Bugbane (*Cimicfuga elata*, Bureau Sensitive)

Road No. 14-2-16 is adjacent to RFI 9 and RFI 8 is bisected by Road No. 14-2-28.2. There is limited road access to RFIs 7 and 10, as roads leading directly to them are closed. RFI 8, 9 and 11 have infestations of weeds (false brome, scot’s broom, herb Robert and shining geranium). These infestations are all mostly with in 300’ of roads or abandoned roads. Weeds threaten to out-compete the Endangered, Threatened and Bureau Sensitive species present at these sites.

There has been documented use by Off Highway Vehicles (OHV) on many of the abandoned and closed roads that come off Blagen Mill Road. The BLM has blocked BLM Road Nos. 14-2-28, -28.2 and -34 several times since the mid-1990's to prevent unauthorized vehicular access. These roads connect with a system of abandoned roads that are still visible on aerial photographs.These barriers have been illegally re-opened several times since the mid-1990's to gain access to the abandoned roads. There is evidence (e.g. road ruts, tracks) that vehicles have accessed RFI 8, 9, and 10. In RFI 9, evidence suggests that unauthorized vehicles have damaged several plants of *Aster vialis* and *Cimicfuga elata* that had colonized closed Road No. 14-2-28.2.

Oak Basin Prairies ACEC was nominated as part of the WOPR both as an internal nomination and as an external nomination from the Nature Conservancy. Oak Basin Prairies ACEC is recognized as having importance at a regional level due to the presence of Kincaid's lupine and Fender's Blue Butterfly and as being part of a larger complex of prairies across the west side of the Coburg Hills. The upland prairie plant community may be as or more rare than Willamette Valley wetlands, which is reduced to less than 1% of its historical range. RFI 10 was included in this nomination due to the prairies, Kincaid's lupine and Fender's Blue Butterfly it contains.

The relevant and important values are identified as: 1) A fish and wildlife resource: habitat and known sites for Fender's Blue butterfly, a Federally Endangered species, now restricted to less than 1% percent of its pre-European settlement distribution. This is the only known site for Kincaid's Lupine (listed Federally Threatened) and Fender's Blue butterfly (Federally Endangered) in Linn County and is one of three sites in Lane County in the Coburg Hills, and is the only site on the Eugene District outside of the West Eugene Wetlands. The sites contain the needed mix of plants to support Fender's Blue Butterfly at all its life stages. The site is potential habitat for Taylor's Checkerspot Butterfly and a historic site for Great Copper Butterflies. 2) A natural process or system: representing an upland red fescue prairie remaining on the fringe of the Willamette Valley, now restricted to less than 1% of its pre-settlement distribution. These prairies are habitat and/or known sites for Kincaid's Lupine, Fender's Blue Butterfly and other vulnerable Willamette Valley species. Oak Basin is historically prairie showing up on the 1850-1910 maps derived from General Land Office surveys. The thin, rocky soils and south aspect are integral in maintaining the prairie. RFI 10 was included in the nomination due to the prairies that occur between the old-growth stands.

Oak Basin is connected to Blagen Mill road via a network of abandoned roads that come off BLM Road Nos. 14-2-28, -28.2 and -34. Vehicular incursions have occurred into Oak Basin ACEC and adjacent private land. In 2008, an OHV track was seen in the Kincaid's lupine/ Fender's blue butterfly patches. In 2010, this track is still visible due to soils compaction and death of native bunchgrasses. The Lupine recovered but the direct affects to Fender's Blue butterfly on those plants is unknown.

These roads also provide vectors for the spread of noxious weeds not only into Oak Basin but to the adjacent lands as well. Oak Basin is infested with shining geranium and herb Robert. The shining geranium was probably introduced from logging or mowing equipment and has been present in small quantities for many years. Herb Robert appeared along Blagen Mill Road several years ago and has spread into the Oak Basin ACEC. Currently, there is no False brome at Oak Basin but there are populations on the Road Nos. 14-2-21-28-28.2, and -34.

Grassy Mountain ACEC was designated as an ACEC to preserve one the "finest" representative examples of a grassy bald on the western margin of the Cascades that remains today (1995 RMP/ROD, pg. 68). The site has had very little disturbance, and is an example of a native fescue grassland community with a variety of herb species adapted to seasonal moisture fluctuations This ACEC also includes a Douglas-fir/pacific madrone forest surrounding the meadow system. The site fills the natural area cell or element described in the Oregon Natural Heritage Plan (2003) as: Blue Wildrye or red fescue grass bald communities; vernal seepage slopes on low-to mid elevation rocky bald communities, with monkey flower, saxifrage and moss.

Grassy Mountain ACEC is accessed by BLM Road No. 15-1-11.1. Vehicle access to this ACEC is limited due to a gated private road system. Access is further limited by Road No. 15-1-11.1 being mostly washed out and impassable at its southern extent. Grassy Mountain has few non-native

species, probably due to the limited access. The abandoned portion of the road would not be reopened, keeping this ACEC inaccessible by vehicles.

### 4.2.2 Environmental Effects

**Alternative 1: No Action**

Under this Alternative no harvest, road construction, culvert replacement and aquatic restoration would occur. In areas where weeds have moved beyond the initial infestation stage and are on the way to becoming naturalized, they would continue to increase and could come to dominate the forest understory. The opportunity to treat weeds along roads is limited as priority is given to areas proposed for harvest, due to limited weed treatment funding**.**

Road Nos. 14-2-28 and 14-2-28.2 would remain closed. Road 14-2-34 would remain blocked at the curve (approx. one half mile from Blagen Mill Road), closing ready access to Oak Basin, RFIs 8, 9, and 10. The BLM would close any new user created access points and periodically check closed roads to ensure the effectiveness to the closure. The access to Grassy Mountain ACEC would remain closed protecting the ACEC from vehicle traffic.

**Alternative 2: Minimize Impacts to Nearby ACECs (Areas of Environmental and Critical Concern)**

Under Alternative 2 areas have been deferred from harvest to minimize impact to Oak Basin Prairies, RFIs 8, 9 and 10 ACECs (see maps for deferred areas). In deferring these areas, the BLM would not reopen Road Nos. 14-2-18, 14-1- 28.2, or 14-2-34, minimizing vehicle access to the ACECs. The effects would be the same as the no action Alternative.

**Alternative 3: No New Road Construction**

Effects would be similar to Alternatives 1 and 2 as the same acres would be deferred from proposed treatments.

## 4.3 ISSUE 3: WHAT ARE THE EFFECTS OF THE PROPOSED COMMERCIAL THINNING AND ROAD ACTIONS ON T&E AND SPECIAL STATUS SPECIES?

### 4.3.1 Affected Environment

*General Stand Characteristics*

The proposed units are mid-seral stands regenerated after clearcut harvest or natural disturbance, with densely stocked overstory trees that generally have crown rations of 30% or less. The stands are dominated by Douglas-fir, with varying amounts of western redcedar and western hemlock; Pacific yew, incense-cedar, and grand fir are present but uncommon. Hardwoods are represented by bigleaf maple, red alder, and a very few madrone and chinkapin. The proportion of hardwoods in the overstory is variable among the proposed units. Hardwoods are more common in the Bickmore Creek units and Northline 25, while the remainders of the units are conifer-dominated.

The stands are in stem exclusion stage, with understories of varying densities that are dominated by typical shrubs like hazel, oceanspray, and vine maple. The conifer regeneration present is primarily western hemlock and western redcedar.

*Coarse Woody Debris and Snags*

Coarse Woody Debris (CWD) is an important habitat feature for many wildlife species. CWD provides refugia, foraging sites, and travel corridors for species with low mobility and small home ranges (*e.g.* invertebrates, small mammals, and amphibians). Additionally, CWD provides ecological functions like moisture retention, nutrient cycling, and microclimate buffering. Stand exam data show CWD distributed across a variety of diameters and decay classes; most CWD is either recent suppression mortality (small-diameter/low decay class) or residue from the previous harvest (large-diameter/high decay class, Table 4). Field review of the proposed units indicates that CWD is more

regularly distributed in Riparian Reserves and irregularly distributed in upland areas, with the greatest amounts present in Riparian Reserves.

CWD and snag data collected during stand exams indicate that amounts of CWD vary widely among the proposed harvest areas. However, sample transects were placed based on preliminary unit boundaries, and samples from several units were pooled.

Large, decayed down logs provide the best currently available habitat features. Proposed harvest areas contain approximately 200-1,100 lf/ac of down logs ≥ 16 inch diameter in decay classes 3, 4, and 5.

Hard CWD provides less function for wildlife and represents potential future wildlife habitat after further decay. Most of the low decay class CWD has been recruited in the past few decades and is of small diameter. Proposed harvest areas contain approximately 0-125 lf/ac of decay class 1-2 CWD that is ≥ 16 inch diameter.

Snags are important to primary and secondary cavity nesting birds (songround basedirds, woodpeckers, owls) and roosting bats. Stand exam data show a range of 0-13 snags per acre in the proposed units. However, more than 90% of these snags are in small diameters (8-15 inches) that do not provide for many wildlife life history needs due to their small size and/or short lifespan. Large moderately decayed snags are most important to wildlife. Stand exam data show an average of only 0.2 snags per acre that are 16 inches diameter or greater.

**Table 4. Snag and coarse woody debris data for North Mohawk units**

| | Decay Class 1/2 | | | | | | Decay Class 3/4/5 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 8"-15" | | 16"+ | | Total | | 8"-15" | | 16"+ | | Total | | Grand Total | |
| Unit | CWD | Snags | CWD | Snags | CWD | Snags | CWD | Snags | CWD | Snags | CWD | Snags | CWD | Snags |
| Bickmore 03 | 52.6 | 2.9 | 17.5 | 0 | 70.1 | 2.9 | 175.3 | 0 | 844.2 | 0 | 1019.5 | 0 | 1089.6 | 2.9 |
| Bickmore 20/21 | 51.9 | 3.1 | 74.3 | 0 | 126.2 | 3.1 | 103.8 | 0 | 212.6 | 0 | 316.4 | 0 | 442.6 | 3.1 |
| Bickmore 21/28, 27/28, 28/33 | 193.7 | 2.0 | 123.2 | 0 | 316.9 | 2.0 | 158.5 | 0 | 582.8 | 0 | 741.3 | 0 | 1058.2 | 2.0 |
| Bickmore 25 | 0 | 0 | 17.8 | 0 | 17.8 | 0 | 284.4 | 0 | 426.6 | 0 | 711.0 | 0 | 728.8 | 0 |
| Bickmore 34/35/03 | 56.4 | 0 | 18.8 | 0 | 75.2 | 0 | 447.5 | 0 | 564.0 | 0 | 1011.5 | 0 | 1086.7 | 0 |
| Good Chance 09 | 29.8 | 0 | 119 | 0 | 148.8 | 0 | 357.1 | 4.1 | 446.6 | 0.4 | 803.7 | 4.5 | 952.5 | 4.5 |
| Good Chance 21 | 367.4 | 1.6 | 79.9 | 0 | 447.3 | 1.6 | 328.0 | 0 | 541.2 | 0 | 869.2 | 0 | 1316.5 | 1.6 |
| North Line 01 | 95.6 | 13.2 | 0 | 0 | 95.6 | 13.2 | 198.5 | 0 | 1180.8 | 0 | 1379.3 | 0 | 1474.9 | 13.2 |
| North Line 11 | 307.3 | 0 | 0 | 0 | 307.3 | 0 | 126.7 | 3.0 | 1168.9 | 1.7 | 1295.6 | 4.7 | 1602.9 | 4.7 |
| North Line 25 | 34.2 | 0 | 34.2 | 0 | 68.4 | 0 | 205.2 | 0 | 478.8 | 0 | 684.0 | 0 | 752.4 | 0 |
| North Line 35 | 0 | 0 | 44.4 | 0 | 44.4 | 0 | 222.1 | 0 | 688.5 | 0.2 | 910.6 | 0.2 | 955.0 | 0.2 |

*Ponds and Wetlands*

Several wetlands exist in or adjacent to the project area (the largest in Bickmore 33) and will receive buffers. None of these wetlands are of sufficient size or quality to support breeding populations of western pond turtles. Depending on microclimate and sun exposure, some of these wetlands could provide suitable habitat for the Oregon Slender Salamander, Crater Lake Tightcoil (snail) or Evening Fieldslug, which are Bureau Sensitive Species. No-harvest buffers will be sufficient to protect habitat values in wetlands, and they will not be analyzed further in this Assessment. Three ponds that are suitable pond turtle habitat are located near the north boundary of Northline unit NL1D; this unit provides suitable turtle overwintering habitat, see Special Status Species below.

*ACEC Management*

See ACEC discussion starting on page 13 under, "Issue 2: What are the Effects of the Proposed Project Activities on the Relevant and Important Values of nearby ACECs?" for additional information. The RFIs are located in a Key Raptor Area (Olendorff et al. 1989) and 16 species of raptors have been observed in them, including large concentrations of wintering bald eagles. The RFIs also provide important and increasingly uncommon late-successional habitat for cavity nesting birds, bats, amphibians, and mollusks. The Oak Basin Prairies include some of the only examples of native grassland on the Eugene District, and support populations of the Threatened Kincaid's lupine and endangered Fender's blue butterfly. Additionally, Oak Basin provides habitat for special status birds like Lewis' woodpecker, Oregon vesper sparrow, and grasshopper sparrow.

*Special Status Species*

Fender's Blue Butterfly – Federal Endangered

Fender's blue butterfly is listed as 'Endangered' under the Endangered Species Act. It is a small butterfly in the family Lycaenidae, with a wingspan of about 2.5 cm (one inch); this species is strongly associated with its primary host plant, the federally Threatened Kincaid's lupine. Suitable habitat for the Fender's Blue butterfly provides: (1) early seral upland prairie, wet prairie, or oak savanna habitat, with a mosaic of low-growing grasses and forbs, an absence of dense canopy vegetation, and undisturbed soils; (2) larval host plants of the genus *Lupinus*; (3) nectar sources for adults; and (4) undeveloped stepping-stone habitat that supports the short-stature prairie/oak savanna plant community within 1.2 miles of natal lupine patches (USFWS: Fed Register Oct 31, 2006).

Fender's blue butterfly is present in the Oak Basin Prairies ACEC and project actions under the 'considered but not analyzed' Alternative to maximize harvest would have potential effects to the species. Human access to Oak Basin would have been facilitated by opening road systems leading to the ACEC and potentially facilitating impacts to Fender's blue butterfly by increasing the likelihood of physical harm, increasing habitat degradation (rutting, erosion, dumping), increasing the spread of noxious weeds that would reduce habitat quality, increasing the risk of human-caused fire that would destroy suitable habitat, and increasing human presence and noise that would disrupt wildlife life histories. This Alternative was eliminated from consideration and the remaining Alternatives would not open roads connected to Oak Basin or have potential effects to Fender's blue butterfly. Therefore the species will not be considered further in this Assessment.

Northern Spotted Owl - Federal Threatened

The Northern Spotted Owl (*Strix occidentalis caurina*; spotted owl) is a long-lived owl species that ranges from northern California to British Columbia. Spotted Owls prey on a variety of small mammals and typically nest and forage in older forest stands. The species was listed as 'Threatened' by the Fish and Wildlife Service in 1990 because of its decreasing numbers. At that time habitat loss from timber harvest was considered the greatest risk; however, competition from barred owls (*S. varia*) has subsequently developed into an equally pressing concern.

Suitable habitat for spotted owls provides for all the species' life history requirements, and is also called Nesting/Roosting/Foraging (NRF) habitat. In the project area it is generally described as

conifer forest greater than 80 years old with mature or late-seral characteristics such as large-diameter trees with nesting structure (broken tops, cavities, or platforms), multiple canopy layers, large down logs and snags, and a somewhat open understory. Stands that show most of these characteristics except nesting structure, and that provide roosting and hunting opportunities, are called foraging habitat. Stands without nesting, roosting, and foraging components but with sufficient canopy cover and sub-canopy space for spotted owl movement are referred to as dispersal habitat. These stands are used to facilitate owl movement at both the site and landscape scale, and may also provide foraging opportunities if the habitat supports prey species. Dispersal habitat is generally found in stands 40 to 80 years old. Forested areas that currently provide no function for spotted owls due to small, dense trees are called unsuitable habitat, and areas that will never provide for spotted owl use (*e.g.* rock outcrops or water bodies) are called non-habitat.

*Spotted Owl Habitat -Proposed Units*

Generally, the proposed units show relatively small tree size; high tree density; uniform age distribution, and low amounts of useful large CWD and snags. The units also lack nesting structure, well-developed understory and shrub layers, sub-canopy flying space, and a variety of roosting choices for thermoregulation. The proposed units are considered primarily spotted owl dispersal habitat with limited foraging opportunities due to these stand conditions. Approximately 500 acres of suitable habitat exist within 0.25 mile of proposed units, occurring as scattered stands of less than 50 acres.

*Spotted Owl Sites and Survey History*

Information on the location and status of spotted owl sites in the project area is available from surveys conducted beginning in the 1990s. All spotted owl sites in the project area are thought to have been identified, but survey efforts have been sporadic from year to year. The effects of habitat modification to spotted owl sites in the Western Cascades physiographic province are assessed by assigning generalized Nest Patches, Core Areas, and Provincial Home Ranges with radii of 300 meters, 0.5 miles, and 1.2 miles respectively (USDI 2008). The quality, amount, and orientation of habitat in the three areas described above are analyzed in combination with survey data to determine the pre-harvest habitat conditions and analyze treatment effects to site occupation and reproductive capability. The Provincial Home Ranges (PHRs) of three known sites (Brush Creek, Cartwright Creek, Crescent Hill) and one predicted site (07NEWITS) overlap the proposed units. Harvest would occur in the core area of the Crescent Hill and 07NEWITS sites; none of the proposed units occur within a spotted owl nest patch. Existing habitat conditions for these sites are detailed in Table 5. The affected sites have little suitable habitat and none meet the Fish and Wildlife Service take thresholds (40% suitable habitat in PHR and 50% in Core Areas, Table 5). Additionally, varying levels of thinning (up to 200 acres) have already affected dispersal habitat in these home ranges.

Temporary sites are designated when owls have been detected in an area, but there is insufficient information to establish a new known site. Temporary site 8215 (Courtney Creek) is located near the Bickmore Creek units.

<u>Bald Eagle – Bureau Sensitive</u>

Bald eagles are large raptors that feed on a variety of prey, including fish, waterfowl, and carrion. They are a migratory species that will both overwinter and nest on the District. Bald eagles typically choose to nest in large trees with open canopies near large bodies of water, and are sensitive to disturbance while nesting (Buehler 2000, Isaacs and Anthony 2003). Proposed treatment areas in Bickmore Creek sections 20, 21, and 28 are in or adjacent to Bald Eagle Habitat Areas (BEHAs). BEHAs were designated in the District RMP to manage and develop bald eagle nesting and winter roosting habitat, and are to be managed as described in the <u>McKenzie Resource Area Bald Eagle Habitat Management Plan</u> (USDI 1998). The primary management goals for BEHAs are to maintain and develop mature or late-seral habitats that are not subject to noise or visual disturbance from humans. Managing for human disturbance includes minimizing permanent road locations within 0.25 mile or more (depending on local topography) of BEHAs. Other types of actions that could disturb nesting are also discouraged (e.g. quarry blasting within one mile). Road management objectives

include not creating new permanent roads, blocking or fully removing existing roads, and generally minimizing opportunities for human access and disturbance.

Oregon Slender Salamander– Bureau Sensitive

Key habitat conditions for this species are moist and cool locations in high canopy cover coniferous or mixed conifer/hardwood forests with large well decayed (≥ 20 inch diameter, decay class 3-5) down logs and stumps, bark accumulations at the base of snags, and loose, uncompacted soil. This salamander has a small home range, very low mobility, and is generally intolerant of changes to its habitat. Although not obligated to late-seral stands, the highest numbers of individuals are seen in mature to late-seral forest or stands that have not suffered major disturbance for many decades. Habitat quality in the proposed harvest areas is generally low in uplands due to a low quality and quantity of down log habitat. Riparian Reserves, with better quality and amounts of down logs and more mesic conditions, provide more suitable habitat for this species.

Salamander Slug – Bureau Sensitive

Little is known about the life history and habitat requirements of this species. It is suspected to occur on the District, but has not been detected. Sites where salamander slugs have been found contained moist conditions and large well-decayed coarse woody debris. Similar mollusk species require leaf litter, fungus, and/or detritus as food sources, as well as refugia from desiccation during dry periods. Possible refugia include interstices in rock habitat, soil fissures, or the interior of large woody debris. The salamander slug likely uses herbaceous vegetation, ferns, leaf litter, or moss mats in moist, shaded areas near refugia when active. Potential habitat for the salamander slug exists throughout the project area, although habitat quality is difficult to assess due to lack of detailed knowledge of habitat requirements.

Western Pond Turtle – Bureau Sensitive

The western pond turtle is widely distributed, occurring from the Puget sound area to Baja Mexico. It is a habitat generalist, using many types of stream, river, and pond habitats; key features include slow, moderately deep water, emergent basking structure, and floating or emergent vegetation. Large-scale conversions of habitat, increasing urbanization, and competition from introduced turtle species have greatly reduced pond turtle populations. One area of the proposed project area, unit NL1D, is adjacent to a complex of three ponds that may support pond turtles. This unit could also provide overwintering habitat for the species.

Migratory Birds

Guidance for Federal agencies whose actions could impact migratory birds was issued in Executive Order 13186 (2001), which directs agencies to ensure that environmental analysis considers the effects of agency actions and plans on migratory birds, with emphasis on species of concern.

