Back in Black Regeneration Harvest Plan Environmental Assessment

Bureau of Land Management
Roseburg District Office
Swiftwater Field Office
DOI-BLM-OR-R040-2014-0007-EA

Bureau of Land Management
Swiftwater Field Office – Roseburg District

U.S. Department of the Interior, Bureau of Land Management
Roseburg District Office
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This environmental assessment analyzes proposed timber harvest designed in conformance with management direction provided in the 1995 Roseburg Record of Decision and Resource Management Plan (ROD/RMP), as amended prior to December 30, 2008.

The BLM is providing a 30-day period for public review and comment on the documents, and will accept comments until the close of business (4:30 PM, PDT) on August 26, 2016.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so. If you choose to submit any written comments, they should be directed to Max Yager, Swiftwater Field Manager, at the above address.

The Roseburg District posts Environmental Assessments, Environmental Impact Statements, Findings of No Significant Impact, and Decision Records/Documentations on the National Register for Land Use Planning (LUP) and National Environmental Policy Act (NEPA) at https://eplanning.blm.gov/epl-front-office/eplanning/nepa/nepa_register.do on the same day on which an electronic notice of availability is transmitted to those individuals and organizations on the District's NEPA mailing list who have expressed an interest in project planning and analysis. Individuals desiring a paper copy of such documents will be provided one upon request. Individuals with the ability to access these documents on-line are encouraged to do so. Internet use reduces paper consumption and administrative costs associated with copying and mailing.

Executive Summary

The Back in Black Regeneration Harvest Plan project area occurs within the General Forest Management Area (GFMA) land use allocation administered by the Swiftwater Field Office, Roseburg District Office BLM. This Environmental Assessment (EA) considers two alternative treatments, (including No Action) on approximately 530 acres of forest stands, greater than 60 years old, and the effects of those treatments.

See Table i. *(Comparison of the Key Findings and Effects of the Back in Black Regeneration Harvest Plan Alternatives)*. This table highlights specific examples of the differences between the alternatives. For a complete discussion of the alternatives, see Chapters 2 and 3.

The Roseburg District initiated planning and design for this project on March 17, 2014. The project conforms to and is consistent with the Roseburg District's 1995 Record of Decision/Resource Management Plan (ROD/RMP 1995). Analysis of the effects of the proposed actions tiers to the analytical assumptions and conclusions of the 1994 *Final - Roseburg District Proposed Resource Management Plan/Environmental Impact Statement* ((PRMP/EIS) USDI/BLM 1994). Analysis of effects and information from the 2008 *Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management* is incorporated by reference.

Scoping comments gathered during the early stages in the planning process helped to refine alternatives and project design for Back in Black. However the scoping comments did not provide additional information specific to the project to prompt the Swiftwater Field Office to alter or include additional analyses beyond that which the interdisciplinary team had already considered as pertinent.

Table i. Comparison of the Key Findings and Effects of the Alternatives of the Back in Black Regeneration Harvest Plan

Key Finding/Effect		Alternative One No Action	Alternative Two Proposed Action
Proposed Harvest	**Project Size**	0 acres	530 acres
	Regeneration Harvest Prescription	0 acres	530 unit acres
	Regeneration Harvest Prescription	None	Basal Area: 23-35 sq. ft. / acre
	Volume Harvested	0 MMBF	10-12 MMBF
	Proposed Road Maintenance / Renovation	0 miles	30.1 miles
	Proposed Road Construction	0 miles	1.9 miles
	Proposed Road Decommissioning	0 miles	4.6 miles
Fuels Treatment	**Pile and Burn**	0 acres	Option A / Option B 210 acres / 234 acres
Forest Vegetation	**Post-Harvest Canopy Cover**	No harvest 47-80%	10-15%
Northern Spotted Owls	**Harvest within Nest Patch** (300 meter radius)	0 acres	0 acres
	Harvest within Core Area (0.5 mile radius)	0 acres	12 acres unoccupied

Key Finding/Effect		Alternative One No Action	Alternative Two Proposed Action
	Harvest within Home Range (1.2 mile radius)	0 acres	254 acres
	Suitable Habitat	0 acres	12 acres removed 2 acres modified
	Dispersal Habitat	0 acres	516 acres
	Critical Habitat	0 acres	0 acres modified 0 acres removed
	Seasonal Restrictions	Although known activity centers are located outside of the disruption distance thresholds, seasonal restrictions would apply for harvest operations occurring within the disruption distances of occupied stands during the northern spotted owl critical breeding season (March 1-July 15) for harvest of dispersal habitat or prescribed burning or the breeding season (March 1-September 30) for harvest of suitable habitat, until full protocol surveys or spot checks have been completed to determine the current location of nesting owls.	
Soils	**Detrimental Disturbance**	0 acres	Option A / Option B 40 acres (8%) / 32 acres (6%)
	Slope Stability (risk of shallow rapid landslides)	Very Low-Low	Low-Moderate
Hydrology, Aquatic Habitat & Fisheries	**Harvest within Riparian Reserve**	None	0 acres
	Equivalent Clearcut Area (peak flow response when > 29%)	5-21%	9-24%
	Stream Temperature	Stream temperature regimes would remain unchanged under either alternative	
	Sediment Regime	Sources of sediment from roads would not be fully repaired with road maintenance alone	Sources of sediment from roads would be reduced due to improved drainage
	Fish Populations	No impacts to fish populations would be anticipated under either alternative	
Fire and Fuels Management	**Fire Risk** (low fire danger weather)	Low	Low (post-pile and burn) *0-35 years post-harvest*
	Fire Risk (high fire danger weather)	Low	Moderate (post-pile and burn) *0-35 years post-harvest*

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Chapter 1. Purpose and Need for Action

This chapter provides a description of the purpose and need for the proposed action, the decisions to be made, the scope of the analysis, issues expressed, and conformance with management direction and applicable laws and regulations.

1.1. Background

The analysis area encompasses the Calapooya Creek watershed, which contains 157,194 acres, 11,661 acres (7 percent) of which are managed by the Swiftwater Field Office on the Roseburg District, Bureau of Land Management (BLM). Approximately 528 acres out of the total 530 acres of the proposed project are located in the Calapooya Creek fifth-field watershed. The approximate remaining 2 acres of the proposed project are located in the Lower North Umpqua River watershed, which contains 106,427 acres, 12,244 acres (11 percent) of which are managed by the Swiftwater Field Office.

The Proposed Alternative project actions would include regeneration harvest, fuels management, and road construction, maintenance/renovation and decommissioning, referred to as the Back in Black Harvest Plan (Appendix A – Maps for the Back in Black Regeneration Harvest Plan project).

The BLM proposes to apply regeneration harvest to 530 acres in nine units located within the General Forest Management Area (GFMA) land use allocation, although yarding may be allowed through Riparian Reserves where necessary, subject to pre-designation of the yarding corridors and authorization by the contract administrator. With the exception of 5 acres of the project area, all of the stands proposed for harvest were previously thinned between 1999 and 2006. The stands would be over 60 years of age at the estimated time of harvest. Regeneration harvest is a plan-level decision made in the Roseburg District *Record of Decision and Resource Management Plan* (USDI BLM 1995a (ROD/RMP, p. 61)). The proposed action would implement this decision, and the design and conduct of regeneration harvest would conform to management objectives and direction contained in the ROD/RMP.

1.2. Project Area

The proposed project area is located within Douglas County, Oregon. The Back in Black project area lies within the following legal description, Willamette Meridian (Appendix A, Figure A-1):

- T24S, R03W, Sections: 5, 7, 17
- T24S, R04W, Sections: 1, 13
- T25S, R04W, Section: 17

1.3. Purpose (Objectives)

Management of BLM-administered lands and resources in the project area is subject to the requirements of the Oregon and California Revested Lands Act (O&C Act), Federal Land Policy and Management Act (FLPMA), Endangered Species Act (ESA), and Clean Water Act (CWA) as discussed in the Roseburg District ROD/RMP (p. 15). The O&C Act requires the Secretary of the Interior to manage suitable O&C timber lands for permanent forest production in accordance with the principles of sustained yield (ROD/RMP, p. 15).

The following are objectives for the proposed action.

1) Produce a sustained yield of forest products (ROD/RMP, p. 60) to support local and regional economic activity (ROD/RMP, p. 55). The ROD/RMP (p. 60) directs that timber resources on the GFMA land use allocation, be managed to provide timber sale volume toward the Roseburg District's annual allowable sale quantity (ASQ) of 45 million board feet. Manage GFMA lands to promote tree survival and growth, and to achieve a balance between wood volume production, quality of wood, and timber value at harvest (ROD/RMP, p. 60).

2) Select logging systems based on the suitability and economic efficiency of each system for the successful implementation of the silvicultural prescription, for protection of soil and water quality, and for meeting other land use objectives (ROD/RMP, p. 61).

3) The ROD/RMP (p. 61) specifies application of silvicultural systems that are planned to produce, over time, forests which have desired species composition, structural characteristics, and distribution of seral or age classes, as set forth in Appendix E of the ROD/RMP. Appendix E objectives include managing Matrix lands for a balance of age classes (ROD/RMP, p. 150).

1.4. Need

The need for action was determined by analyzing existing stand conditions to identify treatment opportunities to develop a desired age class distribution consistent with the principles of sustained yield across Roseburg District BLM managed lands. Currently, less than one percent of forests in GFMA BLM managed lands in the Calapooya Creek watershed are in the early-seral stage class (0-15 years of age). The Forest Operations Inventory (FOI) was used to identify appropriate age stands for management in the Calapooya Creek and Lower North Umpqua River watersheds. Stand examinations and field review provided current data on stocking levels, stand health, and species composition in units proposed for management.

The following are needs for the proposed action.