Additional guidance for migratory birds was issued in BLM Instruction Memoranda Nos. 2008-050, Migratory Bird Treaty Act – Interim Management Guidance (USDI 2008) and 2009-018, Migratory Bird Treaty Act—Clarification of WO IM 2008-050 for Western Oregon. These memos identify “Birds of Conservation Concern” and “Game Birds Below Desired Condition,” as defined by the Service (2008), as species to be addressed in project-level NEPA documents. Six of these species (bald eagle, harlequin duck, marbled murrelet, peregrine falcon, streaked horned lark, and vesper sparrow) are addressed as BLM Sensitive species. Habitat for five other species (black swift, mourning dove, rufous hummingbird, willow flycatcher, and wood duck) would not be affected by the proposed action. The remaining four species that could potentially be affected by the proposed modification of mid-seral habitat are discussed below.

The band-tailed pigeon is a fruit- and seed-eating bird that is widely distributed across North and South America. Nesting in Oregon is generally in mature, closed canopy conifer stands, while more open forest stands and agricultural lands are used for foraging. Band-tailed pigeons travel widely in search of food, giving the species a nomadic nature. Mineral springs and deposits are also thought to be key habitat features.

The olive-sided flycatcher is an aerial insectivore associated with edge habitats between mature and early-seral stands, and large openings in late-seral habitat. It uses tall trees and snags for singing and foraging perches.

Purple finches are widely distributed and breed in the Pacific states, the northeastern US, and Canada. The species typically uses early- to mid-seral coniferous habitat, but may also be found in agricultural and suburban settings. Purple finches' main diet is seeds, supplemented by fruit and insects. Competition with the house finch is thought to be reducing purple finch numbers.

Northern Goshawks prefer to nest in mature to late-seral stands with characteristics such as larger trees with large side limbs, multistory canopies, large down logs and snags, and a relatively open understory. Nests are usually built on mistletoe brooms, large branches, or on branch whorls near the boles of younger trees. Most nests located on the Eugene District have been in lower quality mid-seral stands as young as 50 years old that have only some of the preferred late-seral characteristics. However, the local significance of such stands, especially their likelihood of facilitating repeated successful reproduction, is unknown. Goshawks forage in nesting stands as well as younger mid-seral stands with ample flying room and lower amounts of brush. Bickmore 20/21 provide low-quality goshawk nesting habitat.

### 4.3.2 Environmental Effects

**Alternative 1: No action**

*General Stand Conditions*

There would be no direct effects to wildlife or habitat on BLM-managed lands if the proposed units were not thinned. Conditions would remain unchanged at the unit scale in the short-term unless a major disturbance such as fire, wind, ice, insects, or disease occurred. Without disturbance, the primary influence on long-term habitat development would be the growth and mortality of overstory trees. Overstocked stand conditions would result in relatively slow growth rates that would prolong crown differentiation; eventually some trees would become dominant and shade out suppressed trees. These trees would stand as small-diameter snags and ultimately fall, but would not create openings as in late-seral stands because of their small size. The remaining dominant trees would soon expand their crowns into the newly-available growing space, limiting effects of mortality on understory vegetation. Multiple waves of such competition mortality would occur before dominant tree density would be low enough for understory reinitiation. This growth trajectory would be unfavorable to the development of mature and late-successional forest attributes, particularly large-diameter trees, high crown volume, large branches, cavities, large snags, and large CWD.

Blowdown of small patches in mid-seral stands would be another, less important source of disturbance. Areas of root disease, soil instability, or poor tree height-to-diameter ratios would be susceptible to blowdown; such patches would increase light to the forest floor and stimulate remaining trees, shrubs, and herbaceous vegetation.

*Coarse Woody Debris and Snags*

Existing CWD and snags would not be physically degraded or removed, nor would their quality or function change due to alteration of surrounding microclimate. Stands would continue to recruit small to medium-sized CWD and snags, primarily through suppression mortality. Although the numbers recruited would be higher than in treated stands, diameters would be smaller than in stands where tree growth was accelerated by thinning. Existing large-diameter CWD and snags would continue to decay and disappear from the stand. These features would not be replaced until natural processes created the necessary growing space for the development of large-diameter trees.

*Special Status Species*

No direct or indirect effects to special status wildlife species or their habitat would occur under this Alternative. Stands would not be modified and no potential for noise disturbance would exist. The project area would continue to provide for wildlife use at current levels, and habitat development would continue along current trajectories. However, attainment of mature or late-seral habitat characteristics would occur at a slower rate compared to the Action Alternatives.

**Alternative 2: Minimize Impacts to Nearby ACECs (Areas of Environmental and Critical Concern)**

*General Stand Conditions*

The proposed thinning would remove some overstory trees and create growing space for residual trees, which would continue height and diameter growth and expand their crowns and roots to use newly available resources. Increased light would penetrate the canopy and stimulate growth of understory trees and shrubs. Thinning would thereby accelerate by several decades the development of late-successional characteristics like large tree diameters, fissured/sloughing bark, deep crowns, large branches, multiple canopy layers, and cavities. Additionally, thinning would ensure that hardwood and minor conifer species would be retained and persist in the units.

Felling and yarding operations would physically degrade understory trees, shrubs, and herbaceous vegetation which would require approximately 10-15 years to recover. Operations would also fragment stands and create completely open areas through the creation of skid trails, cable yarding corridors, roads, and landings. Permanent road construction would cause permanent habitat fragmentation.

Unthinned portions in riparian, wetland, and Timber Production Capacity Classification (TPCC) buffers, and in inaccessible inclusions (see Silviculture project files for details on deferred acres) would provide areas where existing conditions and development trajectories would remain undisturbed.

Despite the benefits of thinning, the proposed units would still require many decades to develop into fully functional late-successional habitat, and current management direction for the proposed units within the Matrix Land Use Allocations (except BEHAs and Riparian Reserves) ultimately calls for regeneration harvest. Therefore, it is unlikely that they will ever develop into late-successional habitat.

*Coarse Woody Debris and Snags*

Project Design Features (see Appendix A) would physically retain most existing CWD and snags in the proposed units. However, harvest operations would damage some down logs (particularly those in advanced decay classes), and some snags could be felled for safety reasons or be inadvertently knocked over. Changes in microclimate due to overstory removal could also adversely affect CWD and snag function and quality until stand canopy conditions recover in 10-15 years.

In addition to damaging some existing CWD and snags, thinning would remove trees that would suffer suppression mortality and become snags or down wood and existing material would disappear from the stands as decay continues. As a result, less small-diameter CWD and snags would be recruited when compared to the No Action Alternative until mortality of residual trees occurs. This may be many decades in the future because residual trees will continue vigorous growth, although sporadic mortality from wind, disease, or insects will occur. Retention of unthinned riparian buffers and deferred areas in and around the proposed units would moderate this effect. Additionally, thinning would accelerate the development of large trees, and therefore long-term recruitment of large CWD and snags compared to the No Action Alternative.

*Special Status Species*

Northern Spotted Owl - Federal Threatened

*General Habitat Effects* - Approximately 1230 acres of dispersal-only habitat would be affected under Alternative 2, and approximately 970 acres under Alternative 3. Vertical and horizontal cover would be reduced in treated areas through overstory tree removal, with varying levels of residual tree density. Harvest would also damage existing shrub and herb layers, and may also damage or destroy some coarse woody debris and snags.

Spotted owls would be expected to continue to utilize treated areas because post-project canopy cover and horizontal cover would continue to allow spotted owls to effectively use stands. Canopy cover after treatment would be 40% or greater, a figure widely used as a threshold for dispersal function (Thomas et al. 1990). However, spotted owls would likely utilize thinned stands less than unthinned stands for approximately 15-20 years until canopy cover and shrub/understory layers recover and develop further. The proposed action would leave untreated riparian buffers that would provide a narrow network of denser canopy cover that could facilitate spotted owl movement through the units.

The proposed action would improve the development trajectory of habitat features used by both spotted owls and their prey, like large (≥30' DBH) trees and snags, deep crowns with large branches, multiple canopy layers, herbaceous and shrub vegetation, and large CWD. These features would develop in varying time frames; for example response from understory vegetation would take only years, while recruitment of large CWD could take hundreds of years. These features would be free to develop in Riparian Reserves, but the majority of the project area is outside of Riparian or District-Designated Reserves and would be available for regeneration harvest within 30-60 years. High-quality suitable spotted owl habitat would not develop in this timeframe, and any habitat improvement realized on these acres would be short-lived. Therefore, it is likely that the proposed action would contribute little to the long-term conservation needs of the spotted owl.

Potential noise disruption to spotted owl nesting from project activities would be mitigated at the Crescent Hill site through seasonal operating restrictions in the North Line Unit 35C from March 1 to July 15. No other project activities would be close enough to known or predicted spotted owl sites to cause noise disruption.

*Cumulative Effects to Spotted Owls* - The amount, location, and timing of reasonably foreseeable actions that could occur on BLM lands in the project watersheds are currently unknown. BLM actions would likely be thinning harvest of similar habitats and/or regeneration harvest of mature or late-seral stands. Non-federal lands in the project watersheds generally provide some short-term dispersal or low quality foraging habitat because most of these lands support previously managed young or mid-seral habitat that lacks late-seral characteristics. Spotted owl habitat on non-federal lands is generally not expected to improve temporally or spatially due to typical industrial forest management practices.

*Effects to Spotted Owl Sites* - Amounts of existing spotted owl habitat and proposed treatment are detailed in Table 5 below. No harvest would occur in any spotted owl nest patch, and differences between effects to spotted owl core areas would be negligible. As used below, "degrading of habitat" due to thinning means that the quality and function of dispersal-only would be reduced to the lowest quality dispersal-only habitat (i.e., little/no forage qualities); at least until treated stands begin to recover in 10-20 years.

07NEWITS: This site would receive the great impacts among affected sites, all from the Bickmore Creek project. Within the core area, approximately 40 acres (11% of all habitat) would be degraded, and approximately 65 acres were previously thinned in the Calapooia 2 timber sale. The site's PHR would receive approximately 390 acres (33% of all habitat) of treatment under Alternative 2 and approximately 275 acres (23% of all habitat) of treatment under Alternative 3. Additionally, approximately 200 acres in the PHR were previously thinned in the Calapooia 2 timber sale.

When the previous and proposed thinning are considered with the small amount of suitable habitat (177 acres or 6% of the PHR) available to the site and generally poor quality and unsecure future of adjacent private habitat, both proposed Alternatives would be *likely to adversely affect* the 07NEWITS site.

Brush Creek: No treatment would occur in the core area of this site, and 72 acres (14% of all habitat) in the PHR would be degraded under both Alternatives in the North Line project. Because the thinned acres are in younger, lower-quality dispersal-only habitat at the periphery of the PHR, the proposed treatment would be *not likely to adversely affect* this site.

Cartwright Creek: No treatment would occur in the core area of this site and approximately 30 acres (5% of all habitat) would be degraded in the PHR. Although the habitat to be treated offers some foraging function, the treated area would be small and there is a relatively large block of contiguous foraging/nesting habitat available to the site. Therefore, the proposed action would be *not likely to adversely affect* the site.

Crescent Hill: Approximately 25 acres (28% of all habitat) of dispersal-only habitat would be degraded in this site's core area and approximately 130 acres (35% of all habitat) degraded in the PHR. The stands affected would be low quality dispersal-only habitat, and there is a moderate amount of dispersal habitat available on adjacent private lands. Therefore, the proposed thinning would *be not likely to adversely affect* this site.

**Table 5: Existing Spotted Owl Habitat**

| Area Analyzed | Site Name | MSNO | Current Conditions | | | | | | Proposed Treatment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Suitable Habitat | | Dispersal Habitat | | All Habitat | | Alternative 2 | | Alternative 3 | |
| | | | Acres | Percent[1] | Acres | Percent[1] | Acres | Percent[1] | Acres | Percent[2] | Acres | Percent[2] |
| Core | 07NEWITS | 07NEWITS | 58 | 12% | 287 | 57% | 346 | 69% | 40 | 11% | 35 | 10% |
| | Brush Creek | 0143O | 133 | 26% | 11 | 2% | 143 | 29% | 0 | 0% | 0 | 0% |
| | Cartwright Creek | 2851O | 48 | 10% | 124 | 25% | 172 | 34% | 0 | 0% | 0 | 0% |
| | Crescent Hill | 4668O | 60 | 12% | 30 | 6% | 90 | 18% | 25 | 28% | 25 | 28% |
| | | | | | | | | | | | | |
| PHR | 07NEWITS | 07NEWITS | 177 | 6% | 1009 | 35% | 1186 | 41% | 391 | 33% | 275 | 23% |
| | Brush Creek | 0143O | 363 | 13% | 172 | 6% | 535 | 18% | 72 | 14% | 72 | 14% |
| | Cartwright Creek | 2851O | 95 | 3% | 553 | 19% | 648 | 22% | 34 | 5% | 27 | 4% |
| | Crescent Hill | 4668O | 221 | 8% | 153 | 5% | 375 | 13% | 131 | 35% | 131 | 35% |

1: Percent of "Area Analyzed," Core = 503 acres, PHR = 2,894 acres

2: Percent of "All Habitat" in Area Affected

Bald Eagle

The project could directly affect bald eagles through disruption and habitat modification in the Bickmore Creek sale, which is adjacent to known winter roosting areas; however, no known nesting occurs anywhere in or near the project area, nor is it suspected due to the lack of suitable large water bodies. Thinning treatment in BEHAs (units BC1-BC6) would be designed specifically to improve bald eagle roosting and nesting habitat and generally to accelerate the development of late-seral characteristics under both Alternatives 2 and 3. Treatment prescriptions for these units would include variable density thinning, targeting individual trees for release, leaving unthinned clumps, creating small canopy gaps, and creating snags and coarse woody debris throughout the units.

Noise and visual disruption from project activities would be mitigated by seasonal operation restrictions on harvest activities in BEHA units (units BC1-BC6) and on operations at the Blagen Mill quarry from November 15 to April 1 under both Alternatives 2 and 3. Differences in the potential for disruption between the Action Alternatives are described below.

*Alternative 2:* Three spur roads (BC20B, C, and D) totaling approximately 0.39 miles would be constructed in BEHA units under this Alternative. These spurs would not be expected to significantly contribute to ongoing human intrusion into the BEHAs because they would be located behind locked gates that restrict public access and would be blocked after use. No other road construction or renovation would occur within 0.25 miles of BEHAs or other known winter roost stands; however, one potential roost in ACEC RFI-11 could be subject to potential noise disruption from winter cable logging in units BC23 and BC24. All other logging operations in Bickmore Creek would be ground-based and occur outside of the winter roosting season or would not be close enough to cause disruption.

Oregon Slender Salamander

Information regarding the persistence of this species in thinning units is limited. The best habitat for the species is in/near Riparian Reserves and other cool, mesic portions of stands. Retention of existing coarse woody debris would reserve most of these habitats for the species. However, existing down log habitat would continue to decay and become less functional over the next few decades, and probably would not be replaced by natural stand processes until harvest units are well into the mature-seral stage. Due to planned regeneration harvest rotation ages on Matrix lands, recruitment of new habitat would only occur in Riparian Reserves and BEHAs. Additionally, depending on the amount of soil compaction, coarse woody debris degradation, and changes to local microclimate conditions, the quality and function of some down log and soil habitat could be degraded for 5-15 years until stand canopy cover increases (longer for soil compaction). This could cause displacement of some individuals. Untreated Riparian Reserves and areas deferred from treatment should provide refugia for some individuals in the project areas.

Salamander Slug

Effects to this species are difficult to analyze due to lack of specific knowledge on its behavior and habitat. Potential habitat in leaf litter and other detritus could be impacted, but this type of habitat is likely to remain in the project area post-harvest. The best large, well-decayed coarse woody debris habitat in the project area is in the portions of Riparian Reserves proposed to be left untreated. The remaining lower quality habitat in treated Riparian Reserves and Matrix lands would be protected and reserved by project design features, although some of this of habitat could be damaged by project actions. Thinning would reduce the canopy cover and create drier microclimate conditions for 10-20 years until canopy and shrub/herbaceous vegetation recovers. It is unknown if and how this could affect species persistence in treated areas.

Western Pond Turtle

Although a complex of ponds with suitable habitat features occurs adjacent to unit NL1D, it is unlikely to support pond turtles due to its high slope position and lack of connectivity with other suitable aquatic habitat. However, these ponds will be surveyed and if turtles are found, unit boundaries will

be adjusted to avoid noise/visual disruption and negative impacts to any suitable overwintering or nesting habitat adjacent to or in the unit.

Migratory Birds

The proposed thinning could have direct and indirect effects on migratory birds and their habitats. Partial removal of overstory trees would reduce canopy cover and volume, and operations would remove or some damage understory vegetation, snags, and existing coarse woody debris. This would reduce nesting and foraging opportunities for the species listed above in the short-term, particularly the olive-sided flycatcher and purple finch. Nests could be removed by project actions and adverse effects to nesting behavior from noise and visual disruption could also occur during felling and yarding actions. Thinning would also stimulate growth in residual trees, understory trees, shrubs, and herbaceous vegetation over the course of several decades. These effects would benefit these and other migratory bird species that use mature and late-successional habitat. However, because Matrix uplands are planned to be regeneration harvested at approximately age 80, these effects would only be fully realized in Riparian Reserves and BEHAs.

Project Design Features that are intended, in part, to mitigate effects on migratory birds include: favoring a diverse residual tree species mix, retention of large remnant trees where they exist, retention of snags and coarse woody debris where not prevented by operational and safety concerns, and creation of snags and coarse woody debris.

*Cumulative effects to Special Status Species and Migratory Birds*

The amount, location, and timing of reasonably foreseeable actions that could occur on BLM lands in the project watershed are currently unknown. BLM actions would likely be thinning harvest of similar mid-seral habitats and/or regeneration harvest of mature or late-seral stands. For most species, cumulative effects at the landscape scale are unpredictable due to lack of specific information on individuals or local habitats (e.g., down logs and snags) as well as specific project locations. Non-federal lands in the watershed primarily provide short-lived, low quality mid-seral habitat for Special Status wildlife species, but little high quality or even stable habitat. These lands provide mostly previously managed young or mid-seral habitat that lacks late-seral characteristics due to typical industrial forest management practices. Such non-federal lands are may serve as population sinks or barriers to landscape-scale movements for species with low mortality, like slugs and salamanders. Habitat quality and availability for the wildlife species described above is generally not expected to improve on non-federal lands for the Special Status wildlife species described above.

**Alternative 3: No New Road Construction**

Effects to wildlife habitat under Alternatives 2 and 3 would differ only in the number of acres treated; Alternative 3 would treat approximately 317 acres (26%) less than Alternative 2 and would result in more complex juxtaposition of habitat types, provide more untreated refugia, and minimize fragmentation from road construction/renovation.

*Alternative 3:* Spurs BC20B, C and D would not be built under this Alternative, nor would units BC23 or BC24 be treated, minimizing the potential for disruption at known or suspected winter roosts. No roads would be constructed or renovated within 0.25 miles of BEHAs or other known winter roost stands and all timber harvest with the potential for disruption would be seasonally restricted (BC1-BC6) or would be ground-based and occur outside of the winter roosting season (BC6, 9, 10, 20, 21,22,25, 27)

## 4.4 Issue 4: What are the effects of the proposed commercial thinning and road actions on soil compaction and displacement?

### 4.4.1 Affected Environment

Field inspection during sale planning provided verification of the Lane and Linn County Soil Surveys. Updates to the District's existing Timber Production Capability Classification (TPCC) System were also incorporated in the proposal and withdrawn from the project. TPCC is a soil-based classification system designed to identify sites that are incapable of sustained intensive timber production without loss of long-term productivity potential. Shallow skeletal soils with low inherent productivity and resiliency, saturated soils (hydric/wetlands), and landslide prone sites are the primary categories. Soil maps are provided in the Analysis file.

All sections exhibit some level of impact to soil quality from past harvest, but the current extent of detrimental soil conditions (severe compaction, severe displacement, and/or active erosion) within individual sub-units/polygons varies in response to different treatment history and soil sensitivity. Current condition estimates for severe legacy compaction were estimated from historic air photos and field reviews.

*North Line (T. 15 S., R. 1 W., Sec. 11)*

The entire unit is mapped as Klickitat soils. Slopes are generally between 25 and 35% and are underlain by durable basalt. The soils are moderately deep, 20 to 40 inches, and well drained, with a stony loam surface layer and cobbly clay loam subsoil. Coarse content, mainly cobbles, occupies about 40 to 60% of the soil profile. Klickitat stony loam is classified as intermediate productivity and resiliency.

Klickitat soils are prone to compaction despite the high skeletal content. Three primary excavated skid roads traverse the unit; one with a cut in excess of ten feet. Skid trails are still evident, occupying about 10% of the acreage. Advanced conifer regeneration and tall brush is limited in the old travelways. Compaction is highly variable, from minor to severe. Overall, the areal extent of severe compaction is at the 2% growth-loss standard as directed in the 1995 RMP (pg. 37).

*North Line (T. 15 S., R. 1 W., Sec. 1)*

These units are comprised of gentle slopes, typically less than 35%, and contain Kinney soils. Bands of steeper topography contain a mix of Harrington and Klickitat soils. The soils are deep and moderately deep, well drained, cobbly loams, stoney loams, and gravelly loams. Kinney cobbly loam is deep with weathered bedrock at 55 inches. The surface soil is cobbly loam; the subsoil cobbly clay loam. Coarse fragments occupy 25 to 45% of the soil profile. Kinney soils are classified as high productivity and resiliency. Kinney soils are available for ground-based harvest where slopes are less than 35%. Harrington soils are intermingled with lesser amounts of Klickitat on slopes in excess of 50%. Harrington gravelly loam is moderately deep (average 34") and well drained. The surface soil is gravelly loam: the subsoil gravelly clay loam with very cobbly loam at depth. Harrington soils are classified as intermediate productivity and resiliency. Runoff is rapid and the risk of surface erosion is high due to the loamy texture and high gravel content.

A network of skid trails is still evident as linear canopy gaps, but excavation is not pronounced since slopes are consistently gentle. Bare soil is uncommon. A deeply excavated skid road does exist in the steeper portion. The A horizon depth has been reduced from machine trafficking outside of travel ways. Areal extent of residual compaction ranges from 2% to 5%.

*North Line (T. 14 S., R. 1 W., Sec. 25)*

About 2/3 of the proposed acres are occupied by Bellpine soils. Slopes are typically less than 25%, with very few short steeper pitches. This moderately deep, well drained soil is on foothills and uplands adjacent to the Willamette valley. Surface soil is silty clay loam; the subsoil silty clay over clay. Bellpine soils usually lack coarse content, but this area has up to 20% cobble at the surface. Weathered tuffaceous sandstone is at a depth of 32 inches. Permeability of this Bellpine soil is slow

due to the lack of coarse fragments and high clay content of the subsoil. Bellpine soils are classified as high productivity and high resiliency.

Trees are subject to wind throw because of the limited rooting depth, especially during the rainy season when soils are saturated and winds are strong.

The areal extent of severe residual compaction is greater than 5% in this area. The loss of porosity has reduced tilth and altered soil structure. Some severely compacted trails are acting as intermittent streams during winter storm events, routing water, which has increased erosion and sediment transport. Interaction of the drainage network and compacted skid trails is most pronounced in Unit NL25C.

*North Line (T. 14 S., R. 1 W., Sec. 35)*

Peavine soils occupy gentle slopes less than 30% adjacent to roads, and moderate slopes to 50%. This deep, well drained soil has silty clay loam surface soil over silty clay and clay subsoil. Coarse content is typically less than 20% with minimal surface rock. Permeability is moderately slow. These characteristics make the Peavine sites prone to compaction. Peavine silty clay loam is classified as high productivity and high soil resiliency. These sites are available for ground-based harvest where slopes are less than 35%. Klickitat/Harrington complex on moderate slopes occur in the southeast corner. A small polygon of Cumley silty clay loam occurs on slopes in excess of 35%.

Prior entry with ground-based machines on slopes in excess of 35% has produced localized excavation and severe compaction within old travel ways. Though difficult to estimate the areal extent of residual severe compaction is estimated between 2% and 5%.

*Good Chance (T. 16 S., R. 1 W., Sec. 9)*

This low elevation foothill site is occupied by deep and moderately deep, well drained and somewhat well-drained soils. Areas east of Road No. 16-1-9.3, and the east half of Unit GC9E are largely Bellpine soils (previously described). Slopes are typically less than 30% in Unit GC9A. Slopes in the southeast (GC9C and within the curve west of Road No. 16-1-9.3) range between 30 to 45%. Cumley soils are contained in GC9E. Cumley silty clay loam is the most widespread series in Lane County. The deep, moderately well-drained soil usually occurs in depressional topography adjacent to streams and wetlands, or on old landslide topography with benches and short steep pitches. Slopes are generally less than 20%. The surface soil is silty clay loam; the subsoil silty clay and clay. The clay rich texture, lack of coarse fragments, and nearly level topography causes moderately slow permeability. Cumley sites have a seasonal high water table at 2 to 3 feet, as evidenced by mottles. Cumley soils are classified as high productivity and high resiliency.

Cumley soils are perennially too moist to permit ground-based logging systems without substantial compaction occurring. Where Cumley soils have been trafficked, broad scale residual compaction has altered water infiltration and storage characteristics, as well as available water for conifer growth. Severe compaction on nearly level terrain near streams 5 and 6 is responsible for routing water outside of the channels and increasing sediment additions to the natural stream system. Displacement and reduction of the A horizon is also evident, which exacerbates the condition. Areal extent of severe legacy compaction is estimated to be 5% within the areas proposed for ground-based systems.

*Good Chance (T. 16 S., R. 1 W., Sec. 21)*

Bellpine silty clay loam occurs in the western half of the proposed acreage. Slopes range from 15% to 30%. Peavine silty clay loam is less extensive and occurs on the east side, including the Riparian Reserves of streams 29 and 30. Slopes are more variable from 30% to 50%. Klickitat stony loam occurs along the southern boundary on 30% to 50% slopes.

Legacy compaction occupies less than 5% of the acreage proposed for ground-based systems.

### 4.4.2 Environmental Effects

**Alternative 1: No Action**

No additional compaction or displacement would occur as a result of new activities. Residual compaction and excavation in certain areas would continue to impair water storage, natural rates of erosion and soil productivity. A slight amount of natural decompaction occurs in this climatic regime since freeze thaw action of resident soils is limited.

**Alternative 2: Minimize Impacts to Nearby ACECs (Areas of Environmental and Critical Concern)**

The majority of the thinning proposed in the North Line and Good Chance sections would occur on sites with high and intermediate resiliency soils. High resiliency soils can sustain substantial vegetative manipulation and still maintain nutrient capital, inherent physical and chemical properties and natural rates of erosion. Intermediate resiliency soils would require design features to reduce the potential for chronic erosion and subsequent loss of soil productivity (see design features in Appendix A).

*Cable Yarding*

About 152 acres, or 38% of the 402 total acres planned for harvest in North Line, would be yarded with skyline systems. No cable yarding is planned in Good Chance units. In Bickmore, about 405 acres or 58% of the total acres would be harvested with cable systems. Direct effects of the cable yarding would be the displacement of surface soils and organic matter, and discontinuous localized compaction and erosion within yarding corridors. The effects are typically confined to a strip less than 12 feet wide. When topography permits, independent corridors with settings 150 feet apart would be required. Under this design, the bare soil subject to compaction and erosion would occupy from 3% to 5% of any unit's area, often dependent on landing size. Where ridge settings are necessary, lateral yarding in excess of 75 feet on steep slopes with coarse textured soils, can lead to greater soil exposure and increase the potential for accelerated erosion.

Compaction would be deeper and more continuous for areas harvested in the winter when soils are wet. Downhill yarding proposed for the northern portion of BC 17 has the potential for greater soil displacement than traditional uphill cable on these acres because generally, the widths of corridors are wider. Severe displacement in the form of gouging/plowing is likely to occur because one-end suspension is difficult to achieve when cabling downhill.

After operations, bare soil exposure, soil displacement, and compaction in corridors and associated landings would occupy 6 to 7 acres in the four North Line sections and about 20 acres in Bickmore. The severity and duration of these detrimental soil conditions depends on soil characteristics, topography, harvest methods, and implementation of effective mitigations. Full vegetative recovery in cable corridors, with ground cover at 65% or more, is expected in five to 10 years for the high resiliency soils. Vegetative recovery on the coarse textured intermediate resiliency soils is expected in 10 to 20 years.

*Ground-based Yarding*

In general, ground-based yarding systems are planned on suitable soils, where slopes average less than 35 percent. About 250 acres or 62% of the North Line proposal, and 100% of the Good Chance proposal would be subject to various combinations of ground-based yarding. Approximately 289 acres in the Bickmore units would be impacted by ground-based systems. Small inclusions where slopes are in excess of 35% occur in many ground-based polygons, sometimes on slump terrain, a product of ancient instability. Generally these slopes are shorter than 100 feet long. The combination of winching and directional felling, as contained in design features and contract stipulations, would minimize the need for excavated skid trails on the steeper portions.

Ground-based heavy equipment has the potential for more extensive, deeper displacement of surface soils and more severe compaction than cable systems because trails are wider and compaction extends deeper. Where organic matter and topsoil are displaced, long-term site

productivity may be reduced. Compaction is detrimental to soil dwelling arthropods, microbes, fungi and bacteria, all of which are essential to nutrient cycling and long-term soil productivity. (Moldenke, A., OSU Entomologist).

Areal extent and severity of compaction would vary depending on the amount and distribution of surface litter and slash, soil texture and structure, percent soil moisture, and the weight and function of the machinery employed by the operator. Studies have concluded that after six yarding trips most soil textures will become compacted to the point that bulk density is increased and soil function is impaired (Steinfeld, D., 1997). After that point, a higher traffic frequency on the same trail doesn't necessarily increase the compaction level.

The Eugene District RMP sets the management direction as follows: To achieve insignificant growth loss effect from compaction from ground-based harvest systems, plan so that two percent or less of any treated unit area is left compacted after amelioration practices (pg. 37). After harvest, 20 acres in Good Chance and 40 acres in North Line would be occupied by skid trails and landings. About 43 acres would be affected in the ground-based polygons in Bickmore. Severely compacted skid trails would be decompacted with an excavator modified for tillage or other approved equipment to restore infiltration and hasten vegetative recovery. Utilizing old routes would reduce new adverse effects and provides the opportunity to treat residual effects in some areas. Legacy trails that are not used in this entry would not be ameliorated, largely due to the interpretation of augmentation of commercial timber sales. The untreated compacted surfaces would continue to impact upland water storage and productivity. Length of impaired productivity for new and legacy trails is largely determined by the depth of excavation, extending through this rotation to many hundreds of years.

Because of the persistence of a high water table, anticipated compaction and associated growth loss effects in Good Chance, Sec. 9 (GC 9E) on Cumley soils would exceed effects on well drained upland soils. The narrow window for dry soils on Cumley sites presents a high risk for adverse soil impacts (Eugene RMP 1995, App. C, Silviculture, pg. 166). Cable harvest was not a consideration in this stand where trees are too young and short to provide for intermediate supports and suspension on the flatter terrain.

Skids, both existing and new, placed on skeletal soils (Klickitat and Ritner series') would result in localized compaction that cannot be effectively ameliorated with standard tillage techniques. This design feature is especially useful in certain Bickmore units where skeletal soils with shallow inclusions are the norm.

*Mechanized feeling/processing equipment*

Preliminary monitoring for Upper Willamette Resource Area Timber Sales show that a feller buncher as compared to a cut-to-length harvester results in greater bare ground subject to erosion (95% vs. 30% bare soil of plots sampled). A feller buncher resulted in somewhat higher percentage with some level of compaction (33% vs. 23%). Where compaction occurred, 75% of harvester plots showed less than two inch depth, whereas more than 90% of feller buncher plots showed compaction greater than three inches deep. Young depauperate stands like GC 9 and NL 35J have minimal large woody ground cover (i.e., vine maple, heavy salal) to travel on and are therefore especially prone to compaction from off-trail cutting machines. Acres occupied by large deeply compacted landings increases where feller bunchers are employed. Large amounts of available nitrogen are contained in the needles and small twigs of conifers. A data gap exists regarding the effects of broad scale whole tree yarding on nitrogen interactions and potential losses in young conifer stands.

*Road Construction*

Long-term soil productivity would be irreversibly lost on about .64 acres of productive forest land in the North Line project area, due to the proposed construction of about .15 mile of new permanent rocked roads. Approximately 9.2 acres/2.16 miles of permanent rocked road would be constructed to facilitate logging the Bickmore units (13 named spur roads). Most segments, especially in sections 3 and 20, would make use of legacy skid roads. Renovation to access North Line and Bickmore units would occur along historic alignments. For these segments, productivity losses were

incurred at time of initial construction, prior to this current proposed activity. No new construction or major renovation would be needed to facilitate harvest of the Good Chance units.

Optional rocking at purchaser's financial discretion would result in the irreversible loss of soil productivity on as much as 2.5 acres of productive forest land within the North Line project area (.57 miles/4 spur roads), and 1.1 acres in Bickmore (.25 mile/3 spur roads). Where the purchaser decides to operate during the dry season and forego the optional rocking, the native surface roads would be blocked and water barred after sale operations to render the compacted surfaces erosion resistant. The benefits of tilling (discussed below) would not be realized.

Proposed construction of temporary native surface roads and associated landings would result in the loss of duff, litter, and topsoil, and compaction on about 3 acres of productive forest land in both North Line (.09 mile) and Bickmore (.088 mile). No temporary native surface roads are planned in Good Chance. Only one native surface short-term road is planned in Bickmore.

Decompaction of short-term native surface roads with an excavator modified for tillage (full decommissioning) would improve infiltration and mitigate the potential for long-term erosion. This amelioration is planned for the .1 mile/ .03 acre of native roads in both North Line and Bickmore. Root growth in the loosened soil would be better distributed and more vigorous, resulting in accelerated improvement of soil structure and recovery back to a forested condition as compared to leaving untreated compacted surfaces. However, soil function and long-term soil productivity would still be impaired for 50 to 100 years, largely dependent on the depth of excavation. Two miles of native surface road built in Bickmore section 25 is considered as permanent and would not be decompacted.

**ALTERNATIVE 3: NO NEW ROAD CONSTRUCTION**

*Yarding Systems*

The proposed acreage for ground-based systems in the Good Chance units remains the same under both Alternatives. As compared to Alternative 2, nine less acres would be harvested with cable systems in North Line. Fifteen less acres are proposed for ground-based systems in the North Line units. Proposal for combined systems in NL35J, ground-based yarding with cable yarding would result in machine footprint and potential bare soil exposure of 20 to 25% within the unit, subject to soil displacement and compaction.

*Road Construction:*

No new roads would be constructed under this Alternative. The long-term soil productivity losses and reductions associated with road construction, discussed in Alternative 2, would not occur on about 20 total acres throughout the entire project area.

## 4.5 ISSUE 5: What are the effects of the proposed commercial thinning and road actions on the spread of invasive species?

### 4.5.1 Affected Environment

Noxious weeds have impacted native plant diversity on the Eugene District. The loss of native plant diversity impacts wildlife forage, shades out plants that hold the soil causing erosion and increasing sediment to streams, reduces pollinator populations and shades out special status species.

Most of the North Mohawk units rate out at high or moderate risk for noxious weed spread and establishment using the criteria established in the "BLM Manual 9015 Risk Assessment" (Table 6). These units have had multiple past disturbances, showing signs of past logging, road construction and burning. Sites that remain in continuous forest cover have low probability of weed invasion, while sites that have gone from forest to agriculture and back to forest have high probability (80%+) of weed occurrence. Also the bigger a disturbance and the more frequent the disturbance the more weeds (Mortensen et al 2009).

**Table 6: Weed Presence for North Mohawk Project**

| Name | Weeds | Infestation location | BLM Manual 9015 Risk Assessment |
|---|---|---|---|
| Good chance<br><br>T. 16 S., R. 1 W., Sec. 9 | *Cytisus scoparius*, 3 ac= 2% within 60' of road<br><br>*Geranium robertianum*, 2 ac = 1% within 60" of road<br><br>Evergreen Blackberry 5 ac =3 % within 60'of road and along a creek connected to the road<br><br>Armenican Blackberrry 5 ac = 3% roadside and along streams in the unit<br><br>Canada thistle, Bull thistle, St. Johnswort, holly = trace amounts within 60' of road | Roadside infestations and satellite populations in unit | Factor 1 = high<br><br>Factor 2 = high<br><br>Rating = 100<br><br>High likelihood and consequences of adverse effects |
| Good chance<br><br>T. 16 S., R. 1 W., Sec. 21 | *Brachypodium sylvaticum*, < 1% roadside<br><br>Trace=Canada thistle, Bull thistle,<br><br>St. Johnswort, Tansy ragwort | Unit very weed free probably due to locked gate and closed canopy | Factor 1 = moderate<br><br>Factor 2 = high<br><br>Rating = 50<br><br>But High likelihood of consequences due to invasiveness of *Brachypodium*, could be controlled by pre-project treatment |
| Bickmore Creek<br><br>T. 14 S., R. 2 W., Secs. 20 and 21 | Weeds along the road, large infestation of blackberrires Unit is Heavily infested<br><br>*Brachypodium sylvaticum*, <1 ac >200' from road<br><br>*Cytisus scoparius*, >1 ac<br><br>*Geranium robertianum*, 23 ac = 14 %<br><br>Shining geranium 3 ac = 2%<br><br>Blackberries, 33 ac = 20%<br><br>Trace=Canada thistle,Bull thistle,<br><br>St. Johnswort, Tansy ragwort | Unit is heavily infested<br><br>Weed > 1000' from roads<br><br>Infestation is in the naturalization stage, with satellite populations | Factor 1 = high<br><br>Factor 2 = high<br><br>Rating = 100 high likelihood of consequences |
| Bickmore Creek<br><br>T. 14 S., R. 2 W., Sec 25 | Blackberries are the major weed mostly along roads and streams, mostly with 50m of the roads, but has spread downhill along streams, 2 small area ( > 5m square) of Geranium roberitanum<br><br>Along Courtney creek & tribs<br><br>Approx 22 acres occupied by blackberries 9% of area | Roadside infestations and satellite populations in unit, more than 500' from the road | Factor 1 = moderate<br><br>Factor 2 = high<br><br>Rating = high due to invasiness of<br><br>Brachypodium |
| Bickmore Creek<br><br>T. 14 S., R. 2 W., Secs. 21,27, 28. | *Brachypodium sylvaticum*,<br><br>*Cytisus scoparius*, = trace<br><br>*Geranium robertianum, lucidum*<br><br>Trace amounts of Blackberries, Canada thistle<br><br>Bull thistle, St. Johnswort, Tansy ragwort | Roadside infestations and satellite populations in unit<br><br>But portions of units are weed free (BC 10) is weed free | Factor 1 = moderate<br><br>Factor 2 = high<br><br>Rating = high due to invasiness of *Brachypodium* |

**Table 6: Weed Presence for North Mohawk Project**

| Name | Weeds | Infestation location | BLM Manual 9015 Risk Assessment |
|---|---|---|---|
| Bickmore Creek<br>T. 14 S., R. 2 W., Sec. 34,<br>T. 14 S., R. 2 W., Sec. 35,<br>T. 15 S., R. 2 W., Sec. 3 | *Brachypodium sylvaticum*, 11 acres = 3%<br>*Cytisus scoparius*, 1 ac<br>*Geranium robertianum* 14 ac = 4%<br>Blackberries, RUDI2 45 ac = 12%<br>RULA 16 ac = 4%<br>TRACE=Canada thistle<br>Bull thistle,<br>St. Johnswort,<br>Tansy ragwort<br>Weeds are mostly roadside and in creek drainages<br>(creeks that blew out in the 1996 storms) | Most weeds within 100' of road | Factor 1 = high<br>Factor 2 = high<br>Rating = high |
| Northline<br>T. 14 S., R. 1 W., Sec. 25 | *Brachypodium sylvaticum*, 1ac/70=.1%<br>Blackberries,<br>RUAR9 & rula = 10 ac = 13%<br>Trace = holly | Most weeds within 100' of road several blackberry infestations more than 100' from road in creeks | Factor 1 = moderate<br>Factor 2 = high<br>Rating = 50 moderate<br>Pretreatment of *Brachypodium* could reduce/prevent spread into |
| Northline<br>T. 15 S., R. 1 W., Sec. 1 | *Brachypodium sylvaticum*, 2 ac<br>*Cytisus scoparius*, 2 ac<br>*Geranium robertianum* 5 ac<br>Blackberries, 11 ac<br>Trace = Canada thistle,Bull thistle,<br>St. Johnswort, Tansy ragwort,Holly | Weed restricted to road, few interior patches. Interior patches on old over grown roads | Factor 1 = moderate<br>Factor 2 = high<br>Rating = 50 |
| Northline<br>T. 15 S., R. 1 W., Sec. 11 | Blackberries less than 1 ac | along roads | Factor 1 = moderate<br>Factor 2 = moderate<br>Rating = 25 |

### 4.5.2 Environmental Consequences

**Alternative 1: No Action**

Under this Alternative no harvest, road construction, culvert replacement and aquatic restoration would occur. Weeds would continue to increase, especially along roads. In areas where weeds have moved beyond the initial infestation stage and are on the way becoming naturalized, they will continue to increase and could come to dominate the forest understory. The opportunity to treat weeds along roads is limited as priority is given to areas proposed for harvest, due to limited weed treatment funding**.** The *Cimicfuga elata* (Tall Bugbane) sites are at risk of being invaded by weeds. Blackberries and false brome pose the highest risk as they: 1)are tall enough to shade out Tall Bugbane; 2) occur nearby; and 3) are very invasive. Regular monitoring of the Tall Bugbane is needed to find weed invasions into the populations at an early stage for effective treatment.

The risk to ACECs comes from weeds species that have naturalized and are spreading through the forest. Many weeds have Blagen Mill Road as an initial infestation point and have spread along the road and into the forest. Two of the Relict Forest Island ACECs sit on Blagen Mill road, while the closed canopy overstory limits the spread of most weeds, theses ACECs are at risk of invasion by

shade tolerant species such as false brome and European Blackberry. Oak Basin is about a mile from Blagen Mill Road, the biggest risk of weed spread comes from OHV activity going from Blagan Mill Road to Oak Basin. OHVs and vehicles are vectors for the spread of weeds. Monitoring of the ACECs for weeds and OHV incursions, followed by weed treatment needed to maintain the ACEC values. See PDFs for mitigations to prevent the spread of weeds and protect ACEC values.

Road maintenance activities are a source of weed introduction and spread by using machinery that is not cleaned of weed seed as it moves from infested to not infested areas.

**Alternative 2: Minimize Impacts to Nearby ACECs (Areas of Environmental and Critical Concern)**

Noxious and invasive non-native species populations would be expected to increase with disturbance due to new areas of open ground and increased roading activity during project implementation. Once introduced, false brome, herb Robert, and shining geranium are known to spread quickly throughout a stand. Their spread is not limited by shade and they would spread into closed canopy stands. These species quickly occupy large areas of forest, crowding out native forbs and grasses.