1) There is a need for the estimated 10 to 12 million board feet of timber in order to contribute toward the Roseburg District's declared ASQ of 45 million board feet (ROD/RMP, p. 8). Roseburg's annual achievement of its ASQ is dependent upon the sale or offering of timber volume in individual timber sales, which in the aggregate, total the District's ASQ. Because timber sale planning requires two to three years, the inability to proceed with a given sale in the District's sale plan for any particular fiscal year has the potential to prevent the District from achieving its ASQ. Timber volume generated would contribute toward the socio-economic benefits envisioned in the *Roseburg District Proposed Resource Management Plan/Environmental Impact Statement* (PRMP/EIS, USDI BLM 1994a, Vol. 1, p. xii).

2) There is a need to contribute to the economic stability of local communities and industries (ROD/RMP, p. 15) by providing consistent and steady operational opportunities for the purchaser(s) throughout the year.

3) There is also a need to schedule regeneration harvests in stands as young as 60 years in order to develop a desired age class distribution across the landscape (ROD/RMP, p. 61). The desired age class distribution for lands managed by the Roseburg District depicted in the PRMP/EIS (Chapter 4-26 & 27) reflects the entire land base managed by the District. As no regeneration harvest is scheduled or authorized in Riparian Reserves and Late-Successional Reserves, only regeneration harvest in the Matrix and the Little River Adaptive Management Area provide the opportunity to create early-seral (0-15 years) and mid-seral (15-40 years) stages of forest succession on lands managed by the Roseburg District. To achieve the desired age class distribution, it is necessary

that the harvest type resets the age class or seral stage, i.e. a *regeneration harvest* of selected stands is necessary, including regeneration harvest of intermediate-age classes. Over time, regeneration harvests can transform or convert an irregular forest structure to a regulated one (Chapter 3, Section 3.3.2.3; Hennes *et al.* 1971). The early-seral stage has the least representation on BLM managed lands in the Calapooya Creek watershed at 0.03 percent (Chapter 3, Section 3.3.1, Table 3-1). The seral stages would be adjusted under Alternative Two from late-seral to the early-seral stage (Chapter 3, Section 3.3.2.3, Table 3-6).

1.5. Decision Factors

Factors to be considered in alternative development and selection would include:

- The degree to which the objectives previously described would be achieved, including: the manner in which timber harvest would be conducted with respect to economic viability, and the feasibility and continuity of project implementation;
- The nature and intensity of environmental impacts that would result from implementation of the proposed timber harvest and the nature and effectiveness of measures to avoid and/or mitigate impacts to resources including, but not limited to, wildlife and wildlife habitat, soil productivity, water quality, and the spread of noxious weeds;
- Compliance with management direction from the ROD/RMP;
- Compliance with applicable laws including, but not limited to, the Clean Water Act, the Endangered Species Act, O&C Act, and the National Historic Preservation Act; and
- The degree to which the proposed project provides revenue to Federal and County governments from the sale of timber resources in support of local industry while managing the lands in a cost efficient manner.

1.6. Scoping

1.6.1. Internal Scoping

An interdisciplinary team was assembled at initiation of the project analysis. Issues identified for analysis were determined based on ROD/RMP management direction for utilization and protection of natural resources; circumstances and concerns identified through field reconnaissance; comments from external groups, and requirements set forth in laws, regulations, policy and court rulings.

1.6.2. External Scoping

A notice of project initiation was published in the Roseburg District Quarterly Planning Update (Spring 2014), informing the general public of the nature of the proposed action.

Letters were sent to landowners with property adjacent to BLM-administered lands where timber harvest is proposed, those whose property lies beside or astride identified haul routes, and those with registered surface water rights for domestic use located within one mile downstream of any proposed units. Recipients were encouraged to share any concerns or special knowledge of the project area that they may have.

Letters were also sent to the Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz, and Cow Creek Band of Umpqua Tribe of Indians requesting identification of any special interest they might have in the lands in question.

Scoping comments were received from two organizations. Many comments were of a generic or philosophical nature that would not guide the development of alternatives. Numerous comments identified issues for consideration and analysis that are routinely addressed in environmental assessments for timber management activities. Other comments suggested analyses that cannot or need not be addressed within the scope of this EA.

A smaller subset of comments was identified that might refine alternatives and project design. These are summarized in italics and addressed below.

ACS Objectives

"Regeneration harvest and the construction of new roads do not meet the objectives of the Aquatic Conservation Strategy. These management activities cause increases in peak flow and destabilization of soils. The problem is augmented in the Back in Black landscape where private land clearcuts substantially contribute to degraded waterways."

The Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within watersheds on public lands (ROD/RMP, p. 19). Neither the Northwest Forest Plan nor the ROD/RMP suggests ACS prohibits regeneration harvest or road construction. The Northwest Forest Plan and ROD/RMP envisioned regeneration harvest, road construction, *and* ACS compliance. The Back in Black Regeneration Harvest Plan would not retard or prevent attainment of ACS objectives; therefore this action is consistent with the ACS and its objectives at both the site and watershed scales (Chapter 3, Section 3.5.2.2).

There would be no change in active road density within the project area since 1.9 miles of road would be constructed with all 1.9 miles decommissioned after use. By decommissioning roads not needed for long-term access, the potential for peak flow effects and sediment routing would be diminished (Chapter 3, Section 3.5.2.2).The project design features (PDFs) and road sediment control plan (Chapter 2, Section 2.3.4, # 2 and #3) would implement strategies to avoid and minimize sediment production and disconnect roads from stream networks to prevent adverse impacts to aquatic systems (Chapter 3, Section 3.5.2.2).

Riparian Reserves reduce the likelihood that landslides would impact stream channels because inclusion of unstable areas in Riparian Reserves protects the areas from physical disturbance that could potentially trigger slope movement of failure. Potential landslides would not pose safety concerns nor would they result in major property damage, and the combined impacts from harvest and potential landslides would not reduce soil productivity (Chapter 3, Section 3.5.2.2). Proposed harvest units were field reviewed by the project soil scientist and areas of existing instability would be excluded from treatment (Chapter 3, Section 3.5.2.2).

The Equivalent Clearcut Area (ECA) analysis included private timber harvest for this EA. It is expected that timber harvest would continue at current rates on private lands. As a result, older harvested areas would reach a point of hydrologic recovery as newer areas are harvested which maintains a constant level of watershed disturbance into the future. No measurable change in hydrologic response would be expected from the proposed action compared to current conditions (Chapter 3, Section 3.5.2. 2). The project is designed to implement a regeneration harvest while still achieving ACS compliance (Chapter 3, Section 3.5.2.2).

Cumulative Effects

"The Back in Black project is in the same location as the Calapooya Creek Harvest Plan. The Calapooya EA identified impacts from that sale that will be compounded with the additional treatment in the area contemplated in Back in Black."

The Calapooya Creek Harvest Plan project is located within the same watershed as most of the Back in Black Regeneration Harvest Plan. Cumulative effects in this EA address the proposed Calapooya Creek Harvest Plan project as a reasonably foreseeable action. Chapter 3 of this EA analyzes the environmental consequences of the no action alternative and the proposed action alternative, as well as the cumulative effects of current and reasonably foreseeable future projects on the existing environmental baseline. This analysis provides information for the deciding official's determination as to whether or not there would be impacts exceeding those analyzed in the PRMP/EIS (pp. 4-7 to 99), or new significant effects not previously disclosed, all of which would preclude a Finding of No Significant Impact and require preparation of an Environmental Impact Statement.

"The additional impacts to carbon storage and release from Back in Black should be disclosed and analyzed. Please disclose how the projected impacts to carbon storage and release from the regeneration proposed in Back in Black will impact overall carbon impacts exacerbated by the Calapooya project's intense thinning and clearcutting

The Calapooya Creek Harvest Plan Environmental Assessment does not propose clearcutting, but instead proposes variable density thinning and variable retention harvest in mid-seral stands. The cumulative effects for carbon storage and release are analyzed in Chapter 3, Section 3.9.2.2.

"The regeneration proposed in Back in Black and the clearcutting in the VRH units of Calapooya will have compounded adverse impacts on the NSO. These cumulative impacts need to be thoroughly addressed in the Back and Black EA."

The cumulative effects for wildlife resources are analyzed in Chapter 3, Section 3.4.3.3.

"The Boyd Howdy timber sale identified density management thinning in the riparian reserves in the units proposed in Back in Black. The impacts from this past management need to be addressed in the EA. It is likely that any past management in the Riparian Reserves in these units will cause significant cumulative effects if the upland matrix lands are now clearcut."

Past management actions are included in the description of the Affected Environment for Water Resources and Soils (Chapter 3, Sections 3.3.1 and 3.3.5, respectively). The bare assertion of synergistic impacts between the previous Riparian Reserve thinning and this project do not identify what, if any, combined impact the treatments would have on any particular resource. BLM independently has identified water resources as one of the potential resources to evaluate for synergistic effects from the past thinning and present project, and has analyzed those potential cumulative effects in the Water Resources section (Chapter 3, Section 3.5.2.2).

Riparian Reserves of 180-360 feet would be untreated along all streams, although yarding may be allowed through Riparian Reserves where necessary, subject to pre-designation of the yarding corridors and authorization by the contract administrator (Chapter 2, Section 2.3.4, #1). The trees in the Riparian Reserves would provide root strength sufficient to maintain bank stability (USDI BLM 2008a), protect eroding banks, and prevent sediment from entering streams (Chapter 3, Section 3.5.2.2).

The Riparian Reserves located within the Back in Black project area were commercially thinned between 1999 and 2006 (except for 5 acres in Unit 25-4-17A) (Chapter 2, Section 2.4.2). This treatment occurred 9 to 16 years ago. The FY 2003 Commercial Thinning Harvest EA (EA No. OR-104-02-11) discussed the cumulative effects of the Boyd Howdy Thinnings at that time. The 2003 EA page 22-23 states: "*The long-term cumulative effects of Riparian Reserve treatments under this and other future federal projects would promote late-successional characteristics. Thinning activities would improve forest health and encourage the development of late-successional characteristics in Riparian Reserves including the long-term recruitment of coarse woody material. As Riparian Reserves attain late-successional characteristics, improvements in riparian health, riparian vegetation, instream wood amounts, small channel capacity to store water and sediment, summer low flows, stream temperatures, and the delivery of upland nutrients to streams and hyporheic zones may occur."* The 2003 EA on page 24 states that sediment inputs: "*would be indistinguishable from background levels and therefore add very little to the cumulative impacts of sedimentation at the fifth-field scale and would be within the range of natural variation."* Since it has been nearly 10 years since the last thinning treatment has been completed, it is unlikely any adverse lingering effects would be detectable or add cumulatively to the proposed project.

At this time, additional treatment in the Riparian Reserves would not provide a benefit beyond what has already been provided by the previous treatment. For this project, utilizing the full Riparian Reserve widths would allow the riparian stand conditions to improve as a response from the previous thinning treatments (Chapter 2, Section 2.4.2). The Aquatic Conservation Strategy is discussed in Chapter 3 and describes how the objectives of the ACS are being met (Chapter 3, Section 3.5.2.2).

"The Back in Black EA should address the impacts from increased use on existing roads, as well as the impacts expected from recomissioning [sic] or building new roads in the same area for Back in Black."

Cumulative effects for the impacts of road use, road construction, and road decommissioning on water resources are analyzed in Chapter 3, Section 3.5.2.2.

Regeneration Harvest

"Many of the proposed units appear to not have met the CMAI."

"The Environmental Assessment needs to address the CMAI of these stands and should consider alternatives that wait for these units to reach CMAI before scheduling a regeneration harvest. Anything less would not meet the requirements of NEPA and the RMP."

The ROD/RMP allows for regeneration harvest in units that have not reached culmination of mean annual increment (CMAI). Stands within the proposed regeneration harvest units are not currently at CMAI (Chapter 3, Section 3.3.1); however regeneration harvests may be scheduled in stands as young as 60 years in order to develop a desired age class distribution across the landscape (ROD/RMP, p. 61). A management objective of the GFMA is a high level of sustained timber productivity, i.e. sustained yield (ROD/RMP, p. 150). The key to achieving sustained yield is to establish a regulated forest with the proper distribution of stand age and size classes so that over time, approximately equal periodic harvests of the desired size and quality are produced. A "regulated forest" consists of tree sizes in approximately equal parts and age classes that correspond to the size classes. To achieve the desired age class distribution, it is necessary that the harvest type resets the age class or seral stage, i.e. a regeneration harvest of selected stands is necessary, including regeneration harvest of intermediate-age classes. Over time, regeneration harvests can transform or convert an irregular forest structure to a regulated one (Chapter 3, Section 3.3.2.3; Hennes *et al*., 1971).

The proposed regeneration harvest would aid in developing a desired age class distribution across the landscape (ROD/RMP p. 61). The ROD/RMP assumed a regeneration harvest level of approximately 19,250 acres over the first two decades of implementation (1994 PRMP/EIS, p. Appendices 252, Table II-6). Over that period, approximately 1,920 acres or ten (10) percent of that total has actually been harvested in the GFMA, resulting in a substantial departure from the planned acres in the 0 to 20 years age classes over that period. Consequently, there are fewer than anticipated "young" stands on GFMA lands resulting in a departure from the assumed age class distribution. Harvest treatments which contribute to balancing age class distributions simultaneously contributes to meeting the management objective (ROD/RMP, p. 150) for a balance of seral stages by creating stands of early-seral stage conditions.

An alternative that waits for units to reach CMAI before scheduling a regeneration harvest was not considered because it would not meet the Purpose and Need to develop a more desirable age class distribution. Waiting for units to reach CMAI would be a deferral for 20 to 40 years, and would essentially be the no action alternative.

"This project should be adjusted to reflect the growing recognition of the ecological and social value of complex early seral habitats which are promoted by delayed re-establishment and dominance of conifers after disturbance."

"This project could be made more beneficial to the creation of complex early seral habitat by dropping areas from planting entirely when they have a nice existing complement of diverse vegetation."

"If this project involves artificial planting, avoid dense replanting that creates dense homogeneous plantations."

"Please replant in patches and/or at a fairly low density and avoid the need for future thinning and other stand management costs."

Reforestation would be achieved primarily through conifer tree planting. Natural regeneration may also supplement conifer stocking. Planting would use a mixture of species, up to 500 trees per acre, to meet BLM reforestation goals for future timber harvest goals (Chapter 2, Section 2.3.1; ROD/RMP, p. 63). Planting at a low density, in patches, or skipping areas would not meet the purpose and need of the project to produce a sustainable yield of forest products (Chapter 1, Sections 1.3 and 1.4), because it would be inconsistent with management direction to achieve reforestation as promptly as practical following timber harvest (ROD/RMP, p. 63). Planting commercial conifer species would enhance the potential for the development of a conifer dominated forest stand (Tappeiner *et al.* 2007) (Chapter 3, Section 3.3.2.3).

"The Back in Black EA needs to address the rationale behind clearcutting previously thinned units, particularly as the BLM has invested substantial time and money into thinning managed plantations."

The Back in Black Regeneration Harvest Plan Environmental Assessment does not propose clearcutting, but instead proposes regeneration harvest in late-seral stands. As stated above, a management objective of the GFMA is a high level of sustained timber productivity, i.e. sustained yield (ROD/RMP, p. 150). The key to achieving sustained yield is to establish a regulated forest with the proper distribution of stand age and size classes so that over time, approximately equal periodic harvests of the desired size and quality are produced. To achieve the desired age class distribution, it is necessary that the harvest type resets the age class or seral stage, i.e. a *regeneration harvest* of selected stands is necessary, including regeneration harvest of intermediate-age classes. Over time, regeneration harvests can transform or convert an irregular forest structure to a regulated one (Chapter 3, Section 3.3.2.3; Hennes *et al.* 1971). The early-seral stage has the least representation on BLM managed lands in the Calapooya Creek watershed at 0.03 percent (Chapter 3, Section 3.3.1, Table 3-1). The seral stages would be adjusted under Alternative Two from late-seral to the early-seral stage (Chapter 3, Section 3.3.2.3, Table 3-6).

Previously thinned stands were chosen in response to litigation (Swanson vs. Salazar) that required increased timber volume outputs from the harvest land base. From a logistical and resource standpoint, these stands provided the advantage of having had previously established road systems, possible harvest systems and harvest unit boundaries identified, riparian reserves locations, archaeological surveys, etc. In other words, considerable information was available that would aid in streamlining process and project layout compared to stands which were not previously treated.

"Many of the units in the Back in Black Harvest Plan appear to be too young for regeneration harvest under the Roseburg Resource Management Plan (RMP)."

The stands proposed for harvest would be at least 60 years old before the time of harvest, with most stands between 60 and 66 years old (Chapter 3, Section 3.3.1, Table 3-2). This is consistent with the ROD/RMP because there is a need to schedule regeneration harvests in stands as young as 60 years old in order to develop a desired age class distribution across the landscape (p. 61). To achieve the desired age class distribution, it is necessary that the harvest type resets the age class or seral stage, i.e. a *regeneration harvest* of selected stands is necessary, including regeneration harvest of intermediate-age classes.

Roads

"The impact of construction and renovation of roads on top of the proposed clear cutting needs to be discussed in the EA for Back and [sic] Black, as both actions were identified as potentially problematic in the Boyd Howdy project and to be mitigated by retaining trees. The Back in Black EA must identify and discuss the mitigation measures that will be imposed to address these factors."

Any new road construction would avoid areas with slope stability concerns. Roads and landings would be located on geologically stable locations; e.g., ridge tops, stable benches or flats, and gentle-to-moderate side-slopes (Chapter 2, Section 2.3.2; ROD/RMP, p. 132). The Soils section discusses slope stability related to road construction, maintenance/renovation, and decommissioning (Chapter 3, Section 3.5.2.2).

Wildlife

"[B]oth proposed units 24-3-7D and 24-4-13E are developing ample brush species and differentiation in tree age class and species composition. The EA needs to address the long term potential for these units to provide habitat and discuss alternatives to regeneration that acknowledge the continuing need for NSO habitat."

The effects of both alternatives to northern spotted owl habitat are discussed in Chapter 3, Section 3.4.3.

Based on assumptions used in the wildlife analysis for the No Action Alternative, forest habitat function would continue to improve from conditions created during the previous harvest activities that occurred more than 10 years ago. However, based on predicted canopy cover conditions in 50 years, and barring additional treatment or a natural disturbance event, the existing understory component is expected to diminish as canopy cover increases over time within dispersal habitat in Unit 24-3-7D and three acres of Unit 24-4-13E (Chapter 3, Section 3.3.2.1; Table 3-5). Understory stand conditions would persist in areas of lower than average canopy closure, which would continue to provide some variability within the stand.

Under the Proposed Action Alternative, removed dispersal habitat would subsequently re-develop into dispersal habitat within approximately 40 years. Units were grown forward 20 and 50 years to compare forest conditions between alternatives (Tables 3-4 and 3-5). It is beyond the scope of this analysis to determine the long term potential for these units to provide habitat, particularly because they are located within the General Forest Management Area.

The BLM considered alternatives to regeneration harvest, including a commercial thinning only alternative (Chapter 2.4.1). Furthermore, management direction for the Late-Successional Reserve and Riparian Reserve land use allocations throughout the Roseburg District address the need to protect and enhance northern spotted owl habitat (ROD/RMP pp. 28-29).

1.7. Issues for Analysis

Through internal and external scoping, the interdisciplinary team identified the following issues for analysis. For some resources there may be no specific concerns because the resource is not present, or their protection is covered under program policy or project design features, and no detailed analysis is necessary. The issues and resources not present or affected are discussed in Chapter 2, Section 2.5.

1.7.1. Forest Vegetation

- How would the alternatives affect species composition, structural characteristics and age class distribution in the project area?

1.7.2. Wildlife

- What would be the direct and indirect effects of the alternatives to the Federally-threatened northern spotted owl in terms of disturbance and modification of habitat and designated critical habitat?
- To what degree would the alternatives be consistent with Recovery Actions from the Northern Spotted Owl Recovery Plan and assist in recovery of the northern spotted owl?
- What would the direct and indirect effects of the alternatives be to Survey and Manage wildlife species?
- What would the direct and indirect effects of the alternatives be on Landbirds and to the habitat provided by BLM-managed lands in the project area?