The spread of Scotch broom, St. Johnswort, tansy and Canada thistle is limited by light; typically, these species spread along roads and skid trails, so the less road construction and ground-based logging, the less the spread of these species.

The proximately to towns and locations on a well-traveled paved road (Shotgun/ Blagen Mill/ Timber Road) creates an avenue for weeds to enter the forest from the road and from infested clearcuts. Disturbance is critical for the invasion process to occur. Repeated, prolonged human disturbance such as logging, roads, and fire suppression create trends toward greater invasion of weeds (Dark, 2004). An important determinate in weed invasion is road density, amount of road use, and closeness to cities, e.g. the closer a unit is to Eugene, Marcola, or Brownsville, the higher the road density and the more traffic on those roads the higher the risk of weeds (Prather, 2002). These units are close to town; no unit is further than 10 miles from a town, and none is further than 3 miles from a paved road, and many of the units are on paved roads. Road density is 3.5 to 4 miles of road per square mile.

Roads facilitate weed dispersal by several mechanisms: altering habitat conditions, increasing the probability of weed invasion by stressing or removing native species, creating a long continuous edge which disrupts plant communities, and creating a corridor for weed dispersal by humans and animals (Trombulak & Frissel, 1999). Blagen Mill Road is a major source of weeds in the North Mohawk area, having many weed species growing along it. Roadsides function as both habitat and a conduit for population expansion (Christen & Matlack 2009) Blagen Mill Road is a major thoroughfare connecting Eugene to Brownsville and Highway 20. Blagen Mill Road appears to be the source of the growing Herb Robert and shining geranium infestation in the Coburg Hills. The spread of weeds is directly tied to road density; in North Mohawk most of the weed infestations are with 100 feet of the roads

The longer weeds are in an area or ecosystem the more difficult they are to remove. The best treatment for weeds is prevention, beyond that, treating the initial infestation when they first appear may be the best and only chance to control or eradicate a weed population (Radosevich). Unfortunately, many of the weed populations in North Mohawk are now naturalized, with extensive populations that have spread from the initial infestation, making control nearly impossible. Treatment should focus on those initial or smaller infestations, especially of highly invasive species such as false brome (*Brachypodium sylvaticum*) or Herb Robert (*Geranium robertianum*). Treating small sites has a better chance of being effective.

New roads open up previously weed-free areas to weed invasive. New roads can intersect abandoned roads making them accessible to OHVs, which are a vector for weeds.

Use of project designs features including vehicle washing; pretreatment, especially along roads; use of “Early Detection, Rapid Response” techniques to treat small infestations before they become

widespread; use of weed free gravel; working from least to most infested areas; and sowing native seed on disturbed ground, can reduce the spread of weeds

This Alternative disturbs the most ground and is the highest risk for the introductions and spread of weeds along roads and in to the forest

**Alternative 3: No New Road Construction**

This Alternative does not construct new roads, therefore reducing the number of vectors that weeds may be introduced or spread from as compared to Alternative 2. In regards to harvest activites, effects would be similar to Alternative 2.

## 4.6 ISSUE 6: WHAT ARE THE EFFECTS OF LOGGING SYSTEMS ON THE COST OF YARDING AND ROAD CONSTRUCTION?

### 4.6.1 Affected Environment

See Section 3.0 (pages 3-6) for description of actions.

For this analysis, data includes estimated standing volume and proposed harvest volumes for each proposed timber sale. The harvest stand map was prepared with ArcMap to compute the stand area to evaluate Alternative Net Volume Harvest estimates by stand.

The following factors were used in the analysis:

- A Pond Values for Douglas-fir logs of $420/MBF was used to complete calculations.
- Logging cost estimates from the appraisals of recent area timber sales were used to estimate ground-based and cable stump to truck logging costs, ($120/MBF for ground-based cost estimate, $200/MBF for Cable cost estimate).

### 4.6.2 Comparison of Costs by Alternatives

Tables 7 through 9 shows the difference in logging system cost and road construction by Action Alternative.

**Table 7: Comparison of Logging Costs for Bickmore**

| Alternative | Acres | Volume MBF | Logging Cost | Road Cost | Gross Value | Net Value ($) | Value $/MBF |
|---|---|---|---|---|---|---|---|
| 2 | 694 | 10,969 | $1,815,040 | $523,847 | $4,606,980 | $2,268,093 | $206 |
| 3 | 435 | 7,212 | $1,125,980 | $130,124 | $3,029,250 | $1,773,146 | $245 |

**Table 8: Comparison of Logging Costs for Northline**

| Alternative | Acres | Volume MBF | Log Cost ($) | Road Cost ($) | Gross Value ($) | Net Value ($) | Value $/mbf |
|---|---|---|---|---|---|---|---|
| 2 | 407 | 5,977 | $908,040 | $209,614 | $2,510,340 | $1,392,686 | $233 |
| 3 | 388 | 5,692 | $870,240 | $165,574 | $2,390,640 | $1,354,826 | $238 |

**Table 9: Comparison of Logging Costs for *Good Chance***

| Alternative | Acres | Volume MBF | Log Cost ($) | Road Cost ($) | Gross Value ($) | Net Value ($) | Value $/mbf |
|---|---|---|---|---|---|---|---|
| 2 | 134 | 1,544 | $195,520 | $40,290 | $648,480 | $412,670 | $267 |
| 3 | 127 | 1,432 | $173,120 | $23,190 | $601,440 | $405,130 | $283 |

## 5.0 CONSULTATION

NORTHERN SPOTTED OWL:

ESA consultation considers effects to general habitat due to habitat modification, and effects to site occupation and reproduction due to habitat modification and nesting behavior due to noise disturbance/disruption. Collectively these considerations result in an overall effects determination of project actions. Consultation was conducted under the two following batched Province BAs:

1) Biological Assessment of NLAA Projects with the Potential to Modify the Habitat and/or Disrupt Northern Spotted Owls Willamette Planning Province - FY 2011-2012, and;

2) Biological Assessment of LAA Projects with the Potential to Modify the Habitat and/or Disrupt Northern Spotted Owls Willamette Planning Province - FY 2011-2012.

Consistent with the above documents, the No Action Alternative would result in a no effect determination to spotted owls or their habitat. The Action Alternatives overall would result in a may affect, but not likely to adversely affect determination for all harvest units except Boulder Creek 35 where actions would result in a may affect, likely to adversely affect determination due to affects to the Osborn Knob site.

## 6.0 LIST OF PREPARERS AND REFERENCES

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## APPENDICES

## APPENDIX A: Project Design Features

**Harvest**

1) Retain all incense-cedar, grand fir, yew, oaks and other hardwoods, except where necessary to accommodate safety and logging systems. If such trees are cut, they would be retained on site as down woody debris.

2) Apply seasonal restrictions or suspension of all harvest and road activities that would occur within 1/4 mile (or more) of known nesting great blue herons, peregrine falcons, bald eagles, spotted owls, great grey owls, accipiter hawks, and other owls, hawks, or raptors if they are located at any time during project activities.

3) Apply reasonable and prudent measures, consistent with consultation with the United States Fish and Wildlife Service, to minimize disruption to spotted owls.

   - Project activities in North Line Unit NL35C (including pre- and post-harvest road work, falling, yarding, loading, and hauling) would be seasonally restricted from March 1 to July 15. Any of the above restrictions may be waived or modified (reduced or extended) by the Area wildlife biologist based on relevant survey information regarding occupation or nesting activity.
   - Constistent with the objectives of the Bald and Golden Eagle Protection Act and the McKenzie Area Bald Eagle Habitat Management Plan, disruption to bald eagles at winter roost sites would be minimized through seasonal restrictions. Project activities in Bickmore Creek Units BC1 and BC8 (including pre and post-harvest road work, falling, yarding, loading, and hauling) would be seasonally restricted from November 15 to March 15. Hauling from the other units, which pass these units, would not be restricted.
   - Operations at Blagen Mill Quarry would also be restricted from November 15 to March 15.

4) In Riparian Reserves, retain all snags, down logs in decay classes 3, 4 and 5, existing rootwads, and all trees 28” or greater DBH undamaged when possible. If trees greater than 28” DBH or snags are felled, they would be left on site for CWD; such CWD may be cut into sections and moved to facilitate operations or safety. In Matrix retain trees greater than 28” DBH except in road construction rights of way, landings, yarding corridors, and those posing a safety hazard.

5) Utilize, when operationally feasible, falling and yarding techniques to protect snags, down logs, and large retention trees. When feasible, place cable corridors and skid trails on the landscape to avoid felling or damaging large retention trees, snags, and down logs. Down logs that present a hazard to logging operations or that are needed to close roads, may be relocated within the project area.

6) Create snags and CWD from reserve conifers trees: a) throughout the Bickmore Creek units that overlap or are adjacent to Bald Eagle Habitat Management Areas (Units BC1-Bc8); and b) in portions of Riparian Reserves (see the implementation file for specific areas). Within these areas, cut 2 trees per acre as CWD and create 3 snags per acre. Trees to be cut would be from 16-24"DBH. Trees must be live and not contain visible bird or mammal nests, sloughing bark, cavities, broken leaders, or other notable deformities.

7) Limit log lengths to 40' in length where necessary to minimize damage to residual trees, snags and coarse woody debris during yarding.

8) Require one-end suspension of logs while skidding and cable yarding. Intermediate supports may be required to accomplish this objective.

   - To minimize impacts to residual trees and soils, spacing of cable corridors should be kept to 150 feet apart and limited to 12 feet in width.
   - As determined by the Authorized Officer, cable yarding corridors with severe gouging would be left in an erosion resistant condition by the use of hand waterbarring or placement of wood debris.

9) Approve mechanized harvesting systems when:

- Movement of cutting equipment off designated skid trails shall be limited to a single pass.
- Mechanized harvester shall travel on the cushion of slash created by the harvesting process.
- Where slopes are less than 35%.
- When soil moistures are low (≈25%) and provides resistance to compaction (typically July 1 - October 1), unless waived by the Authorized Officer.

10) Apply the following requirements to ground-base yarding areas:

- Require felling of trees to lead of the skid trails and maximize winching distances.
- Placement of skid trails would be avoided within 75 feet of posted boundaries.
- All skidding equipment would remain on the designated skid trails.
- Average distance between skid trails would be 150 feet or greater where feasible.
- Use existing skid trails or OHV trails, where possible.
- Avoid placing skid trails on rocky soils.
- Restrict yarding to seasonally dry period when soil moisture content provides the most resistance to compaction. This is usually July 1 and October 1.
- Till, where feasible, compacted skid trails, with an excavator to a depth of 18 inches, when soil moisture is appropriate. Other equipment may be authorized if it can accomplish the required depth, lateral shatter of compacted layer. Place woody debris on the decompacted surfaces.
- Minimize damage to residual tree roots.
- To reduce erosion and restore soil productivity, pull slash, logging debris and brush from the forest floor onto severely compacted skid trails in consult with the Authorized Officer.
- If tillage cannot be accomplished the same operating season, all skid trails and temporary native surface roads would be left in an erosion resistant condition and blocked prior to the onset of wet weather. This would include construction of drainage dips, water bars, lead off ditches, and barriers (rootwads or brush piles) to prevent vehicle access until final blockage and/or tilling.

11) Keep a Spill Contamination Kit (SCK) on-site during any operation within the project area; prior to starting work each day, all machinery would be checked for leaks and necessary repairs would be made.

12) Removal, notification, transport and disposal of any diesel, hydraulic fluid, or other petroleum product released into soil and/or water would be accomplished in accordance with all applicable laws and regulations.

**Road Construction Use and Decommissioning**

14) Position fill or waste material from road decommissioning in a location that would avoid direct or indirect sediment discharges to streams or wetlands. Excess excavation and unsuitable material shall be placed in designated disposal areas.

- Revegetate all cut and fill slopes on permanent roads by seeding and/or planting with native seeds.

15) Till, where road sub grade conditions warrant, compacted road surfaces with an excavator when soil moisture is appropriate (generally 25%). If tillage is not possible then waterbars and lead-off ditches would be constructed to reduce sedimentation to streams and wetlands. Logging debris and brush would be placed along the entire length of tilled roadbeds to reduce erosion and block access.

16) Block vehicle access where appropriate with earthen barricades with brush and/or slash additions.

17) Limit use of native surfaced roads to the dry season (generally between July 1 and October 1). Waterbars, drain dips, and/or lead-off ditches may be required to create an erosion resistant condition on roads during seasonal closures. Access to such roads shall be blocked during closures.

18) Remove and dispose of pulled culverts appropriately.

19) Remove all fill material down to original channel bottom. Dig channel to bank-full width and natural gradient. Shape channel sideslopes, and pullback to gradual enough angle to facilitate seeding and mulching. Erosion control to be accomplished prior to fall rains with native grass and/or conifers and native straw mulch. Materials would be supplied by the government.

20) Require the following along perennial streams:

- Stream flow would be routed around the construction activity as much as possible (e.g. temporary flow diversion structure).
- Sediment containment structure placed across the channel below the work section (i.e. straw bales) as needed.
- Work site would be pumped free of standing water.
- Fish and other aquatic species would be removed from the project area and block nets placed above and below the worksite.
- After installation, the disturbed section would be planted with native seed and mulched with native straw or wood mulch before the first rains.

21) Apply Oregon Department of Fish and Wildlife (ODFW) in-water guidelines to all in stream activities. For permanent roads, construction and renovation would occur during the dry season, typically June 1st through October 15.

- Soil stabilization work consisting of seeding and mulching would be performed on existing roads in accordance with these specifications at the culvert installation sites and cutbanks.

22) Implement the following combination of methods during heavy and/or prolonged rainfall or freezing and thawing periods to minimize sedimentation from the gravel surfaced roads into stream channels:

- Keep ditch line, cross drains, and leadoff ditches clean and free to flow, while minimizing disturbance to existing ditch line vegetation.
- Sediment traps may be installed in ditch lines lacking vegetation and having the potential to deliver sediment to streams.
- Prior to and during haul operation, rock surfacing and road maintenance would be assessed throughout the project area and haul route.
- As determined by the Authorized Officer, if erosion and road degradation occur after freeze and thaw periods log haul operations may be discontinued

**Fuels**

23) Cover and burn all landing piles along roads.

24) Pile, cover and burn slash, less than 6" in diameter and greater than 3' in length, within 25 feet of either side of designated (typically permanent) roads within harvest areas.

25) Scatter landing piles, along temporary roads, on top of the road surface to remove the fuel concentrations, deter OHV use and slow erosion. Resulting fuel bed would not be deep and continuous. Piles along temporary roads not scattered on the road surface would be covered and burned.

26) Cover all piles to be burned with plastic in compliance with the Oregon Smoke Management Plan.

**Other**

27) Prevent the spread of noxious weeds from other locations, by washing logging, road construction,and tilling equipment prior to entry on BLM lands.

28) Cultural resource surveys have been completed prior to harvest and sites have been removed from the project area. However, if additional sites are found within the project area, appropriate actions would be taken to mitigate effects to the sites.

## APPENDIX B: Tables

**Table B-1: North Mohawk 2012 Thinnings - Roads Table Alternative 2**

| Road Construction - Temporary | Length (miles) | Comments |
|---|---|---|
| Spur NL25A | 0.139 | Native, ridgetop road |
| Spur NL25B | 0.014 | Native, Landing Spur |
| Spur NL25E | 0.014 | Native, Landing Spur |
| Spur NL35B | 0.064 | Native |
| Spur BC35A | 0.088 | Native |
| **Total** | **0.32** | |
| | | |
| **Road Construction - Permanent** | **Length (miles)** | **Comments** |
| Spur BC20B | 0.133 | 4"-8" rock |
| Spur BC20C | 0.114 | 4"-8" rock |
| Spur BC20D | 0.148 | 4"-8" rock |
| Spur BC25B | 0.049 | 4"-8" rock, Purchaser locate |
| Spur BC25C | 0.044 | 4"-8" rock, Purchaser locate |
| Spur BC25D | 0.013 | 4"-8" rock, Purchaser locate |
| Spur BC25E | 0.206 | Native, block at property line |
| Spur BC25T | 0.199 | 4"-8" rock |
| Spur BC25V | 0.165 | 4"-8" rock |
| Spur BC3B | 0.256 | 6"-10" rock, uses old compacted skid trail |
| Spur BC3D | 0.045 | Native/Optional Rocking, short landing spur |
| Spur BC3G | 0.093 | 4"-8" rock, |
| Spur BC3H | 0.436 | 4"-8" rock, 50% of length uses existing compacted skid trail |
| Spur BC3Z | 0.417 | 6"-10" rock, Uses existing compacted skid trails |
| Spur BC3Y | 0.092 | 6"-10" rock |
| Spur NL35A | 0.021 | 4"-8" rock |
| Spur NL35C | 0.049 | 4"-8" rock |
| Spur NL35K | 0.078 | 4"-8" rock |
| Spur BC35B | 0.077 | Native, Optional Rocking |
| Spur BC35S | 0.129 | Native, Optional Rocking |
| Spur NL1B | 0.271 | Native, Optional Rocking, Uses existing compacted skid trail |
| Spur NL35E | 0.087 | Native, Optional Rocking |
| Spur NL35G | 0.174 | Native, Optional Rocking |
| Spur NL35I | 0.031 | Native, Optional Rocking |
| **Total** | **3.32** | |

**Table B-1: North Mohawk 2012 Thinnings - Roads Table Alternative 2**

| Road Renovation | Length (miles) | Comments |
|---|---|---|
| 14-2-16 | 0.930 | Grade & scarify, Replace 3-4 culverts, add approx 3 cross drains |
| 14-2-28.8 | 0.250 | Reopen decomm road, install approx 0-2 temporary pipes |
| 14-2-25.8 | 0.066 | Reestablish ditch line, add approx. 4" rock |
| 15-2-3 | 0.280 | Brush & grade, Reestablish ditch line, add 4"-8" rock |
| 14-2-21.1 | 0.199 | Brush & grade, Add 4" rock, Replace 2 culverts |
| 14-2-25.1 | 0.208 | Brush & grade, add 4"-8" rock |
| 15-2-3.1 | 0.197 | Realign road into quarry, add 1-2 cross drains, add 6"-12" rock |
| Spur BC25Z | 0.091 | Brush & grade, install 0-2 cross drains, Add 4"-8" rock |
| Spur BC3Y | 0.115 | Brush & grade, install 2-4 culverts, add 4"-8" rock |
| 15-1-11.1 | 0.157 | Brush & grade, Add 4" rock |
| 14-1-35.1 | 0.208 | Scarify potholes, Brush, Grade, Reestablish ditch line |
| Spur NL1F | 0.259 | Native, Reopen decomm road, Install 1-3 cross drains |
| Spur NL1H | 0.167 | Optional rocking, Uses existing road, install 1-2 cross drains |
| Spur NL35H | 0.051 | Optional Rocking, Uses existing old landing & road bed |
| Spur BC35T | 0.227 | Native, Reopen decomm road, Install 1-3 cross drains |
| **Total** | **3.41** | |
| | | |
| **Road Improvement** | **Length (miles)** | **Comments** |
| 14-2-21.1 | 0.446 | Brush & grade, reestablish ditch line, native surface, install 0-2 cross drains |
| 14-1-35 | 0.799 | Major improvement, Roll grades and install/replace 3-7 culverts to improve drainage |
| 15-1-1.3 | 0.410 | Brush & grade, reestablish ditch line, add 1-3 cross drains |
| 14-1-35.2 | 0.030 | Increase curve radius to accommodate lowboy trucks |
| **Total** | **1.69** | |
| | | |
| **Decommission** | **Length (miles)** | **Comments** |
| Spur BC35T | 0.227 | Barricade & Waterbar |
| Spur BC35S | 0.126 | If native barricade and waterbar |
| Spur BC35B | 0.079 | If native barricade and waterbar |
| Spur BC3B | 0.254 | Heavily Block |
| Spur BC3H | 0.461 | Barricade at Junction |
| Spur NL35A | 0.021 | If native barricade and waterbar |
| Spur NL35B | 0.063 | Barricade and waterbar |
| Spur NL35C | 0.048 | If native barricade and waterbar |
| Spur NL35E | 0.086 | If native barricade and waterbar |
| Spur NL35G | 0.173 | If native barricade and waterbar |
| Spur NL35H | 0.051 | If native barricade and waterbar |
| Spur NL35I | 0.030 | Barricade and waterbar |
| Spur NL35K | 0.077 | If native barricade and waterbar |
| Spur BC25E | 0.206 | Block at property line and waterbar |
| Spur NL1B | 0.268 | Barricade and waterbar |
| Spur NL1F | 0.275 | Barricade and waterbar |
| Spur NL1H | 0.166 | If native barricade and waterbar |
| 14-2-28.8 | 0.249 | Barricade and waterbar |

**Table B-1: North Mohawk 2012 Thinnings - Roads Table Alternative 2**

| **Decommission (Cont.)** | **Length (miles)** | **Comments** |
|---|---|---|
| Spur BC35A | 0.088 | If native barricade and waterbar |
| Spur NL25A | 0.139 | Native, ridgetop road |
| **Total** | **3.09** | |
| | | |
| **Full Decommission** | **Length (miles)** | **Comments** |
| 14-1-26 | 0.254 | Full decomm of existing road that follows stream 10W |
| Spur NL25B | 0.014 | Barricade, Till |
| Spur NL25E | 0.014 | Barricade, Till |
| Spur BC35A | 0.088 | Barricade, Till |
| **Total** | **0.37** | |