1.7.3. Water Resources

- What effects would the alternatives have on water quality, particularly temperature, sediment and turbidity in streams in the project area?
- What effects would the alternatives have on the timing and quantity of stream flows in the project area?

1.7.4. Noxious Weeds

- What effects would the alternatives have on the introduction and spread of noxious weeds and non-native and invasive plants?
- What effects would the road activities (construction, renovation, decommissioning) have on the introduction and spread of noxious weeds and non-native and invasive plants?

1.7.5. Soils

- How would regeneration harvest and associate road activities affect soil productivity?
- How would regeneration harvest and associate road activities affect slope stability?

1.7.6. Fire and Fuels Management and Air Quality

- What direct and indirect effects would the alternatives have on present and future risk of fire within the proposed harvest units and within the project area?
- What would be the effects on air quality from fuels reduction implemented as part of the proposed action?

1.7.7. Carbon Storage and Release

- What effects would the alternatives have on the release of carbon in the form of carbon dioxide (CO_2) at the project scale and in comparison to annual national and global CO_2 emissions?
- What would be the effects of the alternatives on future carbon sequestration in the forested stands proposed for harvest?

1.8. Conformance

1.8.1. Applicable Planning Documents

This EA addresses the environmental consequences of no action and the proposed action to determine if there would be impacts exceeding those analyzed in the PRMP/EIS, precluding a Finding of No Significant Impact and requiring preparation of an Environmental Impact Statement. The following documents provide additional information and analysis and are specifically referenced in Chapter 3.

- Final Supplemental Environmental Impact Statement (FSEIS) on Management of Habitat for Late-Successional and Old-Growth Related Species Within the Range of the Northern Spotted Owl (USDA and USDI 1994a),
- Roseburg District Proposed Resource Management Plan/Environmental Impact Statement (USDI BLM 1994a)
- FSEIS for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (USDA and USDI 2000),
- FSEIS to Remove or Modify the Survey and Manage Mitigation Measures Standards and Guidelines (USDA and USDI 2004);
- Final Supplement to the 2004 Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measures Standards and Guidelines (USDA and USDI 2007);
- Final Environmental Impact Statement for the Revision of the Resource Management Plans for the Western Oregon Bureau of Land Management (USDI BLM 2008a), and
- Proposed Resource Management Plan/Final Environmental Impact Statement, Western Oregon (USDI BLM 2016).

Implementation would conform to management direction from the Roseburg District 1995 ROD/RMP as amended by the following:

- Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (USDA and USDI 2001).

1.8.2. Applicable Laws and Regulations

Design and implementation of the proposed action would conform to applicable laws, regulations and Executive Orders that include but are not limited to:

- **The Oregon and California Railroad Lands Act of 1937:** Section 1 of the Act stipulates that suitable commercial forest lands revested by the government from the Oregon and California Railroad are to be managed for the sustained production of timber.
- **The Federal Land Policy and Management Act (FLPMA):** Section 302 at 43 U.S.C. 1732(a), directs that "The Secretary shall manage the public lands . . .in accordance with the land use plans developed by him under section 202 of this Act when they are available . . ."
- **National Historic Preservation Act, 2012 National Programmatic Agreement, and 2015 Oregon State Historic Preservation Office Protocol:** Protection of resources of historic or cultural value.
- **Clean Water Act:** Section 313 and Executive Order 12088 requires federal agencies to comply with the provisions of the Clean Water Act to control water pollution from nonpoint sources.
- **Clean Air Act:** Directs federal agencies to maintain and enhance air quality.
- **The Endangered Species Act:** Section 7(a) (2) directs that each Federal agency shall insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat.
- **Migratory Bird Treaty Act and Executive Order 13186**: Protection of migratory birds.
- **Lacey Act, Federal Noxious Weed Act, and Executive Order 13112:** Minimize the risk of establishment or spread of noxious weeds and invasive non-native plants.

1.8.3. Survey and Manage

On February 18, 2014, the District Court for the Western District of Washington issued a remedy order in the case of *Conservation Northwest et al. v. Bonnie et al.*, No. 08-1067- JCC (W.D. Wash.)/No.11-35729 (9th Cir.). This was the latest step in the ongoing litigation challenging the 2007 Record of Decision (ROD) to modify the Survey and Manage (S&M) Standards and Guidelines.

The remedy order contained two components. The order:

1. Vacates the 2007 ROD to Remove or Modify the Survey and Manage S&M Mitigation Measure Standards and Guidelines, and
2. Allows for continued project planning and implementation for projects that relied on the 2011 Consent Decree and were being developed or implemented on or before April 25, 2013 (date of the Ninth Circuit Court ruling invalidating the 2011 Consent Decree).

In summary, the current status of Survey and Manage is:

1. Follow the 2001 S&M ROD and Standards and Guidelines (S&G);
2. Apply the "Pechman exemptions;" and
3. Implement the 2001, 2002, and 2003 ASR modifications to the S&M species list, except for the changes made for the red tree vole.

The project is consistent with the 2001 ROD and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, as incorporated into the District Resource Management Plan (USDA and USDI 2001).

This project utilizes the December 2003 species list. This list incorporates species changes and removals made as a result of the 2001, 2002, and 2003 Annual Species Reviews (ASR) with the exception of the red tree vole.

Chapter 2. Discussion of the Alternatives

This chapter describes the basic features of the alternatives being analyzed.

2.1. Terminology and Definitions

There are several terms for which definitions and meanings are integral to a clear understanding of the Back in Black Regeneration Harvest Plan Environmental Assessment. These definitions are presented below, prior to the description of the no action and proposed action alternatives. In addition, throughout this assessment, acres (or percentages) are presented and discussed. These numbers are approximations based on office planning and subsequent ground reconnaissance. These acres and percentages may include minor changes as additional information and further field review refine the approximations.

2.1.1. Silvicultural Terminology

Canopy cover – The proportion of the forest floor covered by the vertical projection of tree crowns, adjusted for crown overlap.

Culmination of mean annual increment (CMAI) – The peak of average yearly growth in volume of a forest stand (total volume divided by age of stand) (ROD/RMP, p. 103).

Cumulative mortality – Trees projected to become snags and down woody material using a modeling system.

Decay Classes

Coarse woody debris decay classes (Bartels et al. 1985):

> **Decay class 1 –** Bark and texture are intact. Twigs are present with original shape and color. Log is elevated on supported points.
>
> **Decay class 2 –** Bark is intact. Texture ranges from intact to partly soft. Twigs are absent with original shape and color. Log is elevated on supported points but sagging slightly.
>
> **Decay class 3 –** There is a trace of bark. Texture is hard and in large pieces. Twigs are absent with original shape. Color ranges from original to faded. Log is sagging near the ground.
>
> **Decay class 4 –** The bark and twigs are absent. Texture is soft and in small blocky pieces. Shape is round to oval. Color is light brown to faded brown and Douglas-fir *(Pseudotsuga menziesii)* may be red-brown. Log is on the ground.
>
> **Decay class 5 –** The bark and twigs are absent. Texture is soft and powdery. Shape is oval. Color is faded to light yellow or gray, and Douglas-fir may be red-brown to dark brown. Log is on the ground with greater than 50 percent above ground.

Forest Operations Inventory (FOI) – An intensive inventory that provides managers with information regarding age, species, stand location, size, silvicultural needs, and recommended treatment based on individual stand conditions and productivity.

Minor conifer – Any conifer tree species other than Douglas-fir.

Relative density (RD) – A means of describing the level of competition among trees or the site occupancy in a stand relative to some theoretical maximum based on tree size and species composition. For this project "relative density" refers to Curtis relative density (Curtis 1982). RD is defined on a scale of 0 to 100. Competition (suppression) related mortality begins at a RD equal to 55.

Seral stages – The series of relatively transitory plant communities which develop during ecological succession from bare ground to the climax stage. There are five stages with associated age classes (ROD/RMP, p. 112):

> **Early-seral stage** – The period from disturbance to crown closure of conifer stands, usually occurring from 0 to 15 years. Grass, herbs, or brush are plentiful.
>
> **Mid-seral stage** – The period in the life of a forest stand from crown closure to first merchantability. Usually ages 15 through 40. Due to stand density, brush, grass or herbs rapidly decrease in the stand. Hiding cover may be present.
>
> **Late-seral stage** – The period in the life of a forest stand from first merchantability to culmination of mean annual increment. This is under a regime including commercial thinning, or to 100 years of age, depending on wildlife habitat needs. During this period, stand diversity is minimal, except that conifer mortality rates will be fairly rapid. Hiding and thermal cover may be present. Forage is minimal.
>
> **Mature seral stage** – The period in the life of a forest stand from culmination of mean annual increment to an old-growth stage or to 200 years. This is a time of gradually increasing stand diversity. Hiding cover, thermal cover, and some forage may be present.
>
> **Old-growth** – This stage constitutes the potential plant community capable of existing on a site given the frequency of natural disturbance events. For forest communities, this stage exists from approximately age 200 until when stand replacement occurs and secondary succession begins again. Depending on fire frequency and intensity, old-growth forests may have different structures, species composition and age distributions. In forests with longer periods between natural disturbance, the forest structure will be more even-aged at late mature or early old growth stages.

Snag recruitment:

> **Passive recruitment** – Natural mortality processes are relied on to produce snags and down wood.
>
> **Active recruitment** – The artificial creation of snags and down wood via girdling and/or felling of live trees at, or soon after, the time of harvest.

Sustained Timber Yield - the amount of wood that may be harvested from a particular type of forest stand by species, site, stocking, and management regime at various ages that a forest can produce continuously at a given intensity of management.

Treatment prescription method – One prescription method is proposed and modeled for the Back in Black project. The prescription method proposed for Back in Black is:

> **Regeneration harvest** – Timber harvest conducted with the partial objective of opening a forest stand to the point where favored tree species would be reestablished (ROD/RMP, pp. 110-111).

Green tree retention - A stand management practice in which live trees as well as snags and large down wood, are left as biological legacies within harvest units to provide habitat components over the next management cycle (ROD/RMP p. 105).

2.1.2. Road Terminology

Road Maintenance/Renovation

Road maintenance/renovation includes road work to maintain the original design and/or bring an existing road ***back to its original design***. Road maintenance/renovation includes work on any existing designed road that is on the landscape - not just numbered roads currently in the BLM transportation system. Indicators of a designed road include a defined cut and fill, compacted surface, rock surfacing, and/or drainage structures. In some instances, trees and other plant species may have re-vegetated the road and it may be serving as wildlife habitat but it would still be considered road maintenance/renovation if the planned road work would bring the road back to its original design within the cut and fill slopes.

The amount of effort to bring the road back to its original design can vary dramatically from road to road. Typical activities that would be associated with road maintenance/renovation include:

- brushing,
- ditch cleaning,
- surface grading,
- removing trees,
- replacing drainage structures, and/or
- rock placement where needed, in locations where rock was included in the original design.

Typically, road maintenance/renovation that is performed by BLM personnel is referred to as "maintenance" while road maintenance/renovation performed by a timber sale purchaser or other contractor is termed "renovation".

Road Construction

Road construction includes work to build a road where a ***designed road did not exist previously***. Typical activities that would be associated with road construction include:

- removing vegetation,
- building cut/fill slopes,
- compacting the driving surface,
- surfacing with rock (in some instances but not all), and/or
- installing drainage structures (e.g. culverts, cross-drains).

Road Decommissioning

Roads that are not needed for long-term resource management or require resource protection would be closed to vehicle traffic. Prior to closure, roads would be left in an erosion-resistant condition by applying one or more of the following:

- removal of temporary and/or existing culverts to eliminate the need for culvert maintenance where barriers would prevent access,
- installation of waterbars to effectively drain a rock or native road surface,
- mulching the road surface with logging slash to control erosion and deter use by off-highway vehicles,
- mulching the road surface with seed and straw mulch to control erosion where logging slash is unavailable or where future access would be necessary for noxious weed control or power line maintenance, and/or
- blocking the road with a barrier, such as logs, a gate or a trench to prevent access.

If a road or spur being decommissioned is under a reciprocal right-of-way agreement, easement, or other legal interest, the decommission stipulations may be subject to the private landowner terms.

2.2. Alternative One - No Action

This alternative describes a baseline against which the effects of Alternative Two can be compared. It discusses the consequences of not taking any action and assumes that current resource trends would continue into the future.

No timber management would occur. Individual trees and stands as a whole would continue to produce moderate to high volume growth rates.

There would be no road construction to provide access for yarding and timber hauling. Road renovation designed to reduce erosion, correct drainage deficiencies, improve water quality, and provide for user safety would not be undertaken. Decommissioning of roads surplus to long-term transportation and management needs would not occur. Road maintenance would be conducted as needed to provide resource protection, accommodate reciprocal users, and protect the federal investment.

No activity fuels would be generated that would require treatment to reduce risk of fire. Fire suppression would continue.

Selection of the No Action Alternative would not constitute a decision to reallocate these lands to non-commodity uses. If the decision maker chooses this alternative, the proposed action would be dropped and the National Environmental Policy Act (NEPA) process ended. Future activities in the area would not be precluded and could be analyzed in subsequent NEPA documents.

2.3. Alternative Two - Proposed Action

The Back in Black project area includes 530 acres allocated to the GFMA (Appendix A, Figure A-1). Regeneration harvests would provide approximately 10 to 12 million board feet of timber. The proposed action would include road construction, maintenance and renovation for the use of yarding, landings, and hauling, road decommissioning, and fuels management (Table 2-1, Table 2-3). Seven acres would be cleared for spur roads to access the harvest units; less than one acre of the spur construction would be under reciprocal right-of-way agreements outside of the units. Yarding or equipment operation would generally be prohibited within Riparian Reserves, although yarding or decking of logs may be allowed through Riparian Reserves where necessary, subject to pre-designation of the yarding corridors and authorization by the contract administrator.

There are two yarding and road surfacing options under Alternative Two. Option A proposes 392 acres of cable yarding and 138 acres of ground-based yarding. Option B proposes cable yarding of the entire 530 acres (Table 2-1). Options A and B both propose 1.9 miles of road construction and 30.1 miles of road maintenance/renovation, although road surfacing (native vs. rocked) differs between the two options (Table 2-1). All other proposed actions would remain the same between the two options, and are discussed in detail in the section below (Appendix A, Figures A-4 – A-12).

In order to make more effective decisions, the BLM may select Option A, Option B, or a combination of these options through adaptive management, depending on conditions on the ground, the market price of logs, and the cost of diesel, at the time of implementation. These options would allow the BLM to offer consistent and steady operational opportunities for the purchaser(s) throughout the year in order to meet the Purpose and Need of the project, including environmental protection while providing economic feasibility. Criteria that the purchaser would use to request Option A, Option B, or a combination of the two options would include; economic efficiency, seasonality, seasonal restrictions, and continuity of logging operations. Project design features (PDFs) for timber yarding would be followed (Chapter 2, Section 2.3.4, #2) and a road sedimentation control plan would be in place (Chapter 2, Section 2.3.4, #3). Environmental effects of Options A and B are analyzed in Chapter 3 of this EA and would therefore capture the effect of a combination of these options that falls within the ranges of yarding methods analyzed under both options.

Table 2-1. Proposed actions for the Back in Black Regeneration Harvest Plan project, Swiftwater Resource Area, Roseburg BLM.

Activity		Gross Area[1]	
		Option A	Option B
Regeneration Harvest	GFMA	530 acres	530 acres
Yarding	Cable yarding Ground-based yarding	392 acres 138 acres	530 acres 0 acres
Hauling	Wet or dry season haul	32 miles	32 miles
Road Activities	Total road construction *Native-surfaced* *Rocked* Total maintenance/renovation of existing roads *Native-surfaced* *Native-surfaced to rocked surface* *Rocked surface* Clearing associated with roads Decommissioning (i.e. waterbar and block)	1.9 miles *1.6 miles* *0.3 miles* 30.1 miles *4.7 miles* *1.3 miles* *24.1 miles* 7 acres 4.6 miles	1.9 miles *0 miles* *1.9 miles* 30.1 miles *0 miles* *6.0 miles* *24.1 miles* 7 acres 4.6 miles
Fuels Management	Landing piles Fuel accumulation piles	42 acres 168 acres	55 acres 179 acres

[1]*Gross area:* approximations based on aerial photo analysis, geographic information systems analysis, and subsequent ground reconnaissance. Gross areas may change as additional information and further field review refines the approximations.

2.3.1. Timber Management

Regeneration Harvest

Regeneration harvest would remove all merchantable trees (greater than eight inches in diameter at breast height (DBH)), excepting trees identified in "Tree Retention" discussed below.

Tree Retention

On average, nine (9) green trees per acre would be retained to meet the post-harvest six (6) to eight (8) green conifer tree retention RMP requirements plus one additional green tree to provide for future snag recruitment (ROD/RMP, pp. 34, 38, 64, 146, 150-151). Selection of retention trees would reflect the existing conifer species composition of the stands and full range of diameter classes greater than 20 inches diameter breast height (ROD/RMP, pp. 64, 150), if available, or the largest trees (ROD/RMP, p. 151).

Retained trees would be distributed in variable patterns (ROD/RMP, pp. 38, 64).

Operational considerations, including road construction and landings, would affect placement of retention trees. Green-tree retention would be met at the individual unit scale.

Retention of Snags and Coarse Woody Debris

In the regeneration harvest units, snags would be reserved from cutting unless the purchaser, subcontractor, and contract administrator deem that a snag poses a safety concern. Retained snags would contribute toward achieving the analytical assumption of providing an average of at least 1.2 snags per acre (PRMP/EIS, Chapter 4-43) to support cavity nesting birds at 40 percent of potential population levels (ROD/RMP, p. 34). Snags felled for safety reasons in the Riparian Reserve would be retained on site as coarse woody debris.

At a minimum, an average of 120 linear feet per acre of large down wood in decay classes 1 and 2 would be provided, initially described in the ROD/RMP (p. 65) as pieces greater than or equal to 16 inches in diameter and 16 feet long.

Plan maintenance in the 1997 Roseburg District Annual Program Summary describes a range of scenarios by which this requirement may be met (USDI BLM 1998, p. 26). Existing coarse woody debris in decay classes 3, 4, and 5 would also be retained.

Reforestation and Stand Maintenance

Reforestation would be achieved primarily through conifer tree planting. Natural regeneration may also supplement conifer stocking. Planting would use a mixture of species, up to 500 trees per acre, to meet BLM reforestation goals for future timber harvest goals (ROD/RMP, p. 63). Douglas-fir would be the primary species planted, using genetically improved nursery stock where available. Minor conifer species would be planted, and may include incense-cedar and western red-cedar, depending on natural occurrence on-site and when the planting stock is available (ROD/RMP, p.152). The composition of natural regeneration would depend on tree species adjacent to harvested areas, species mix of retention trees, seed bed conditions, timing and abundance of seed crops, seed predation, and weather conditions.

Treatments to maintain survival and long-term dominance of tree species would include mulching to reduce competition from grasses on primarily drier south and west aspects, cutting of shrubs and hardwood species for site preparation, using tubing for protection from herbivory (browsing), and cutting competing shrubs and hardwoods for conifer release. The necessary treatments and their timing would be determined from follow-up evaluation exams conducted over the first 15 years following harvest.

2.3.2. Road Activities

The proposed project would use existing roads to the greatest extent practical. Road construction is intended to move landings off heavily travelled roads to avoid user conflict, improve safety, or to access landing locations that provide for environmentally responsible yarding. Roads and landings would be located on geologically stable locations; e.g., ridge tops, stable benches or flats, and gentle-to-moderate side-slopes (ROD/RMP, p. 132). Roads and spurs would be designed no wider than needed for the specific use to minimize soil disturbance (ROD/RMP, p. 132), generally, with a 14-foot wide road surface and an average road clearing width of 30 feet. However, road shoulders, landings, vehicle turnouts, and curve widening could result in road clearings wider than 30 feet.