**Table B-2: North Mohawk 2012 Thinnings - Roads Table Alternative 3**

| **Road Construction - Temporary** | **Length (miles)** | **Comments** |
|---|---|---|
| Spur NL25A | 0.139 | Native, ridgetop road |
| Spur NL25B | 0.014 | Native, Landing Spur |
| Spur NL25E | 0.014 | Native, Landing Spur |
| Spur NL35B | 0.064 | Native |
| Spur BC35A | 0.088 | Native |
| **Total** | **0.32** | |
| | | |
| **Road Construction - Permanent** | **Length (miles)** | **Comments** |
| Spur BC20B | 0.133 | 4"-8" rock |
| Spur BC20C | 0.114 | 4"-8" rock |
| Spur BC20D | 0.148 | 4"-8" rock |
| Spur BC25B | 0.049 | 4"-8" rock, Purchaser locate |
| Spur BC25C | 0.044 | 4"-8" rock, Purchaser locate |
| Spur BC25D | 0.013 | 4"-8" rock, Purchaser locate |
| Spur BC25E | 0.206 | Native, block at property line |
| Spur BC25T | 0.199 | 4"-8" rock |
| Spur BC25V | 0.165 | 4"-8" rock |
| Spur BC3B | 0.256 | 6"-10" rock, uses old compacted skid trail |
| Spur BC3D | 0.045 | Native/Optional Rocking, short landing spur |
| Spur BC3G | 0.093 | 4"-8" rock, |
| Spur BC3H | 0.436 | 4"-8" rock, 50% of length uses existing compacted skid trail |
| Spur BC3Z | 0.417 | 6"-10" rock, Uses existing compacted skid trails |
| Spur BC3Y | 0.092 | 6"-10" rock |
| Spur NL35A | 0.021 | 4"-8" rock |
| Spur NL35C | 0.049 | 4"-8" rock |

**Table B-2: North Mohawk 2012 Thinnings - Roads Table Alternative 3**

| **Road Construction – Permanent (Cont.)** | **Length (miles)** | **Comments** |
|---|---|---|
| Spur NL35K | 0.078 | 4"-8" rock |
| Spur BC35B | 0.077 | Native, Optional Rocking |
| Spur BC35S | 0.129 | Native, Optional Rocking |
| Spur NL1B | 0.271 | Native, Optional Rocking, Uses existing compacted skid trail |
| Spur NL35E | 0.087 | Native, Optional Rocking |
| Spur NL35G | 0.174 | Native, Optional Rocking |
| Spur NL35I | 0.031 | Native, Optional Rocking |
| **Total** | **3.32** | |
| | | |
| **Road Renovation** | **Length (miles)** | **Comments** |
| 14-2-16 | 0.930 | Grade & scarify, Replace 3-4 culverts, add approx 3 cross drains |
| 14-2-28.8 | 0.250 | Reopen decomm road, install approx 0-2 temporary pipes |
| 14-2-25.8 | 0.066 | Reestablish ditch line, add approx. 4" rock |
| 15-2-3 | 0.280 | Brush & grade, Reestablish ditch line, add 4"-8" rock |
| 14-2-21.1 | 0.199 | Brush & grade, Add 4" rock, Replace 2 culverts |
| 14-2-25.1 | 0.208 | Brush & grade, add 4"-8" rock |
| 15-2-3.1 | 0.197 | Realign road into quarry, add 1-2 cross drains, add 6"-12" rock |
| Spur BC25Z | 0.091 | Brush & grade, install 0-2 cross drains, Add 4"-8" rock |
| Spur BC3Y | 0.115 | Brush & grade, install 2-4 culverts, add 4"-8" rock |
| 15-1-11.1 | 0.157 | Brush & grade, Add 4" rock |
| 14-1-35.1 | 0.208 | Scarify potholes, Brush, Grade, Reestablish ditch line |
| Spur NL1F | 0.259 | Native, Reopen decomm road, Install 1-3 cross drains |
| Spur NL1H | 0.167 | Optional rocking, Uses existing road, install 1-2 cross drains |
| Spur NL35H | 0.051 | Optional Rocking, Uses existing old landing & road bed |
| Spur BC35T | 0.227 | Native, Reopen decomm road, Install 1-3 cross drains |
| **Total** | **3.41** | |
| | | |
| **Road Improvement** | **Length (miles)** | **Comments** |
| 14-2-21.1 | 0.446 | Brush & grade, reestablish ditch line, native surface, install 0-2 cross drains |
| 14-1-35 | 0.799 | Major improvement, Roll grades and install/replace 3-7 culverts to improve drainage |
| 15-1-1.3 | 0.410 | Brush & grade, reestablish ditch line, add 1-3 cross drains |
| 14-1-35.2 | 0.030 | Increase curve radius to accommodate lowboy trucks |
| **Total** | **1.69** | |
| | | |

**Table B-2: North Mohawk 2012 Thinnings - Roads Table Alternative 3**

| **Decommission -** | **Length (miles)** | **Comments** |
|---|---|---|
| Spur BC35T | 0.227 | Barricade & Waterbar |
| Spur BC35S | 0.126 | If native barricade and waterbar |
| Spur BC35B | 0.079 | If native barricade and waterbar |
| Spur BC3B | 0.254 | Heavily Block |
| Spur BC3H | 0.461 | Barricade at Junction |
| Spur NL35A | 0.021 | If native barricade and waterbar |
| Spur NL35B | 0.063 | Barricade and waterbar |
| Spur NL35C | 0.048 | If native barricade and waterbar |
| Spur NL35E | 0.086 | If native barricade and waterbar |
| Spur NL35G | 0.173 | If native barricade and waterbar |
| Spur NL35H | 0.051 | If native barricade and waterbar |
| Spur NL35I | 0.030 | Barricade and waterbar |
| Spur NL35K | 0.077 | If native barricade and waterbar |
| Spur BC25E | 0.206 | Block at property line and waterbar |
| Spur NL1B | 0.268 | Barricade and waterbar |
| Spur NL1F | 0.275 | Barricade and waterbar |
| Spur NL1H | 0.166 | If native barricade and waterbar |
| 14-2-28.8 | 0.249 | Barricade and waterbar |
| Spur BC35A | 0.088 | If native barricade and waterbar |
| Spur NL25A | 0.139 | Native, ridgetop road |
| **Total** | **3.09** | |
| | | |
| **Full Decommission** | **Length (miles)** | **Comments** |
| 14-1-26 | 0.254 | Full decomm of existing road that follows stream 10W |
| Spur NL25B | 0.014 | Barricade, Till |
| Spur NL25E | 0.014 | Barricade, Till |
| Spur BC35A | 0.088 | Barricade, Till |
| **Total** | **0.37** | |

**Table B-3: North Mohawk 2012 Thinnings - Roads Table Alternative 4**

| **Road Construction - Temporary** | **Length (miles)** | **Comments** |
|---|---|---|
| **Total** | **0.00** | |
| | | |
| **Road Construction - Permanent** | **Length (miles)** | **Comments** |
| | | |
| **Total** | **0.00** | |
| | | |
| **Road Renovation** | **Length (miles)** | **Comments** |
| 14-2-16 | 0.930 | Grade & scarify, Replace 3-4 culverts, add approx 3 cross drains |
| 14-2-28.8 | 0.250 | Reopen decomm road, install approx 0-2 temporary pipes |
| 14-2-25.8 | 0.066 | Reestablish ditch line, add approx. 4" rock |
| 15-2-3 | 0.280 | Brush & grade, Reestablish ditch line, add 4"-8" rock |
| 14-2-21.1 | 0.199 | Brush & grade, Add 4" rock, Replace 2 culverts |
| 14-2-25.1 | 0.208 | Brush & grade, add 4"-8" rock |
| 15-2-3.1 | 0.197 | Realign road into quarry, add 1-2 cross drains, add 6"-12" rock |
| Spur BC25Z | 0.091 | Brush & grade, install 0-2 cross drains, Add 4"-8" rock |
| Spur BC3Y | 0.115 | Brush & grade, install 2-4 culverts, add 4"-8" rock |
| 15-1-11.1 | 0.157 | Brush & grade, Add 4" rock |
| 14-1-35.1 | 0.208 | Scarify potholes, Brush, Grade, Reestablish ditch line |
| Spur NL1F | 0.259 | Native, Reopen decomm road, Install 1-3 cross drains |
| Spur NL1H | 0.167 | Optional rocking, Uses existing road, install 1-2 cross drains |
| Spur NL35H | 0.051 | Optional Rocking, Uses existing old landing & road bed |
| Spur BC35T | 0.227 | Native, Reopen decomm road, Install 1-3 cross drains |
| **Total** | **3.41** | |
| | | |
| **Road Improvement** | **Length (miles)** | **Comments** |
| 14-2-21.1 | 0.446 | Brush & grade, reestablish ditch line, native surface, install 0-2 cross drains |
| 14-1-35 | 0.799 | Major improvement, Roll grades and install/replace 3-7 culverts to improve drainage |
| 15-1-1.3 | 0.410 | Brush & grade, reestablish ditch line, add 1-3 cross drains |
| 14-1-35.2 | 0.030 | Increase curve radius to accommodate lowboy trucks |
| **Total** | **1.69** | |
| | | |
| **Decommission -** | **Length (miles)** | **Comments** |
| Spur BC35T | 0.227 | Barricade & Waterbar |
| Spur NL35H | 0.051 | If native barricade and waterbar |
| Spur NL1F | 0.275 | Barricade and waterbar |
| Spur NL1H | 0.166 | If native barricade and waterbar |
| **Total** | **0.72** | |
| | | |
| **Full Decommission** | **Length (miles)** | **Comments** |
| 14-1-26 | 0.254 | Full decomm of existing road that follows stream 10W |
| **Total** | **0.25** | |

**Table B-4: Hydrologic Unit, Timber Sale Unit Location, and Nearby Stream Names**

| 10th Field Hydrologic Unit | 12th Field Hydrologic Unit | Unit Name | Major Streams below unit |
|---|---|---|---|
| 1709000303 Upper Calapooia River | 170900030307 Courtney Creek – Calapooia River | Bickmore 25 (W) | Courtney Creek |
| | | Bickmore 3 (N) | |
| | | Bickmore 34 | |
| | | Bickmore 35 | |
| | | Bickmore 20 | |
| | | Bickmore 21 | |
| | | Bickmore 27 | |
| | | Bickmore 28 | |
| | 170900030304 Brush Creek – Calapooia River | Bickmore 25 (E) | Bickmore Creek |
| | | Northline 35 | Brush Creek |
| | | Northline 11 (N) | |
| | | Northline 25 (W) | Calapooia River tributary |
| | 170900030303 Pugh Creek – Calapooia River | Northline 1 (W) | Pugh Creek |
| | | Northline 35 (E, < 10 ac) | |
| | | Northline 25 (E) | |
| | | Northline 1 | |
| 1709000406 McKenzie | 170900040602 Shotcash Creek – Mohawk River | Bickmore 3 (SE) | Owl Creek |
| | | Good Chance 9 (N) | Mohawk River tributary |
| | 170900040603 Mill Creek | Good Chance 9 (S) | Mill Creek |
| | 170900040604 Parsons Creek – Mohawk River | Northline 11 (S) | Mohawk River tributary |
| | | Good Chance 21 | Cartwright Creek |

**Table B-5: Northern spotted owl site histories, 2011 thinning**

| Site Name | MSNO | Monitoring History | Reproductive History | Comments |
|---|---|---|---|---|
| Brush Creek | 0143 | Located 1975, yearly monitoring since '87. Last NSO detection 2005. Pairs '75, '85-'92, '95, '96, '00, '02, '03. | Two fledglings 2002, 1996, one 1975. | Moderate amount of NRF on BLM; low amount of dispersal habitat on BLM or private. Moderate/high probability of occupation. |
| Cartwright Creek | 2851 | Located 1991, yearly monitoring since 1998. Resident single NSO in '91, '03, '09, '10 | No documented reproduction | Adjacent private land provides moderate amount of dispersal habitat to south and east. Moderate probability of occupation. |
| Crescent Hill | 4668 | Located 1992, yearly monitoring to '96, '04-'06, '09-present. Pairs '95, '96, '04, '09, '10. | One fledgling '04. | NRF low and fragmented, moderate dispersal on private. Moderate/high probability of occupation. |
| 07NEWITS | 8215 | Survey of Courtney Creek and Crooked Creek temp sites in '09, '10. | No NSO documented reproduction. | High amount of thinning and low NRF on BLM. No NRF and low/moderate dispersal on private. Recent surveys in vicinity haven't detected NSO. |

| Table B-6: Special Status Species and Migratory Birds evaluated for North Mohawk Thinning. | | | | | | |
|---|---|---|---|---|---|---|
| **Common Name** | **Scientific Name** | **Status** | **Occurrence 2** | **Reason Eliminated** | **Habitat/Range** | **Citations** |
| **SPECIAL STATUS SPECIES** | | | | | | |
| FENDER'S BLUE BUTTERFLY | *PLEBEJUS ICARIOIDES FENDERI* | FE | D | **Analyzed in EA** | Associated strongly with Kincaid's Lupine. Meadow/prairie habitat | Applegarth 1995 |
| CALIFORNIA BROWN PELICAN | *PELECANUS OCCIDENTALIS CALIFORNICUS* | FE | S | No Habitat | Coastal and estuarine habitats. | NatureServe 2008. |
| MARBLED MURRELET | *BRACHYRAMPHUS MARMORATUS* | FT, BCC | D | Out of Range | Within 50 miles of coast. | U.S. Fish and Wildlife Service 1997 |
| NORTHERN SPOTTED OWL | *STRIX OCCIDENTALIS CAURINA* | FT | D | **Analyzed in EA** | Mature/late-successional forest with nesting structure, canopy layers, large CWD. | Forsman 1984 |
| | | | | | | |
| CRATER LAKE TIGHTCOIL | *PRISTILOMA ARCTICUM CRATERIS* | SEN | S | Protected by Riparian Reserves | Wet habitats above 2000 feet. | Duncan et al. 2003 |
| EVENING FIELDSLUG | *DEROCERAS HESPERIUM* | SEN | S | Protected by Riparian Reserves | Perennially wet meadows or rock gardens | Burke and Duncan 2005 |
| SALAMANDER SLUG | *GLIABATES OREGONIUS* | SEN | S | **Analyzed in EA** | Moist mature forest with vegetation and large woody debris. | Duncan 2008a |
| SPOTTED TAIL-DROPPER | *PROPHYSAON VANATTAE PARDALIS* | SEN | S | Out of Range | Moist Coast Range forest with vegetation and large woody debris. | Frest and Johannes 2000, Duncan 2008b |
| TILLAMOOK WESTERN SLUG | *HESPERARION MARIAE* | SEN | D | Out of Range | Moist, mature coastal forest. | Duncan 2008c |
| HADDOCK'S RHYACOPHILAN CADDISFLY | *RHYACOPHILA HADDOCKI* | SEN | S | Protected by Riparian Reserves | Small, cool mountain streams and adjacent riparian areas. | Brenner 2005a |
| HOARY ELFIN | *CALLOPHRYS POLIOS MARITIMA* | SEN | S | No Habitat | Ocean bluffs and dunes. | Ross et al. 2005 |
| MARDON SKIPPER | *POLITES MARDON* | SEN | S | No Habitat | Grassland, prairie. | Kerwin and Huff 2007 |
| OREGON PLANT BUG | *LYGUS OREGONAE* | SEN | S | No Habitat | Ocean dunes. | Scheurering 2006 |
| ROTH'S BLIND GROUND BEETLE | *PTEROSTICHUS ROTHI* | SEN | S | Out of Range | Moist mature Coast Range forest. | Applegarth 1995, Brenner 2005b |
| SISKIYOU SHORT-HORNED GRASSHOPPER | *CHLOEALTIS ASPASMA* | SEN | S | No Habitat | Grassland, meadow, open areas. Associated with blue elderberry. | Brenner 2006 |
| SIUSLAW SAND TIGER BEETLE | *CICINDELA HIRTICOLLIS SIUSLAWENSIS* | SEN | D | No Habitat | Sandy riverbanks and river mouths adjacent to the Pacific Ocean. | Black et al. 2007 |
| TAYLOR'S CHECKERSPOT | *EUPHYDRYAS EDITHA TAYLORI* | SEN | S | No Habitat | Grassland, prairie. | Black et al. 2005 |
| OREGON SLENDER SALAMANDER | *BATRACHOSEPS WRIGHTORUM* | SEN | D | **Analyzed in EA** | North of Hwy. 58 in cool, moist, shady habitat with large CWD; typically old-growth forest. | Corkran and Thoms 1996, Clayton and Olson 2007 |
| FOOTHILL YELLOW-LEGGED FROG | *RANA BOYLII* | SEN | D | No Habitat | Low-gradient streams with bedrock or gravel substrate | Corkran and Thoms 1996 |
| NW POND TURTLE | *ACTINEMYS MARMORATA MARMORATA* | SEN | D | **Analyzed in EA** | Ponds, lakes, larger streams with emergent vegetation and basking sites and nearby nesting habitat. | Rosenberg et al. 2009. |

| Table B-6: Special Status Species and Migratory Birds evaluated for North Mohawk Thinning. | | | | | | |
|---|---|---|---|---|---|---|
| **Common Name** | **Scientific Name** | **Status** | **Occurrence 2** | **Reason Eliminated** | **Habitat/Range** | **Citations** |
| PAINTED TURTLE | *CHRYSEMYS PICTA* | SEN | S | No Habitat | Slow water; rivers, marshes, ponds with abundant vegetation and basking sites | Bury 1995. |
| ALEUTIAN CANADA GOOSE | *BRANTA HUTCHINSII LEUCOPAREIA* | SEN | S | No Habitat | Pasture, harvested agricultural fields, marshes. | U.S. Fish and Wildlife Service 1991 |
| AMERICAN PEREGRINE FALCON | *FALCO PEREGRINUS ANATUM* | SEN, BCC | D | No Habitat | Cliffs and other sheer vertical structure. | White et al. 2002 |
| BALD EAGLE | *HALIAEETUS LEUCOCEPHALUS* | SEN, BCC | D | **Analyzed in EA** | Large nest trees and snags near large water bodies. | Buehler 2000, Isaacs and Anthony 2004 |
| DUSKY CANADA GOOSE | *BRANTA CANADENSIS OCCIDENTALIS* | SEN, GROUND BASEDB DC | D | No Habitat | Willamette Valley agricultural fields and wetlands. | Bromley and Rothe 2003 |
| GRASSHOPPER SPARROW | *AMMODRAMUS SAVANNARUM* | SEN | D | No Habitat | Grassland, prairie. | NaureServe 2008 |
| HARLEQUIN DUCK | *HISTRIONICUS HISTRIONICUS* | SEN, GROUND BASEDB DC | D | No Habitat | Fast-flowing streams with boulders and logs, adjacent riparian habitat. | Thompson et al. 1993, Robertson and Goudie 1999 |
| LEWIS' WOODPECKER | *MELANERPES LEWIS* | SEN | D | No Habitat | Open woodlands with ground cover and snags | Tobalske 1997 |
| OREGON VESPER SPARROW | *POOECETES GRAMINEUS AFFINIS* | SEN, BCC | D | No Habitat | Grassland, farmland, sage. Dry, open habitat with moderate herb and shrub cover | Jones and Cornely 2002 |
| PURPLE MARTIN | *PROGNE SUBIS* | SEN | D | No Habitat | Snags and trees with suitable nest cavities, typically open areas near water. | Brown 1997, Horvath 2003 |
| STREAKED HORNED LARK | *EREMOPHILA ALPESTRIS STRIGATA* | SEN, BCC | S | No Habitat | Prairies, dunes, beaches, pastures; areas with low grassy vegetation. | Pearson and Altman 2005 |
| WHITE-TAILED KITE | *ELANUS LEUCURUS* | SEN | D | No Habitat | Low-elevation grassland, farmland or savannah and nearby riparian areas | Dunk 1995 |
| FISHER | *MARTES PENNANTI* | SEN | D | No Habitat | Large contiguous blocks of mature forest with structural complexity | Verts and Carraway 1998 |
| FRINGED MYOTIS | *MYOTIS THYSANODES* | SEN | S | No Habitat | Known hibernacula and roosts include caves, mines, buildings, large snags. Forages in variety of habitats. | Weller and Zabel 2001 |
| PALLID BAT | *ANTROZOUS PALLIDUS* | SEN | S | No Habitat | Arid or semi-arid habitat with rock, brush, or forest edge; Roosts in caves, mines, bridges, buildings, and hollow trees or snags | Lewis 1994 |
| TOWNSEND'S BIG-EARED BAT | *CORYNORHINUS TOWNSENDII* | SEN | D | No Habitat | Roosts in mines and caves, forages in variety of habitats | Verts and Carraway 1998, Fellers and Pierson 2002 |

| Table B-6: Special Status Species and Migratory Birds evaluated for North Mohawk Thinning. | | | | | | |
|---|---|---|---|---|---|---|
| **Common Name** | **Scientific Name** | **Status** | **Occurrence 2** | **Reason Eliminated** | **Habitat/Range** | **Citations** |
| **MIGRATORY BIRDS** | | | | | | |
| BLACK SWIFT | *CYPSELOIDES NIGER* | BCC | S | No Habitat | Nest near waterfalls. | |
| NORTHERN GOSHAWK | *ACCIPTER GENTILIS* | BCC | D | **Analyzed in EA** | Mature and late-successional forest. | |
| OLIVE-SIDED FLYCATCHER | *CONTOPUS COOPERI* | BCC | D | **Analyzed in EA** | Edge habitats, tall snags and trees important | |
| PURPLE FINCH | *CARPODACUS PURPUREUS* | BCC | D | **Analyzed in EA** | Moist conifer forest, conifer woodlands | |
| RUFOUS HUMMINGROUND BASEDIRD | *SELASPHORUS RUFUS* | BCC | D | No Habitat | Shrubby, early-successional habitat. Nectar-producing plants important | |
| WILLOW FLYCATCHER | *EMPIDONAX TRAILLI* | BCC | D | Protected by Riparian Reserves | Brushy or forested habitat in riparian areas | |
| | | | | | | |
| BAND-TAILED PIGEON | *COLUMBA FASCIATA* | GROUND BASEDB DC | D | **Analyzed in EA** | Nests in mature forest | |
| MOURNING DOVE | *ZENAIDA MACROURA* | GROUND BASEDB DC | D | No Habitat | Forest, woodland, shrub habitats. | |
| WOOD DUCK | *AIX SPONSA* | GROUND BASEDB DC | D | Protected by Riparian Reserves | | |
| **1: FE = Federal Endangered, FT = Federal Threatened, SEN = BLM Sensitive Species, BCC = Bird of Conservation Concern, GROUND BASEDBDC = Game Bird Below Desired Condition**<br>**2: D = Detected on District, S = Suspected on District** | | | | | | |