There would be approximately 30 miles of road maintenance/renovation, and 1.9 miles of road construction (Table 2-2; Appendix A, Figures A-4 – A-12). New cut and fill slopes would be mulched with weed-free straw, or equivalent, and seeded with a native or sterile hybrid mix. All 1.9 miles of new construction would be decommissioned after use. Approximately 2.6 miles of existing spur roads in the project area would also be decommissioned following use, resulting in a total of 4.6 miles of decommissioning in the project area. The proposed decommissioning for specific roads is presented in Table 2-2. Road decommissioning may be subject to stipulations by holders of reciprocal rights-of-way, easements, or other legal interests.

Table 2-2. Roads in the Back in Black Regeneration Harvest Plan project area.

Road No.	Construction		Maintenance/ Renovation (miles)	Surfacing			Season of Haul[1]	Decommissioning	
	Length (miles)	Within Riparian Reserve (feet)		Existing	Proposed			Length (miles)	Method
					Option A	Option B			
23-3-32.0	0	0	1.6	Rock	Rock	Rock	Wet or Dry	0	None
24-3-5.0	0	0	1.0	Rock	Rock	Rock	Wet or Dry	0	None
24-3-6.0	0	0	0.8	Native	Native	Rock	Wet or Dry	0	None
24-3-6.1	0	0	0.1	Native	Native	Rock	Wet or Dry	0.1	Waterbar, block
24-3-6.2(Alt)	0.1	0	0.0	None	Native	Rock	Wet or Dry	0.1	Waterbar, block
24-3-6.2	0.4	0	0.0	None	Native	Rock	Wet or Dry	0.4	Waterbar, block
24-3-6.3	0.1	0	0.0	None	Native	Rock	Wet or Dry	0.1	Waterbar, block
24-3-7.0	0	0	3.6	Rock	Rock	Rock	Wet or Dry	0	None
24-3-7.1	0	0	1.1	Rock	Rock	Rock	Wet or Dry	0	None
24-3-16.0	0	0	2.1	Rock	Rock	Rock	Wet or Dry	0	None
24-3-18.0	0	0	0.2	Rock	Rock	Rock	Wet or Dry	0	None
24-3-21.0	0	0	4.1	Rock	Rock	Rock	Wet or Dry	0	None
24-4-1.1	0	0	0.5	Native	Native	Rock	Wet or Dry	0.4	Waterbar, block
24-4-1.4	0	0	0.6	Rock	Rock	Rock	Wet or Dry	0	None
24-4-1.5	0	0	0.2	Rock	Rock	Rock	Wet or Dry	0	None
24-4-13.0	0	0	1.6	Rock	Rock	Rock	Wet or Dry	0	None
24-4-13.0	0	0	0.8	Native	Native	Rock	Wet or Dry	0	None
24-4-13.1	0	0	0.6	Rock	Rock	Rock	Wet or Dry	0	None
24-4-22.0	0	0	4.8	Rock	Rock	Rock	Wet or Dry	0	None
25-4-17.3	0	0	0.4	Native	Rock	Rock	Wet or Dry	0	None
25-4-17.2	0	0	0.1	Native	Native	Rock	Wet or Dry	0.1	Waterbar, block

Road No.	Construction		Maintenance/ Renovation (miles)	Surfacing			Season of Haul[1]	Decommissioning	
	Length (miles)	Within Riparian Reserve (feet)		Existing	Proposed			Length (miles)	Method
					Option A	Option B			
Pacific Powerline Road	0	0	0.6	Native	Native	Rock	Wet or Dry	0	None
25-4-8.0	0	0	0.6	Rock	Rock	Rock	Wet or Dry	0	None
25-4-8.1	0	0	2.0	Rock	Rock	Rock	Wet or Dry	0	None
Spur BIB i	0	0	0.3	Native	Rock	Rock	Wet or Dry	0.2	Waterbar, block
Spur BIB j	0	0	0.2	Native	Native	Rock	Wet or Dry	0.2	Waterbar, block
Spur BIB k	0	0	0.2	Native	Native	Rock	Wet or Dry	0.2	Waterbar, block
Spur BIB k	0.1	0	0.0	None	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur BIB l	0	0	0.1	Native	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur BIB m	0	0	0.2	Native	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur BIB n	0	0	0.2	Native	Rock	Rock	Wet or Dry	0.2	Waterbar, block
Spur BIB o	0	0	0.2	Native	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur BIB p	0	0	0.1	Native	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur BIB q	0	0	0.1	Native	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur BIB r	0	0	0.1	Native	Rock	Rock	Wet or Dry	0.1	Waterbar, block
Spur BIB s	0.1	0	0.0	None	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur BIB t	0.1	0	0.0	None	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur D&R e	0	0	0.1	Native	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur D&R f	0	0	0.2	Native	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur D&R g	0	0	0.1	Native	Rock	Rock	Wet or Dry	0.1	Waterbar, block
Spur D&R h	0.1	0	0	None	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur D&R i	0.1	0	0	None	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur D&R j	0.1	0	0	None	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur D&R k	0.1	0	0	None	Rock	Rock	Wet or Dry	0.1	Waterbar, block
Spur D&R l	0.1	0	0	None	Rock	Rock	Wet or Dry	0.1	Waterbar, block
Spur D&R m	0.1	0	0	None	Rock	Rock	Wet or Dry	0.1	Waterbar, block
Spur D&R xx	0.1	0	0	None	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur D&R yy	0.2	0	0	None	Native	Rock	Wet or Dry	0.2	Waterbar, block

Road No.	Construction		Maintenance/ Renovation (miles)	Surfacing			Season of Haul[1]	Decommissioning	
	Length (miles)	Within Riparian Reserve (feet)		Existing	Proposed			Length (miles)	Method
					Option A	Option B			
Spur LH c	0	0	0.2	Native	Native	Rock	Wet or Dry	0.2	Waterbar, block
Spur LH d	0	0	0.2	Native	Rock	Rock	Wet or Dry	0.1	Waterbar, block
Spur LH e	0.1	0	0	None	Native	Rock	Wet or Dry	0.1	Waterbar, block
Spur LH f	0	0	0.2	Native	Native	Rock	Wet or Dry	0.2	Waterbar, block
Total	**1.9**	**0**	**30.1**	**-**	**Native / Rock 6.3 / 25.7**	**Native / Rock 0 / 32.0**	**-**	**4.6**	**-**

[1]Season of Haul would be dependent on type of road surface (Chapter 2, Section 2.3.4, #3). Rock would allow wet season haul, native would require dry season haul.

2.3.3. Fuels Management

Treatment of activity fuels would be done to reduce concentrations of residual slash using a combination of three types of pile and burn methods. The PDFs for fuels management are discussed in Section 2.3.4, #4.

Landing Piles

Logging slash at landings would be machine-piled and burned to remove concentrations of activity slash, accounting for up to 42 acres of activity fuels reduction for Option A (cable and ground-based yarding), or 55 acres of fuels reduction for Option B (cable yarding only). Estimates of these treatment acres, by unit, are presented in Table 2-3.

Fuel Accumulation Piles

Small fuels generated by regeneration harvest would be machine piled in areas identified for ground-based yarding in Option A, independent of which yarding method is chosen. In order to reduce activity fuel accumulations along select property lines, in Unit 24-3-17D and Unit 25-4-17A, small fuels would be hand or machine piled. Small fuels would also be hand or machine piled within 50 feet of permanent roads and haul routes, where practicable. Up to 168 acres of fuel accumulation piling for Option A and 179 acres of fuel accumulation piling for Option B would occur. Estimates of these treatment acres, by unit, are presented in Table 2-3.

Table 2-3. Unit identification number, unit size, fuels management, and yarding methods for units within the Back in Black Regeneration Harvest Plan project area, Swiftwater Field Office, Roseburg BLM.

Unit ID No.	Township-Range-Section	Upland Unit Size (acres)[1]	Fuels Management		Yarding Method(s)			
			Landing Piles[2] (acres)		Fuel Accumulation Piles[3] acres piled *(acres burned)*		Cable / Ground-Based acres *(percentage)*	
			Option A	Option B	Option A	Option B	Option A	Option B
24-3-5C	T24S-R03W-Sec. 5	161	12	19	91 *(4.7)*	97 *(5.0)*	77 / 84 *(48 / 52)*	161 / 0 *(100 / 0)*
24-3-5D	T24S-R03W-Sec. 5	8	2	2	0	0	8 / 0 *(100 / 0)*	8 / 0 *(100 / 0)*
24-3-5E	T24S-R03W-Sec. 5	15	2	2	5 *(0.3)*	5 *(0.3)*	12 / 3 *(77 / 23)*	15 / 0 *(100 / 0)*
24-3-7D	T24S-R03W-Sec. 7	18	2	2	3 *(0.2)*	4 *(0.2)*	16 / 2 *(87 / 13)*	18 / 0 *(100 / 0)*
24-3-17D	T24S-R03W-Sec. 17	39	5	5	3 *(0.2)*	3 *(0.2)*	39 / 0 *(100 / 0)*	39 / 0 *(100 / 0)*
24-4-1D	T24S-R04W-Sec. 1	31	3	3	7 *(0.4)*	7 *(0.4)*	23 / 8 *(75 / 25)*	31 / 0 *(100 / 0)*
24-4-1E	T24S-R04W-Sec. 1	22	2	2	10 *(0.5)*	11 *(0.6)*	12 / 9 *(57 / 43)*	22 / 0 *(100 / 0)*
24-4-13E	T24S-R04W-Sec 13	94	5	9	28 *(1.5)*	30 *(1.6)*	71 / 23 *(75 / 25)*	94 / 0 *(100 / 0)*
25-4-17A	T25S-R04W-Sec. 17	142	9	11	21 *(1.1)*	22 *(1.1)*	134 / 8 *(94 / 6)*	142 / 0 *(100 / 0)*
	Total	**530**	**42**	**55**	**168** ***(8.9)***	**179** ***(9.4)***	**392 / 138** ***(74 / 26)***	**530 / 0** ***(100 / 0)***

[1]*Unit Size:* does not include the acreage of existing roads within unit boundaries. Acreage of proposed constructed and maintained/renovated spurs is included.

[2]*Landing piles:* acreage for Option A was calculated by estimating the number of piles generated from the proposed logging systems measuring 0.1 acres each. Acreage for Option B was calculated by assuming piles would be created along roads 150 feet apart and measure 0.1 acres each.

[3]*Fuel Accumulation Piles:* acreage piled was calculated based on the area proposed for ground-based harvest in Option A, including areas proposed for piling along property boundaries and within the first 50 feet of permanent roads and haul routes. Acreage burned was calculated based on previous timber sale monitoring by assuming there would be 10 piles per acre approximately 15 by 15 feet in size.

2.3.4. Project Design Features (PDFs) for Alternative Two

1. Riparian Reserves

Riparian Reserves in the Calapooya Creek and Lower North Umpqua River watersheds would be established based on site-potential tree heights determined for each watershed in the analysis area. These heights were calculated from the average site index of inventory plots throughout each watershed, on the lands capable of supporting commercial timber stands. The calculated site-potential tree height for the watersheds involved is 180 feet.

On intermittent and perennial non-fish-bearing streams, Riparian Reserves would be one site-potential tree height (180 feet) in width, slope distance, measured from the top of the stream bank. On all fish-bearing streams, perennial or intermittent, Riparian Reserves would be two site-potential tree heights in width (360 feet on each side of the stream), slope distance, measured from the top of the stream bank.

On wetlands greater than one-acre in size, Riparian Reserves would be one site-potential tree height in width (180 feet); measured from the outer edge of riparian vegetation, or the extent of seasonally saturated soils (ROD/RMP, p. 24).

Timber in adjacent upland stands would be felled away from Riparian Reserves to protect and maintain their physical integrity. Should a tree fall into the Riparian Reserves, the Contract Administrator would make a determination on whether the tree or portion thereof can be removed without undue risk of creating circumstances that could result in erosion and stream sedimentation.

Yarding or equipment operation would generally be prohibited within Riparian Reserves, although yarding may be allowed through Riparian Reserves where necessary, subject to pre-designation of the yarding corridors and authorization by the contract administrator. If necessary to clear yarding corridors within Riparian Reserves, any cut trees would be directionally felled toward the stream and left on site for potential in-stream recruitment.

Measures would be implemented to protect any tailhold trees located in Riparian Reserves from serious damage by requiring the use of straps, plates or cribbing. If cutting were to be necessary, the trees would be felled toward the stream and left on site for potential in-stream recruitment.

2. Timber Yarding

Skyline cable and ground-based yarding would be used to remove timber from the proposed units. In the areas designated for cable-yarding, up to 10 acres of incidental ground-based yarding may occur, as determined by the purchaser and contract administrator, to access small isolated portions of cable units near roads where cable yarding is not practical, or to remove guy-line anchor trees and trees near landings.

Ground-Based Yarding

- Operations would be restricted during the wet season when soils are most susceptible to compaction, typically October 1 to July 15. The wet season restriction period may be adjusted in the event of unseasonably wet weather and soil moisture conditions.
    - The soil scientist and contract administrator would monitor soil moisture, compaction, and displacement to determine when operations may need to be suspended.

- Operators would use harvest equipment on pre-designated trails or existing trails to the greatest degree practicable, with operations generally limited to slopes of 35 percent or less (ROD/RMP, p. 131). Operations on steeper pitches between gentler benches could be authorized by a BLM forester in consultation with a BLM soil scientist during the IDT process or contract implementation.
- Landings, main skid trails, and large slash piles would be located so that less than approximately ten percent of the ground-based harvest area would be affected (ROD/RMP, p. 131).
- Skid trails would be waterbarred as necessary to prevent erosion (ROD/RMP, p. 131).
- Skidder yarding would be done with one end of the log suspended.
- Skid trails would have an average spacing of at least 150 feet apart. In addition, machines used for ground-based logging would be limited to a track width no greater than 12 feet.
- A track-mounted log loader used for a shovel yarding system would be required to travel on existing skid trails and/or slash-covered areas.
- A track-mounted log loader would avoid making more than one pass in swinging logs and piling slash to roads or designated trails.
- Trees designated for cutting within 100 feet of the Reserve Areas shall be felled and yarded away from these areas.
- Equipment operators would avoid using equipment in perennially wet areas.
- Operations would not occur in or through the Riparian Reserves, except yarding and decking of logs, where approved by resource specialists.
- Main skid trails and landings would be subsoiled to a minimum depth of 18 inches, if feasible as determined by the soil scientist, if deemed necessary. Areas of shallow, rocky soils would not be subsoiled to avoid mixing rock with topsoil. A trail where duff and slash are displaced to an extent that 50 percent or more of the trail surface area is exposed to mineral soil would be defined as a main skid trail. Logging slash, where available, would be placed over at least 50 percent of subsoiled areas to replace some of the displaced duff and surface soil organic matter. Any main skid trails that are not subsoiled as part of project operations would be mapped and evaluated for subsoiling at a later time.

Cable Yarding

- Equipment would be capable of maintaining a minimum one-end log suspension, except for cable yarding over streams where full suspension would be required.
- Yarding to and hauling off of native-surfaced roads would be restricted during the wet season, typically October 15 through May 15, subject to circumstances described above.
- Where excessive soil furrowing occurs, haulback trails would be hand waterbarred and filled with limbs or other organic debris to control surface soil erosion in disturbed areas.

- Occasionally, trees selected for use as tailholds or guyline anchors may be located outside of proposed harvest units. To the extent possible, trees with northern spotted owl nesting structure would be avoided when selecting anchor trees. Contract provisions require written approval before attaching logging equipment to a tree in the reserve area and precautions would be taken to protect the tree from damage. Protective measures could include tree plates, straps, or synthetic rope, where possible, and minimal notching (less than half the tree diameter) where necessary. Guyline trees are generally cut because they are located in the vicinity of cable yarding equipment and subject to state safety regulations. Anchor trees that are felled for safety reasons may be harvested at the discretion of the government's contract administrator, based on a variety of criteria, including land use allocation, habitat type, existing coarse woody debris, and accessibility.

3. Road Sedimentation Control Plan

Best Management Practices (BMPs) would be applied during road construction, renovation, and decommissioning. "Best Management Practices are the primary mechanism to prevent and control to the 'maximum extent practicable' nonpoint source pollution and achieve Oregon water quality standards" (ROD/RMP, p. 129).

The Bureau of Land Management fulfills the requirement for Federal agencies to comply with all State requirements and programs to control water pollution from nonpoint sources (per Clean Water Act Section 313 and Executive Order 12088) by implementing Best Management Practices (ROD/RMP, p. 129).

To minimize or prevent sediment delivery to streams and comply with the Clean Water Act of 1972 and its revisions, the following BMPs would be incorporated into the project design. Implementing these BMPs, and others found in the 2011 Roseburg District Annual Program Summary (pp 71-88) would disconnect road surfaces from drainage ditches to minimize or reduce the conveyance and delivery of sediment to the waters of the United States (USDI BLM 2012). It is not intended that all of the BMPs listed would be selected for any specific management action. Each activity is unique, based on site-specific conditions and the selection of an individual BMP or a combination of BMPs and measures to become the BMP design. Forest road engineers select the appropriate BMP's as part of the road construction, renovation and maintenance plans. The most common BMPs for disconnecting road related sediment delivery are listed below:

- **R-031** Disconnect road runoff to the stream channel by outsloping the road approach. If outsloping is not possible, use runoff control, erosion control and sediment containment measures. These may include using additional cross drain culverts, ditch lining, and catchment basins. Minimize ditch flow conveyance to streams by placing cross drains above stream crossings.
- **R-032** Locate cross drains to prevent or minimize runoff and sediment delivery to wetlands, riparian management areas, floodplains, and waters of the state. Implement sediment reduction techniques, such as settling basins, brush filters, sediment fences, or check dams to prevent or minimize sediment delivery.
- **R-033** Space cross drain culverts at intervals sufficient to prevent water volume concentration and accelerated ditch erosion.
- **R-022** Install underdrain structures when roads cross or expose springs, seeps, or wet areas rather than allowing intercepted water to flow in ditchlines.

- **R-023** Effectively drain the road surface by using crowning, insloping, outsloping, grade reversals (rolling dips), waterbars, or a combination of these methods. Avoid concentrated discharge onto fill slopes unless the fill slopes are stable and non-erodible.
- **R-035** Locate surface water drainage measures (e.g. cross drain culverts, rolling dips, or water bars) where water flow would be released on convex slopes or other stable and non-erodible areas that would absorb road drainage and prevent sediment flows from reaching wetlands, floodplains, and waters of the state. Where possible, locate surface water drainage structures above road segments with steeper downhill grades.
- **R-037** Discharge cross drain culverts at ground level on non-erodible material. Install downspout structures or energy dissipaters at cross drain outlets or drivable dips where water is discharged onto loose material, erodible soils, fills, or steep slopes.
- **R-071** Prior to the wet season, provide effective road surface drainage by machine cleaning ditches, blading surfaces including berm removal, constructing sediment barriers, and cleaning inlets and outlets.
- **R-072** Avoid undercutting cut-slopes when cleaning ditchlines. Retain ground cover in ditchlines, except where sediment deposition or other obstructions require maintenance.
- **R-062** Manage road construction so that any construction can be completed and bare soil protected and stabilized prior to fall rains. Apply native seed and certified weed free mulch to cut and fill slopes, ditchlines, and waste disposal sites with the potential for sediment delivery to wetlands, riparian management areas, floodplains, and waters of the state. Apply upon completion of construction or as early as possible to increase germination and growth. Reseed if necessary to accomplish erosion control. Select seed species that are fast growing, have adequate germination, and provide ample ground cover and soil-binding properties. Apply mulch that would stay in place and at site specific rates to prevent erosion.
- **R-075** Inspect and maintain culvert inlets and outlets, drainage structures, and ditches before and during the wet season to diminish the possibility of plugged culverts and washouts.
- **R-094** On roads being hauled on during the wet season, use durable rock surfacing with sufficient surface depth to resist rutting or the development of sediment on roads that drain directly to wetlands, floodplains, or waters of the state.
- **R-096** Suspend commercial use when the road surface is rutted, covered by a layer of mud, or runoff from the road surface is causing a visible increase in stream turbidity.
- **R-098** Do not allow wet season haul on natural surface roads or sediment producing surfaced roads without practicable and effective mitigation.