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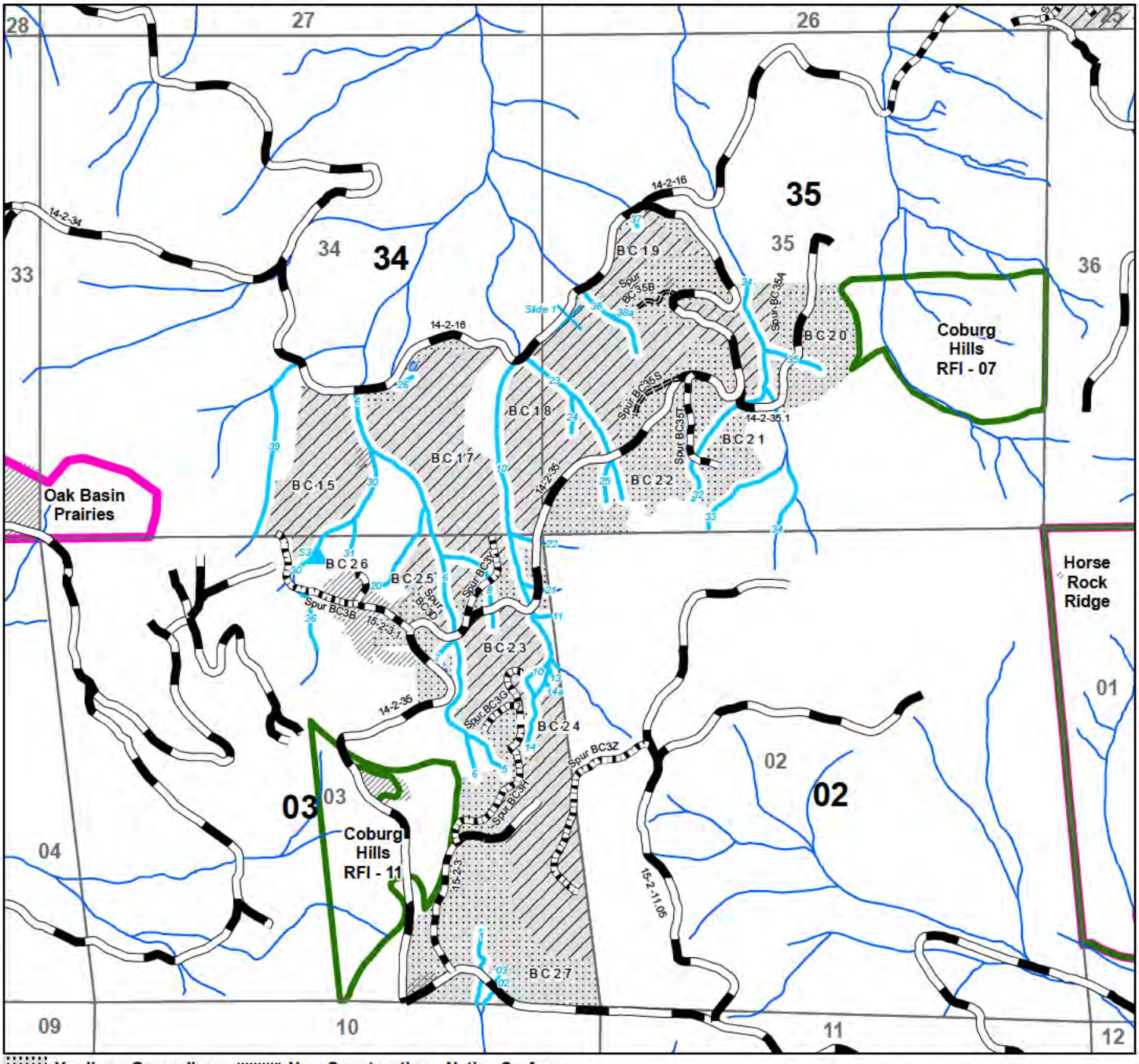
## ENVIRONMENTAL ASSESSMENT
## BICKMORE CREEK, T. 14 S., R. 2 W., SEC. 34 AND 35, T.15 S., R. 2 W., SEC. 3




Yarding - Groundbase
Yarding - Cable
Stream
Field Checked Stream
Landslide
Seep
Wetland
Existing Road
New Construction - Native Surface
New Construction - Optional Rock
New Construction - Rock
Road Improvement
Road Renovation
TPCC Withdrawn
ACEC WOPR
ACEC 1995

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 3 | Ground | 52 | 21 |
| 3 | Cable | 47 | 23 |
| 34 | Ground | 2 | 2 |
| 34 | Cable | 55 | 26 |
| 35 | Ground | 65 | 23 |
| 35 | Cable | 35 | 19 |

**Alt 2**

N

10/31/11

0 500 1,000 1,500 2,000 Feet

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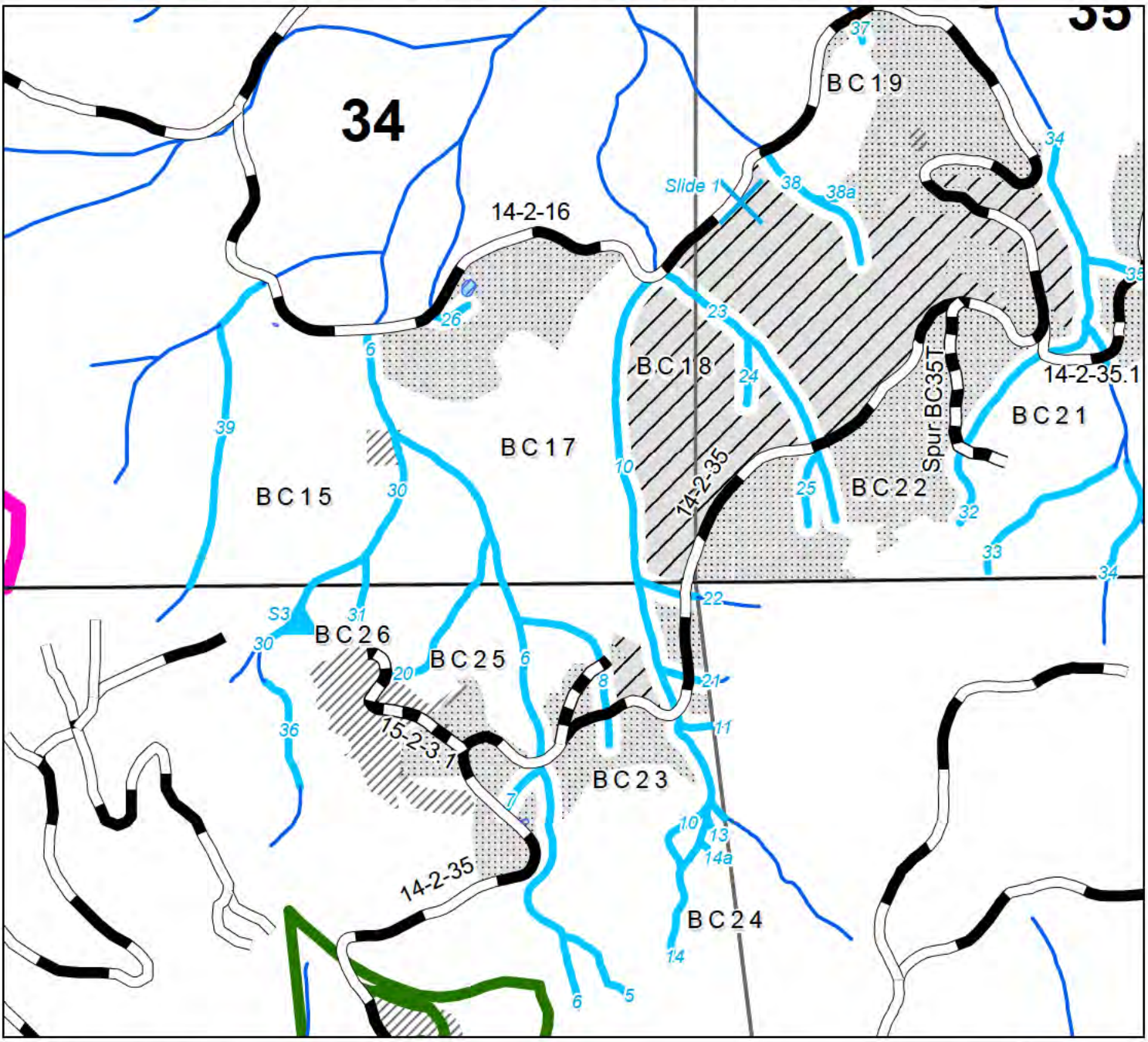
## BICKMORE CREEK, T. 14 S., R. 2 W., SEC. 34 AND 35, T.15 S., R. 2 W., SEC. 3




| | |
|---|---|
| Yarding - Groundbase | Existing Road |
| Yarding - Cable | Road Improvement |
| Stream | Road Renovation |
| Field Checked Stream | TPCC Withdrawn |
| Landslide | ACEC WOPR |
| Seep | ACEC 1995 |
| Wetland | |

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 3 | Ground | 34 | 18 |
| 3 | Cable | 1 | 4 |
| 34 | Ground | 12 | 4 |
| 34 | Cable | 10 | 10 |
| 35 | Ground | 56 | 18 |
| 35 | Cable | 34 | 14 |

**Alt 3**

N

10/31/11

0 1,000 Feet

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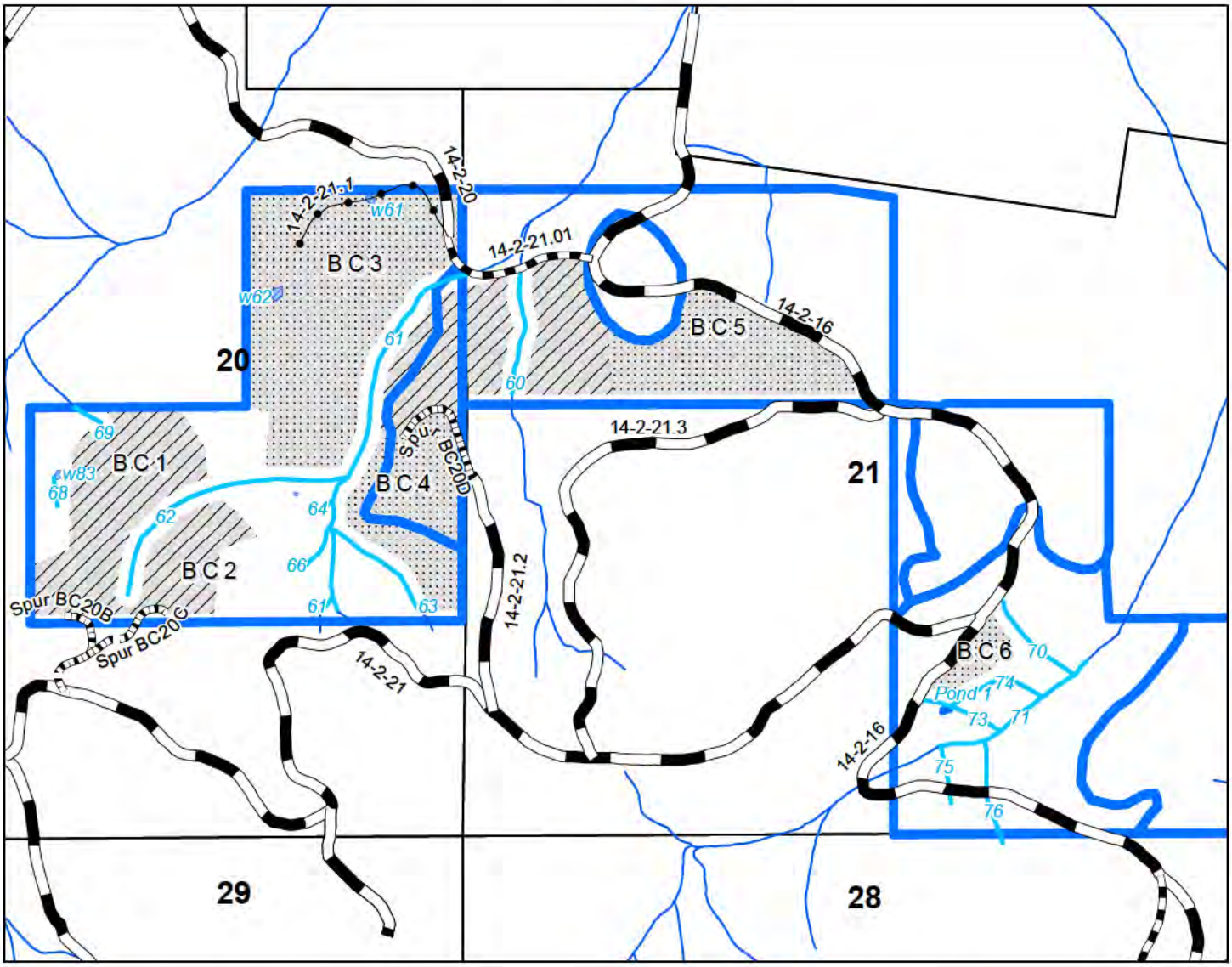
## BICKMORE CREEK, T. 14 S., R. 2 W., SEC. 20 AND 21




Yarding - Groundbase
Yarding - Cable
Bald Eagle Habitat Area
Stream
Field Checked Stream
Pond
Wetland

Road Renovation
Existing Road
Road Improvement
New Construction - Rock
New Construction - Native Surface
New Construction - Optional Rock

# Alt 2

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 20 | Ground | 40 | 10 |
| 20 | Cable | 20 | 12 |
| 21 | Ground | 15 | 3 |
| 21 | Cable | 7 | 5 |

N

07/05/11

0 500 1,000 1,500 Feet

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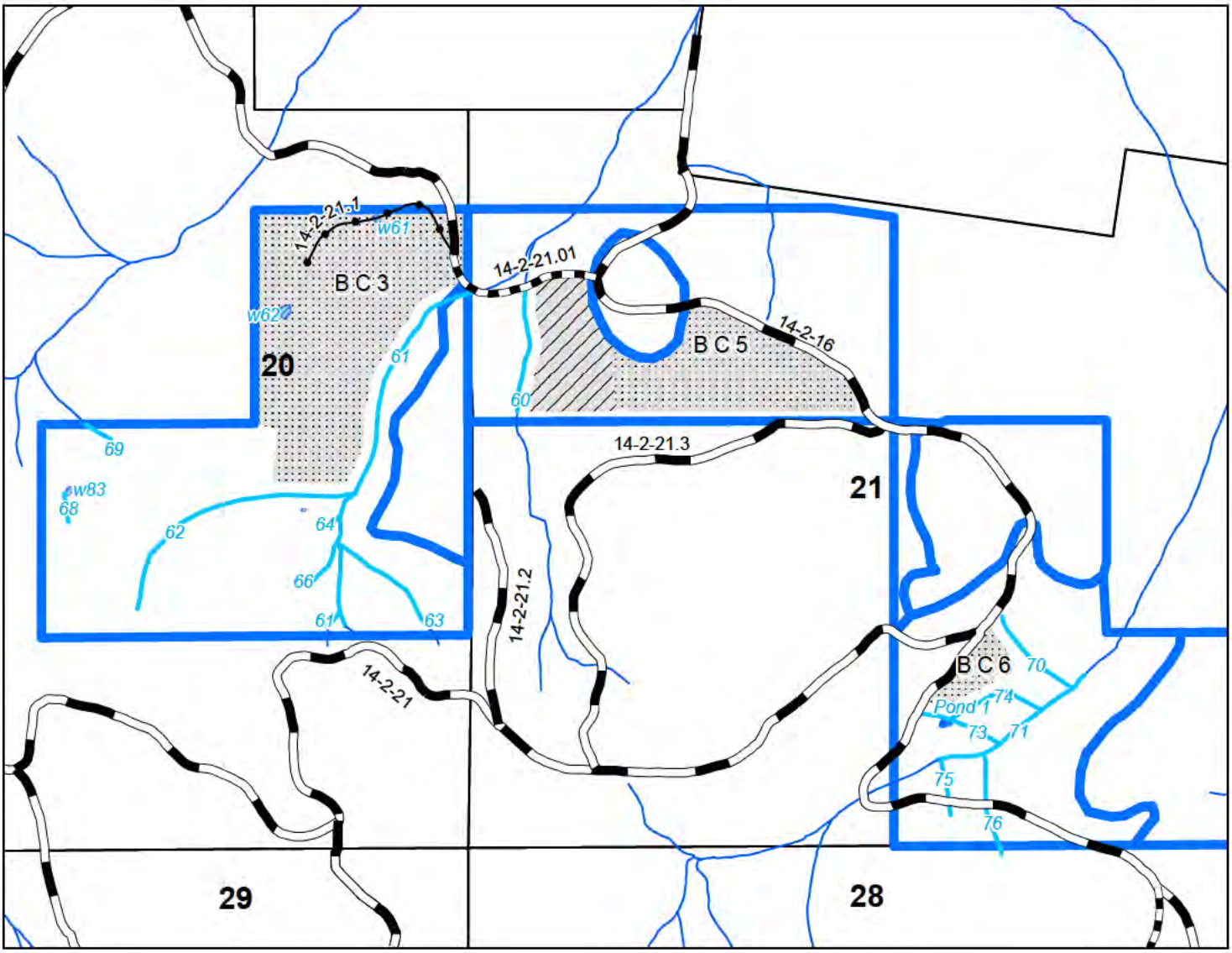


Yarding - Groundbase
Yarding - Cable
Bald Eagle Habitat Area
Stream
Field Checked Stream
Pond
Wetland
Existing Road
Road Renovation
Road Improvement

# Alt 3

N

07/05/11

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 20 | Ground | 30 | 6 |
| 21 | Ground | 15 | 3 |
| 21 | Cable | 7 | 2 |

0 500 1,000 1,500 Feet

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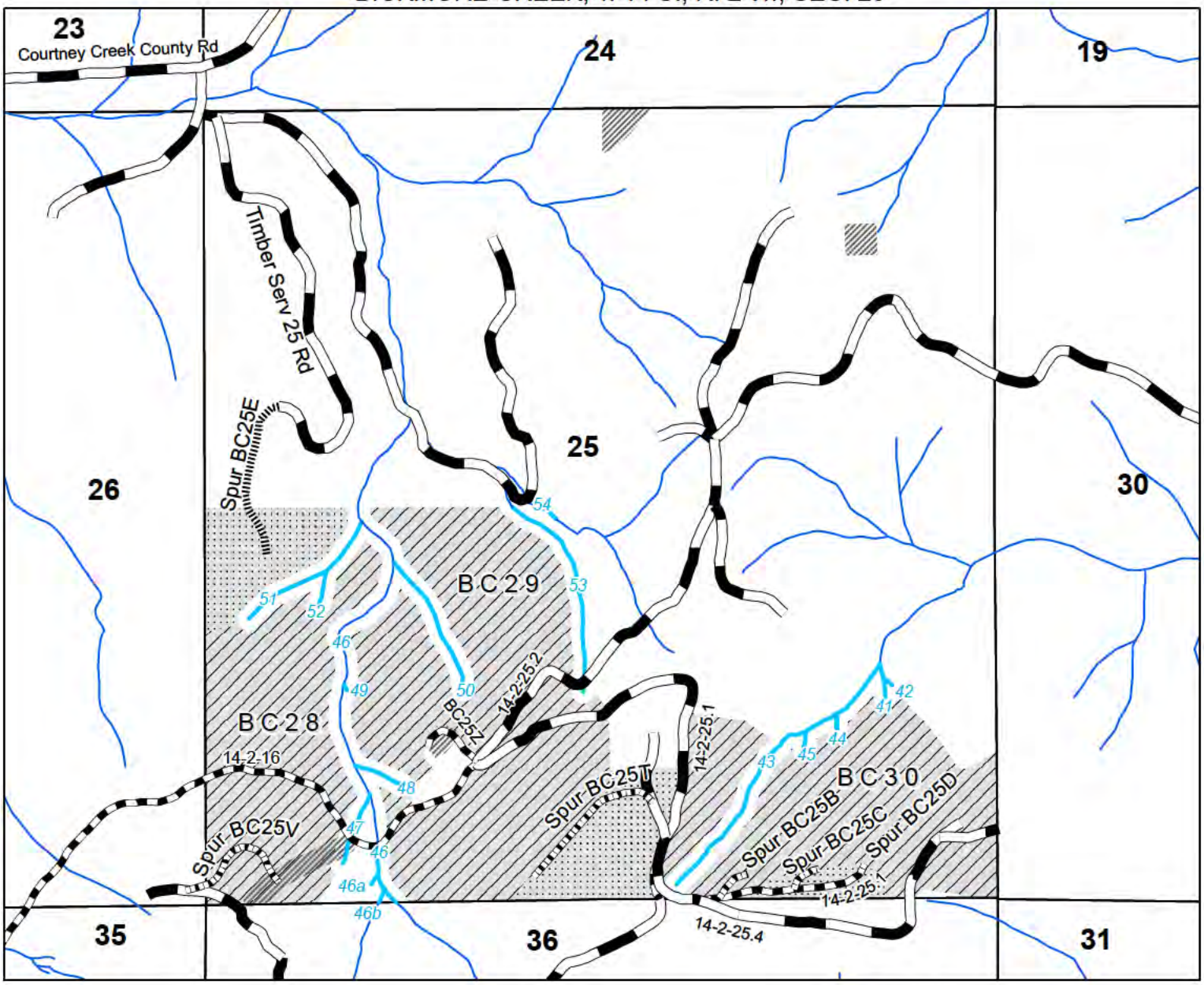


# Alt 2

- Yarding - Groundbase
- Yarding - Cable
- TPCC Withdrawn
- Stream
- Field Checked Stream
- Existing Road
- Road Renovation
- New Construction - Rocked
- New Construction - Native Surface
- New Construction - Optional Rock

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 25 | Ground | 23 | 5 |
| 25 | Cable | 113 | 42 |

N

0 500 1,000 1,500 Feet

9/27/2011

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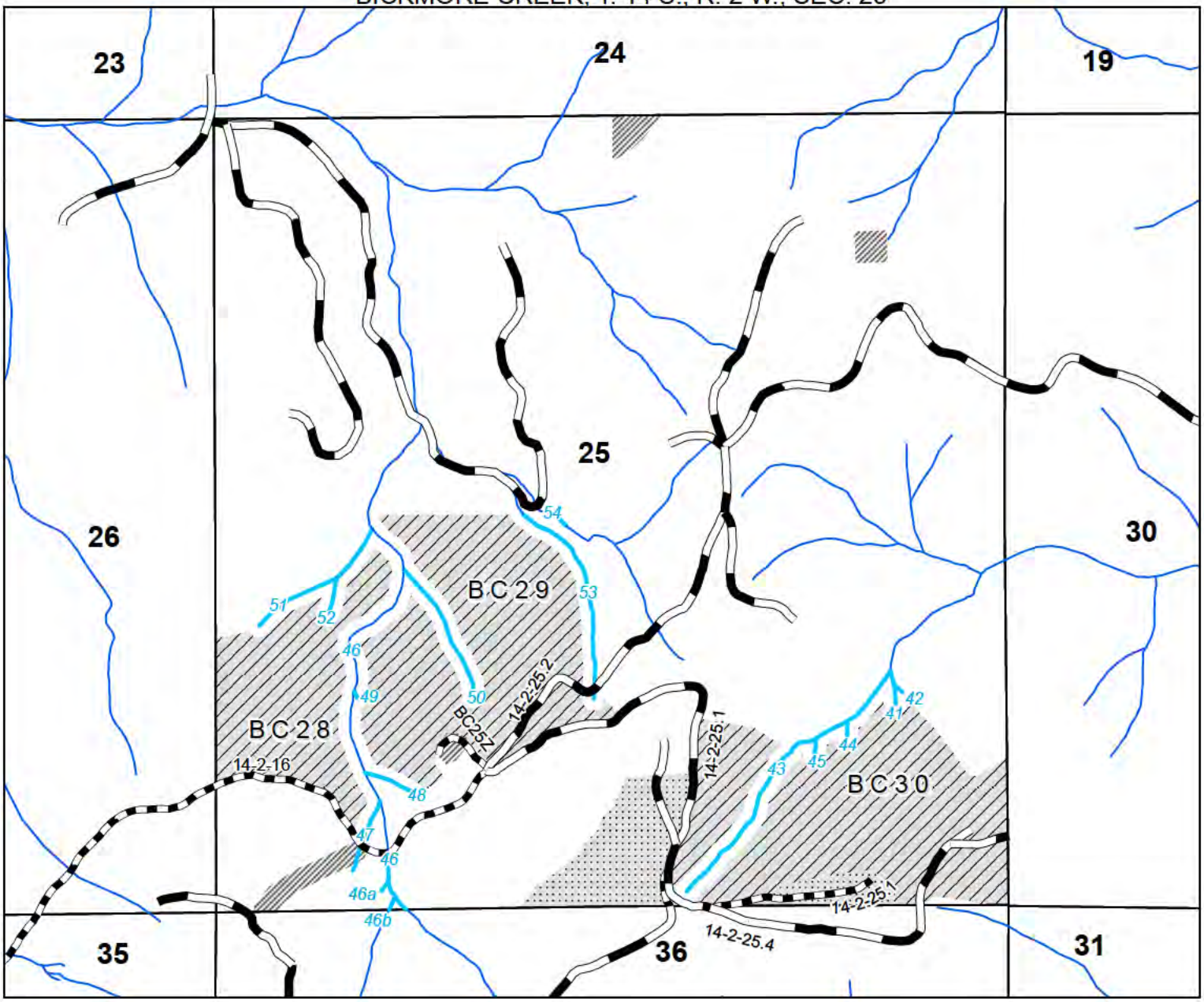


## Alt 3

Ground Base
Skyline
TPCC Withdrawn
Stream
Field Checked Stream
Existing Road
Road Renovation

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 25 | Ground | 16 | 1 |
| 25 | Cable | 74 | 39 |

N

07/05/11

0 500 1,000 1,500 Feet

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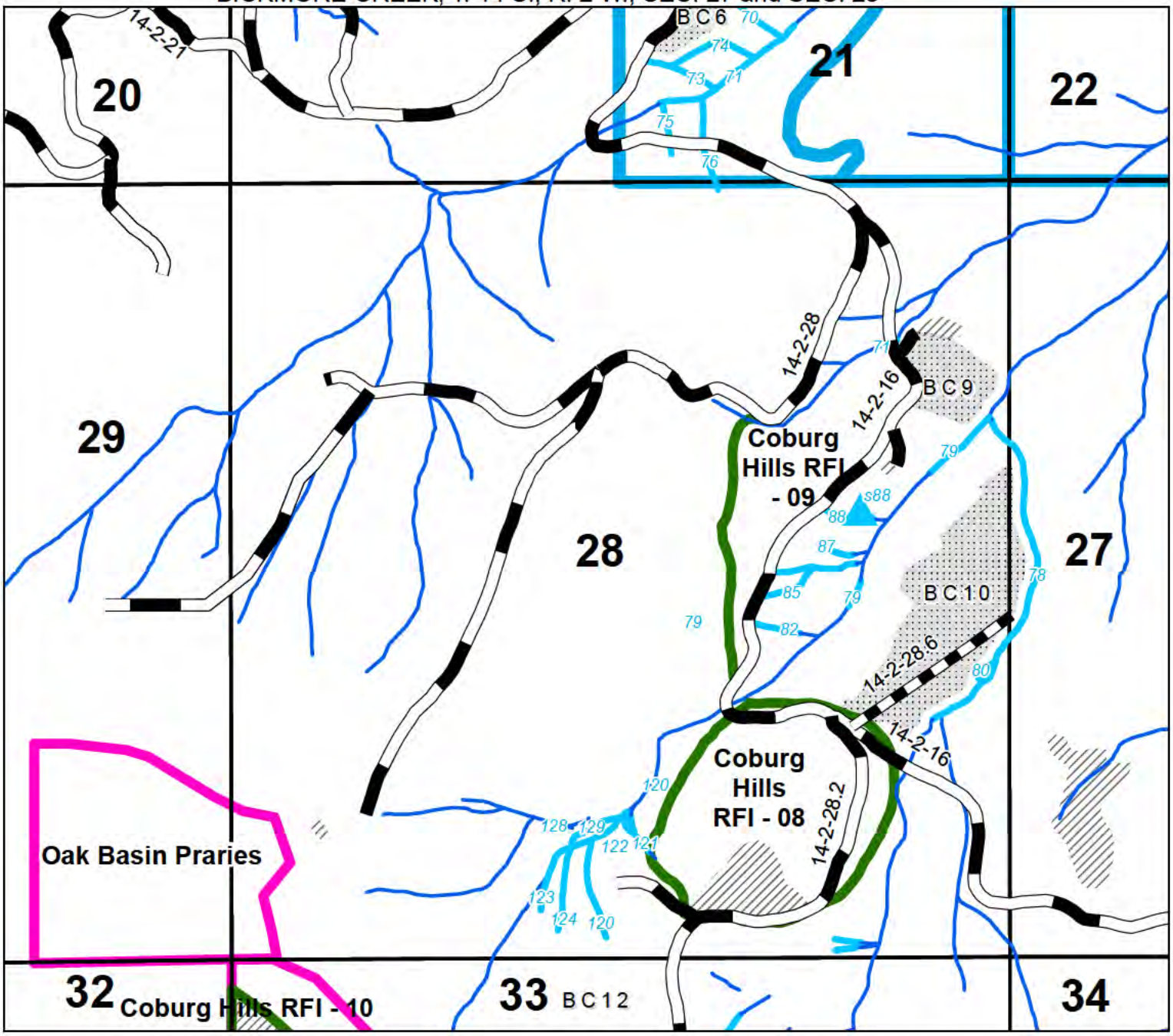
BICKMORE CREEK, T. 14 S., R. 2 W., SEC. 27 and SEC. 28




Yarding - Groundbase
Yarding - Cable
ACEC 1995
ACEC WOPR
Bald Eagle Habitat Area
TPCC Withdrawn
Stream
Field Checked Stream
Landslide
Seep
Existing Road
Road Renovation

## Alt 2 and Alt 3

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 27 | Ground | | 1 |
| 28 | Ground | 9 | 19 |

N

0 500 1,000 Feet

9/26/2011

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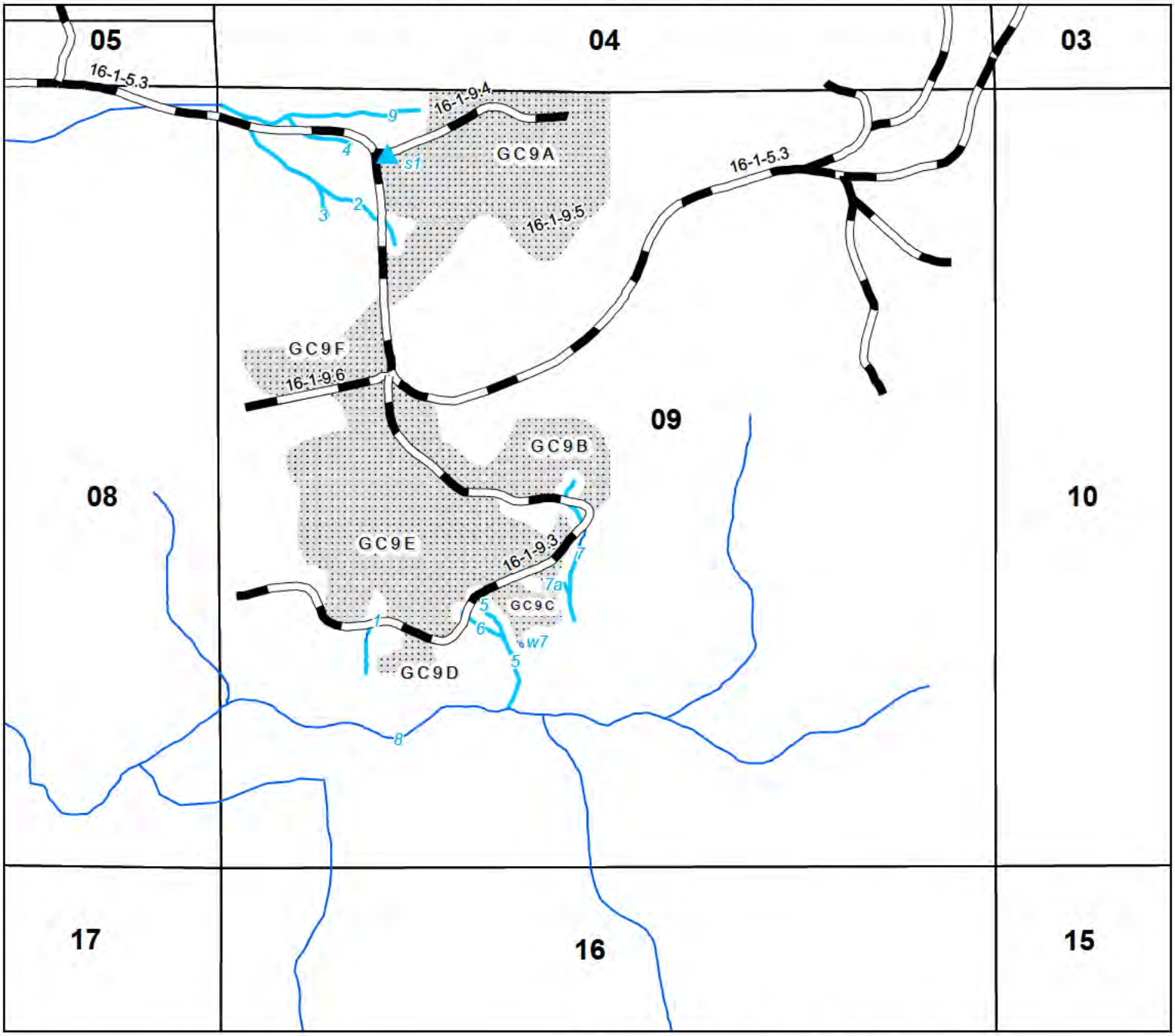
GOOD CHANCE, T. 16 S., R. 1 W., SEC. 09




Yarding - Groundbase

Yarding - Cable

Stream

Field Checked Stream

Wetland

Seep

Existing Road

# Alt 2 and Alt 3

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 9 | Ground | 88 | 12 |

N

07/06/11

0 500 1,000 1,500 Feet

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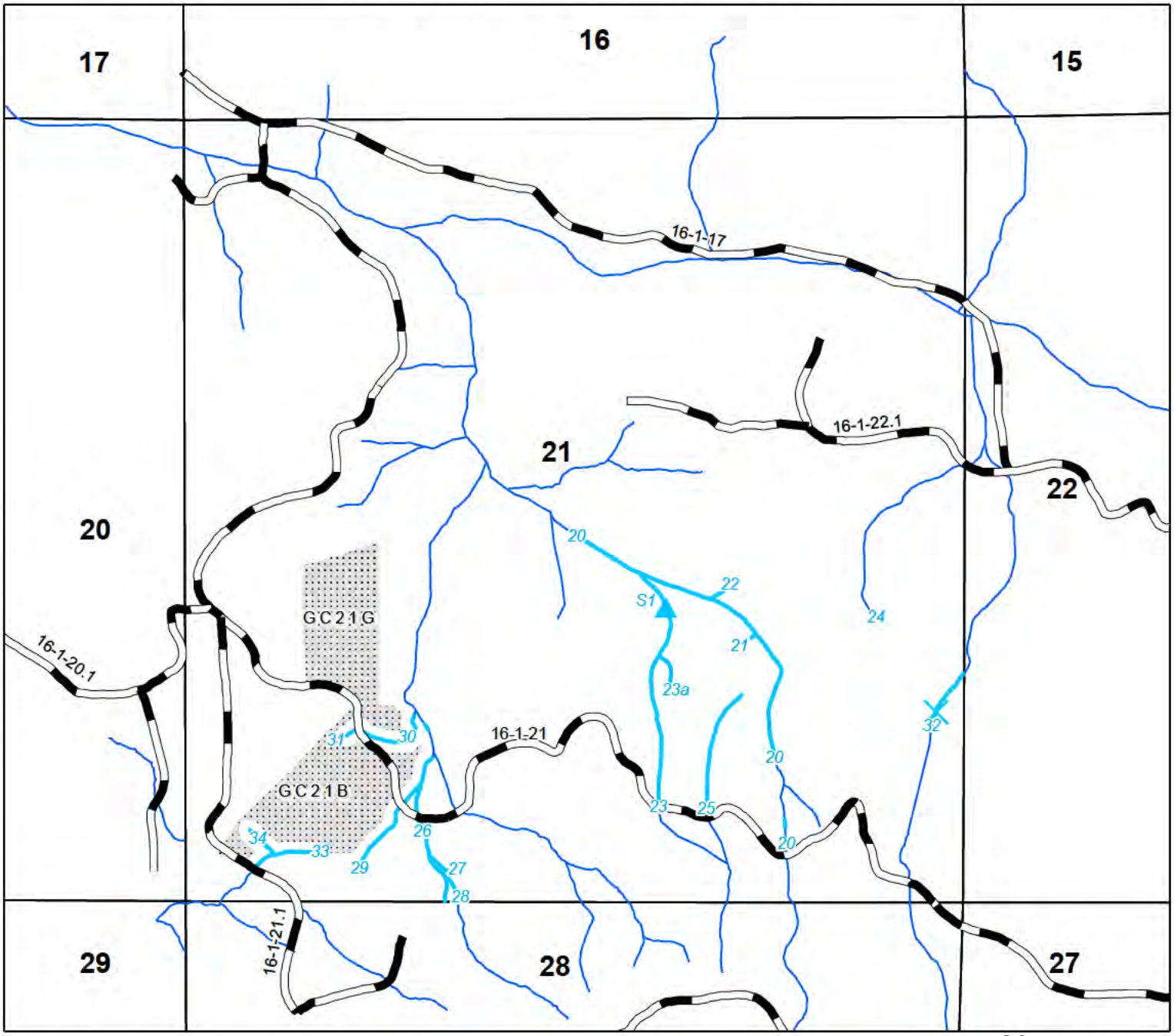
GOOD CHANCE, T. 16 S., R. 1 W., SEC. 21




Yarding - Groundbase
Existing Road
Landslide
Seep
Stream
Field Checked Stream

## Alt 2 and Alt 3

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 21 | Ground | 15 | 11 |

N

07/06/11

0 500 1,000 1,500 Feet

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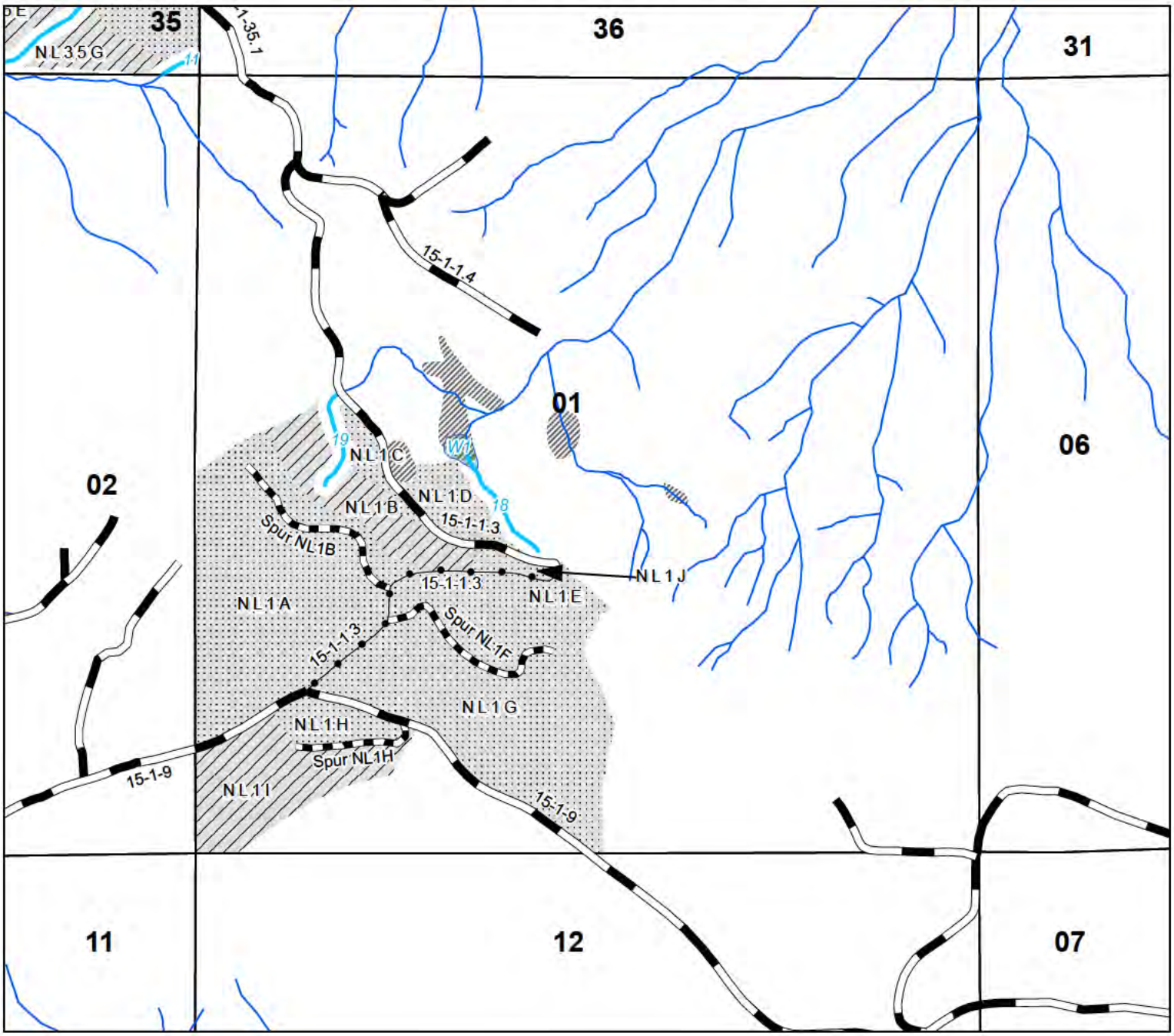
ENVIRONMENTAL ASSESSMENT
NORTH LINE, T. 15 S., R. 1 W., SEC. 01




Yarding - Groundbase
Yarding - Cable
TPCC Withdrawn
Existing Road
Improvement
Renovation
Stream
Field Checked Stream
Wetland

# Alt 2 and Alt 3

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 1 | Ground | 105 | 6 |
| 1 | Cable | 24 | 3 |

N

09/28/11

0 500 1,000 1,500 Feet

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

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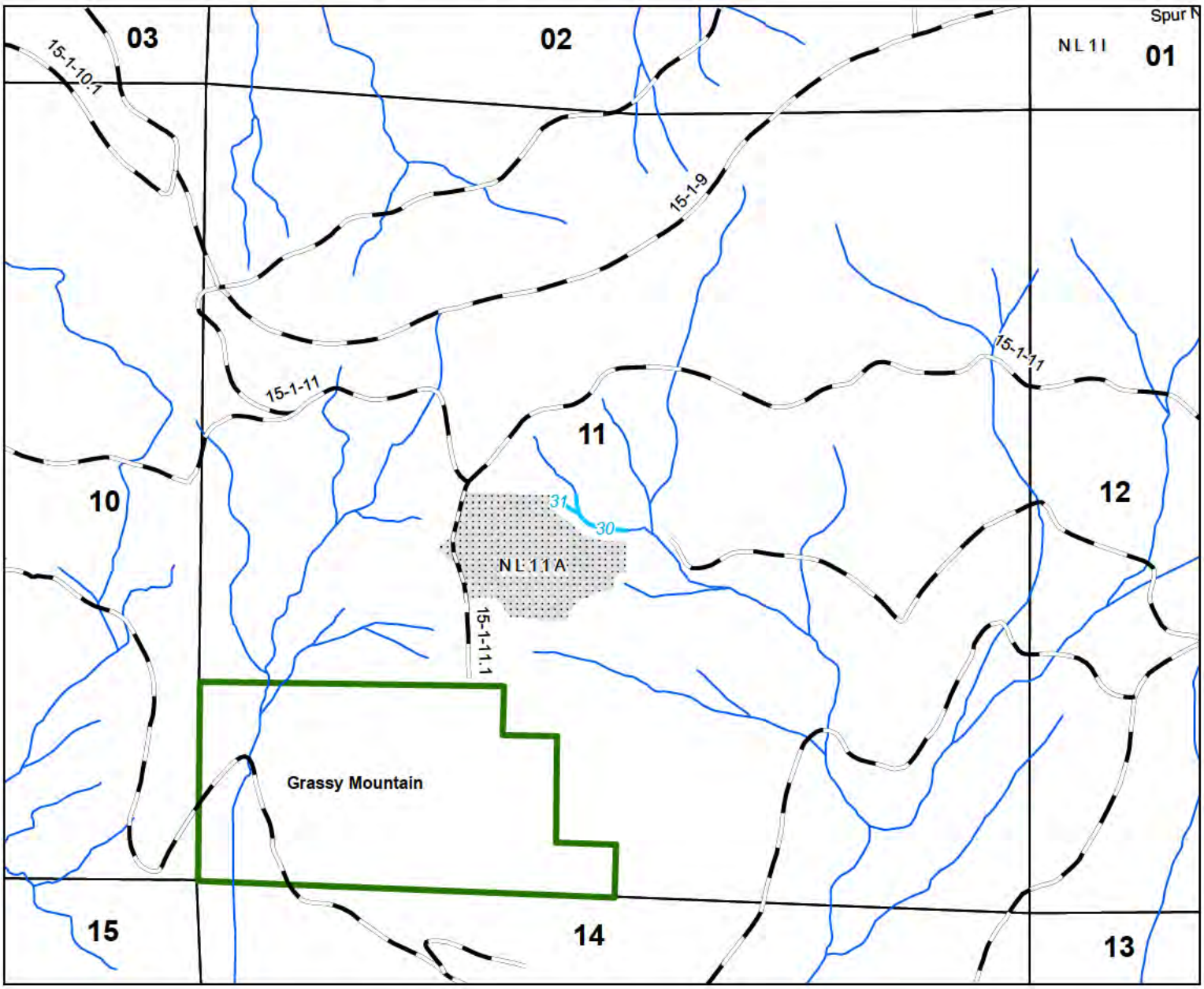
ENVIRONMENTAL ASSESSMENT
NORTH LINE, T. 15 S., R. 1 W., SEC. 11




Yarding - Groundbase
ACEC 1995
Existing Road
Road Renovation
Stream
Field Checked Stream

# Alt 2 and Alt 3

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 3 | Ground | 13 | 3 |

N

07/06/11

0 500 1,000 1,500 Feet

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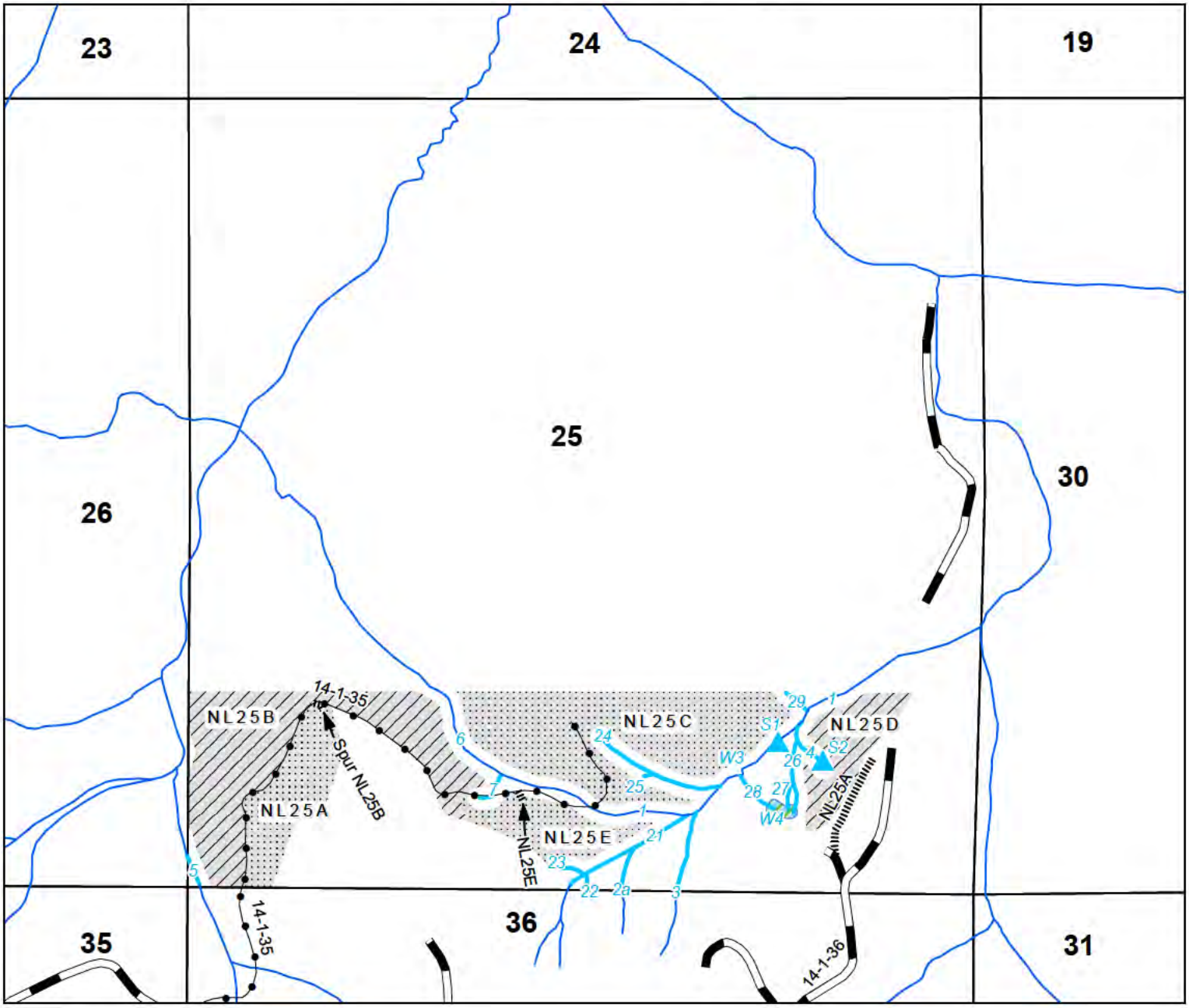
## ENVIRONMENTAL ASSESSMENT
## NORTH LINE, T. 14 S., R. 1 W., SEC. 25




Yarding - Groundbase

Yarding - Cable

Seep

Wetland

Existing Road

New Construc ion - Native Surface

Road Improvement

# Alt 2

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 3 | Ground | 22 | 19 |
| 3 | Cable | 8 | 22 |

N

09/28/11

0 500 1,000 1,500 Feet

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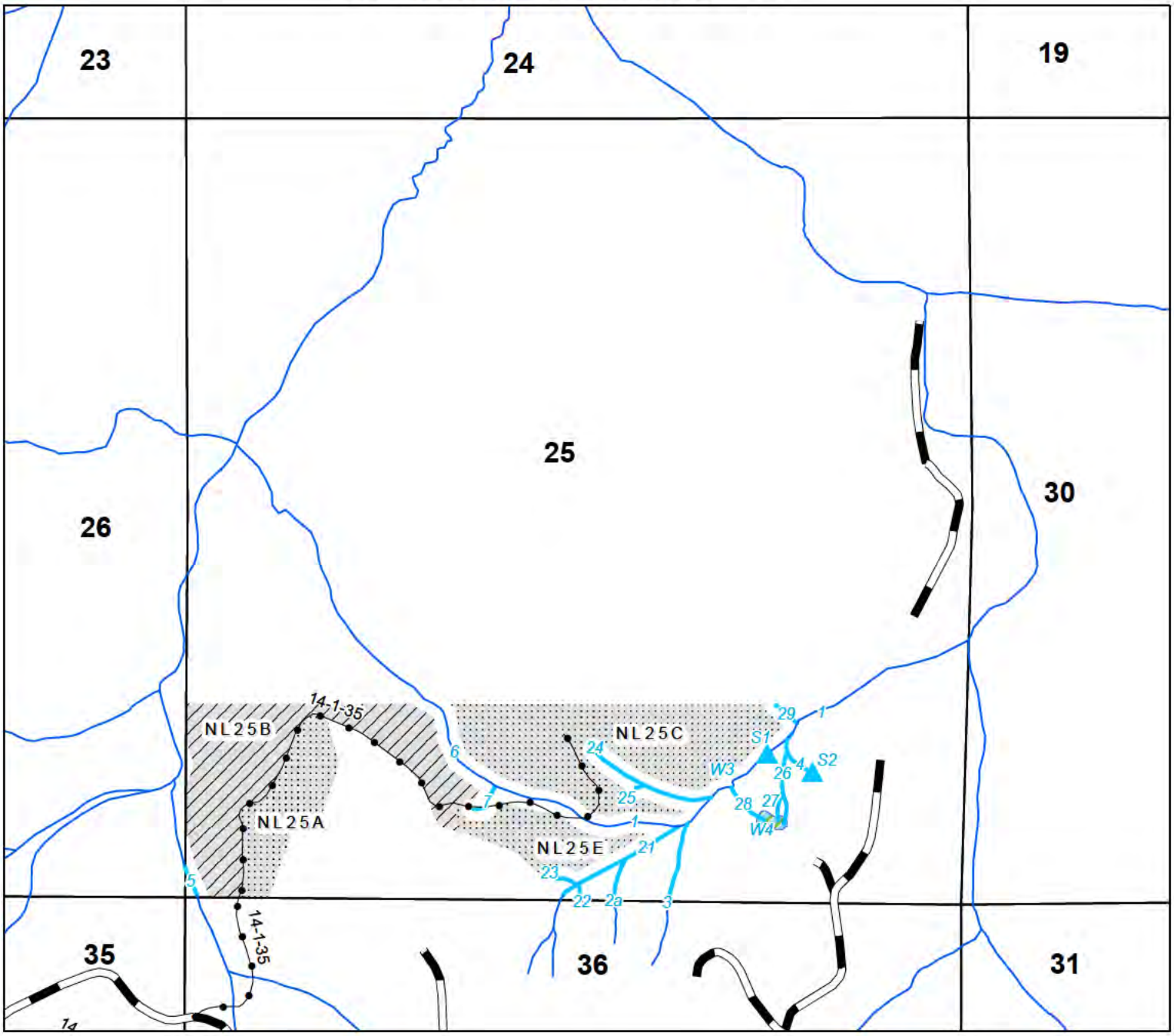
NORTH LINE, T. 14 S., R. 1 W., SEC. 25




Yarding - Groundbase
Skyline
Stream
Field Checked Stream
Existing Road
Road Improvement
Seep
Wetland

## Alt 3

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 3 | Ground | 22 | 19 |
| 3 | Cable | 7 | 16 |

N

07/06/11

0 500 1,000 1,500 Feet

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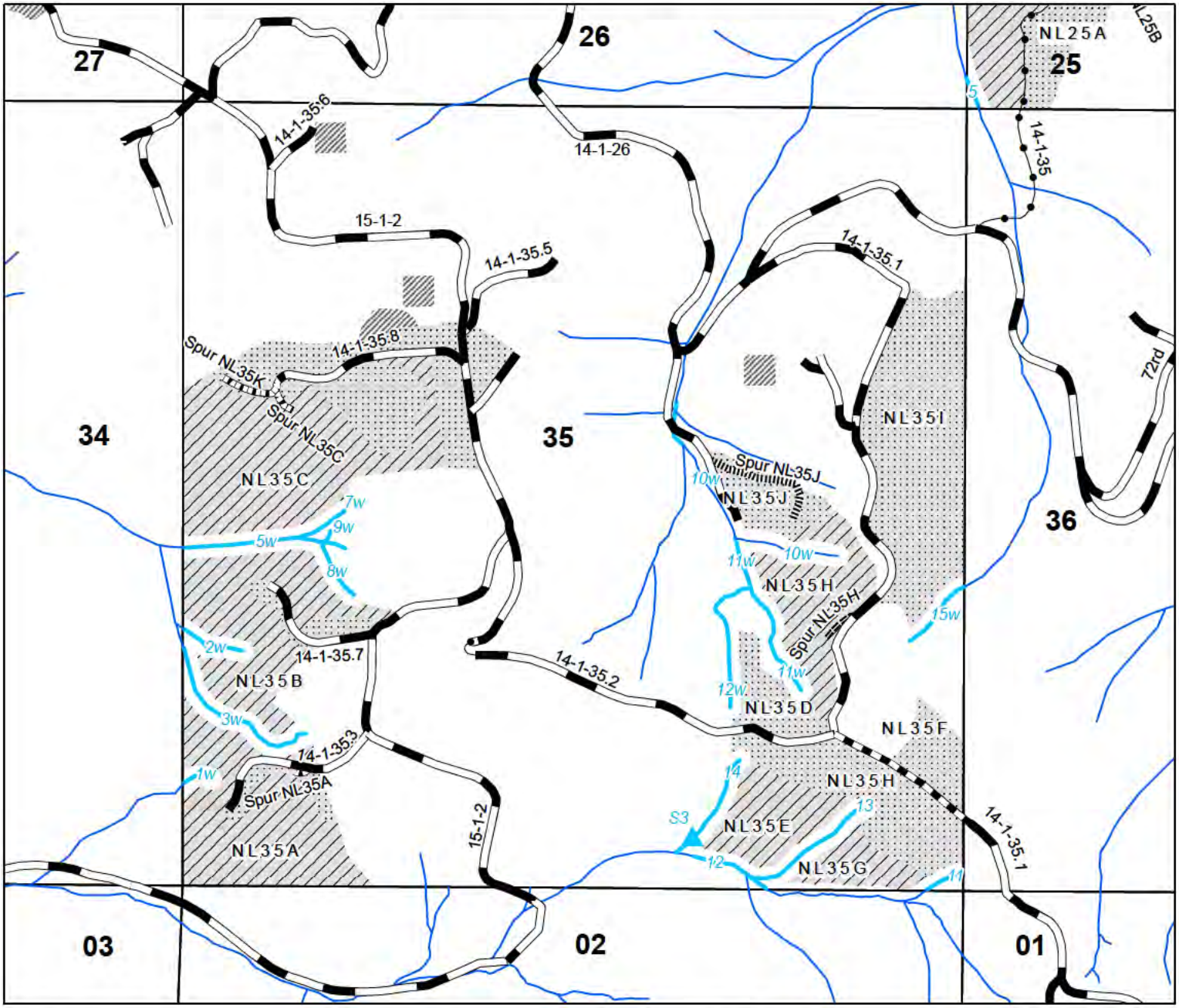
## ENVIRONMENTAL ASSESSMENT
## NORTH LINE, T. 14 S., R. 1 W., SEC. 35




Yarding - Groundbase
Yarding - Cable
Seep
Stream
Field Checked Stream
Renovation
Existing Road
New construction - Rock
New Construction - Native Surface
New Construction - Optional Rock
TPCC Withdrawn

# Alt 2

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 3 | Ground | 73 | 14 |
| 3 | Cable | 58 | 33 |

N

09/28/11

0 500 1,000 1,500 Feet

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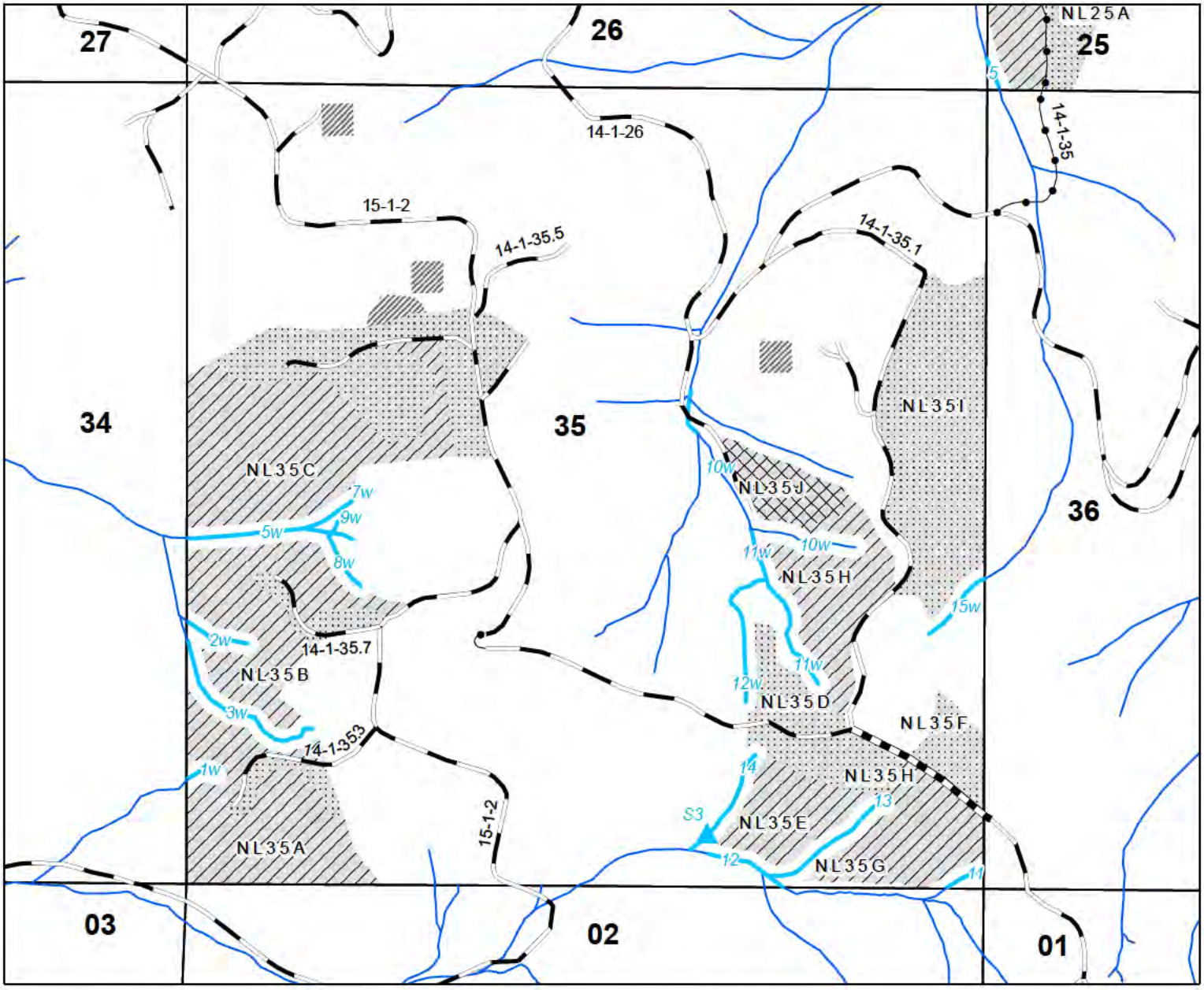
## ENVIRONMENTAL ASSESSMENT
## NORTH LINE, T. 14 S., R. 1 W., SEC. 35




Yarding - Groundbase
Yardin - Cable
Special Yarding Area
Seep
Stream
Field Checked Stream
Road Renovation
Road Improvement
Existing Road
TPCC Withdrawn

# Alt 3

| Section | Yarding Method | Upland Acres | Riparian Acres |
|---|---|---|---|
| 35 | Ground | 67 | 7 |
| 35 | Cable | 63 | 35 |
| 35 | Special Yarding | .5 | 5 |

N

09/28/11

0 500 1,000 Feet

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