Other road sediment control measures specific to Back in Black include:

- Road construction, maintenance/renovation, winterizing, and decommissioning would be restricted to the dry season (typically May 15 to October 15). The operating season could be adjusted by a BLM contract administrator if unseasonable conditions occur (e.g. an extended dry season beyond October 15 or wet season beyond May 15).
- Use of native-surfaced roads for timber hauling would be limited to the dry season (typically May 15 to October 15).
- If necessary, prior to wet season (generally, mid-October through mid-May) haul on surfaced roads, sediment reducing measures such as straw bales, silt fences, or sediment filters would be installed near stream crossings to prevent sediment from reaching the streams.

- Timber hauling would be suspended during wet weather to prevent damage to the road or if road run-off would deliver sediment to a stream at concentrations higher than existing background conditions.
- Natural surfaced roads, not decommissioned prior to the wet season, would be winterized. Winterization would include: installation of waterbars, mulching the running surface within 100 feet of streams with weed-free straw, and blocking the road with a barrier, such as logs, a gate or a trench to prevent access.

4. Fuels Management

Machine piles shall be located away from unit boundaries, retention trees, snags, downed logs, and stumps.

For all machine piling, displacement of duff and topsoil into piles would be avoided to the greatest extent practicable (USDI/BLM 2001, p. 66).

Total exposed mineral soil resulting from primary skid trails and mechanical site preparation activities would be less than ten percent of ground based harvest units and less than 5 percent in cable units (USDI/BLM 2005, p. 59).

Equipment for machine piling within units would be restricted to small and medium sized excavators or other low-ground pressure equipment.

Machine piling within units could occur on slopes up to 50 percent. Equipment would be required to travel straight up and down on slopes between 35 and 50 percent, thereby minimizing soil displacement associated with side-hill travel.

Machine piling within units would occur between July 15th and October 1st. The wet season restriction period may be adjusted in the event of unseasonably wet weather and soil moisture conditions.

- The soil scientist and contract administrator would monitor soil moisture, compaction, and displacement to determine when operations may need to be suspended.

Piles would be covered with plastic or thick paper to ensure that the core of the piles remains dry, and good consumption of the pile is achieved when burned while minimizing the generation of particulates (Oregon SMP 2008).

Up to two small (less than 8 feet diameter in size) piles per acre may be left in place for wildlife habitat, where practical.

All pile burning would have an approved “Burn Plan” and be conducted under the requirements of the Oregon Department of Forestry - Smoke Management Plan (Oregon SMP 2008) in a manner consistent with the requirements of the Clean Air Act (Oregon Department of Environmental Quality and Oregon Department of Forestry 1992).

Piles would be burned during the late-fall to mid-spring season when the soil, duff layer (soil surface layer consisting of fine organic material), and large downed wood moisture levels are high and atmospheric conditions are conducive to smoke dispersion and particulate removal.

5. Soils

In addition to the project design features listed for ground-based yarding, cable yarding, and fuels management, the following unit-specific measures would be applied to further minimize soil disturbance to maintain soil stability.

Unit 24-3-7D

A small deep-seated landslide, 0.35 acres in size, with evidence of recent movement was buffered out of the unit, and incorporated into the Riparian Reserve.

6. Seasonal Wildlife Restrictions on Harvest Operations

ESA Terrestrial Wildlife Species

Federally listed (Threatened or Endangered) or proposed animals and their habitats would be managed to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and Bureau Special Status Species policies (ROD/RMP, p. 41). If during implementation of the proposed action, previously undiscovered Special Status Species locations are found, operations would be suspended, by the BLM contracting officer, as necessary and appropriate protective measures would be implemented before operations would be resumed.

Northern Spotted Owl

Northern spotted owl suitable habitat is adjacent to six of the nine proposed units (Table 2-4, Appendix A, Figure A-13). Based on current protocol survey data (BLM, unpublished data 2013-2015), there are no project activities that would remove dispersal habitat and suitable habitat within 65 yards (dispersal) and 440 yards (suitable) of a known occupied northern spotted owl activity center.

Although known activity centers are located outside of the disruption distance thresholds, seasonal restrictions would apply for harvest operations occurring within the disruption distances of occupied stands (by either a pair or resident single northern spotted owl) during the northern spotted owl critical breeding season (March 1-July 15) for harvest of dispersal habitat or prescribed burning or the breeding season (March 1-September 30) for harvest of suitable habitat, until full protocol surveys or spot checks have been completed to determine the current location of nesting owls. If protocol surveys detect barred owls, but do not detect northern spotted owls, spot checks would be required in units adjacent to stands of suitable habitat being surveyed (USDI/USFWS 2012).

Seasonal restrictions may be waived until March 1 of the following year if current calendar year surveys indicate: 1) northern spotted owls are not detected, 2) northern spotted owls are present, but not attempting to nest, or 3) northern spotted owls are present, but nesting attempt has failed. Based on current survey results, the proposed units that would be affected by seasonal restrictions are shown in Table 2-4, and Appendix A, Figure A-13. Units requiring seasonal restrictions are subject to change based on future survey results. If subsequent surveys locate a new northern spotted owl nest tree within 1.2 miles (home range radius distance from nest tree) of a proposed unit, harvest within the home range would be reevaluated by the BLM and the U.S. Fish and Wildlife Service (FWS).

Table 2-4. Current northern spotted owl seasonal restriction requirements for Back in Black units[1].

	Unit ID No.								
	24-3-5C	**24-3-5D**	**24-3-5E**	**24-3-7D**	**24-3-17D**	**24-4-1D**	**24-4-1E**	**24-4-13E**	**25-4-17A**
Habitat Removal	Dispersal	Dispersal	NRF/ Dispersal	Dispersal	NRF/ Dispersal	Dispersal	Dispersal	Dispersal	Dispersal
Adjacent Suitable Habitat[1]			X	X	X	X		X	X
Restrictions for Harvest Operations/ Prescribed Burning			X	X	X				
Duration of Seasonal Restrictions			March 1-Sept 30	March 1-July 15					

[1]*Seasonal restriction requirements*: based on 2015 survey data. Subsequent surveys may locate new owl locations and determine that seasonal restrictions would be required for units (typically located adjacent to suitable habitat) differently than what is presented in this table.

7. Wildlife Habitat and Survey Requirements

Other Raptors

Great-Horned Owl

A large owl species, originally believed to be a great gray owl (Survey & Manage species), was observed during field review of Unit 24-3-17D in February 2014. The ROD/RMP provides management direction to protect known great gray owl sites (ROD/RMP 1995, p. 44). Although the unit and surrounding habitat does not meet protocol triggers, pre-disturbance surveys were initiated in order to confirm the owl species. Great gray owls were not detected during survey efforts in 2014 or 2015. However, a nesting pair of great-horned owls with fledgling young was detected in 2014.

In accordance with the ROD/RMP, known and future raptor nest sites not protected by other management recommendations would be protected by providing suitable habitat buffers and seasonal disturbance restrictions (1995, p. 39). Based on the Guidance for Raptor Protective Measure specification, the great-horned owl nest tree would have a minimum five-acre buffer and a disturbance restriction during the breeding season, from February 1 through September 30 (IM OR-98-012, Attachment 2). In order to implement the conservation provisions (e.g. avoid disturbing raptors) under the Migratory Bird Treaty Act, the BLM will monitor the nest site annually throughout the harvest contract to determine nesting status. If monitoring surveys determine that 1) owls are not present, 2) owls are present, but not attempting to nest, or 3) owls are present, but nesting attempt has failed, then seasonal restrictions would be waived for the remainder of the current calendar year until February 1 of the following year.

Survey & Manage Terrestrial Wildlife Species

Mollusks

Habitat surveys for the Crater Lake tightcoil snail (*Pristiloma arcticum crateris)* were conducted in stands where surveys are required under Survey and Manage Program guidance (Duncan *et al.* 2003). All or a portion of eight units are within the species' distribution range, which is above 2000 feet in elevation in the Oregon Cascades (Andrews 2010). Areas of suitable mollusk habitat were identified in Units 24-4-1D and 24-3-7D. Habitat identified for this species within the unit boundaries would be protected by retaining habitat features and environmental conditions, following existing Conservation Assessment guidelines (Duncan *et al*. 2004). Therefore, in lieu of pre-project disturbance surveys, these suitable habitat areas would be protected by inclusion within designated retention areas.

Oregon Red Tree Vole

The *Survey Protocol for the Red Tree Vole, Version 3.0* (Huff *et al.* 2012, pp. 5-10) lists the following three criteria that must be met to require pre-disturbance surveys:

1. The project is within the Northern Mesic, Mesic, or Xeric survey zones.
2. Stands that meet both of the following general habitat descriptions:
    - *a.* The quadratic mean diameter (QMD) of the stand is greater than or equal to the diameters for the survey zone.
    - *b.* The stand is either a: 1) mature or old-growth conifer forest or 2) conifer or conifer-dominated mixed conifer-hardwood forests with canopy cover of intermediate, co-dominant and dominant trees greater than or equal to 60 percent, and with two or more super-dominant conifer trees per acre.
3. The proposed project is habitat-disturbing activity that has the potential to cause a "significant negative effect on the species habitat or the persistence of the species at the site."

The Back in Black project area is in the Mesic survey zone. The survey protocol (Huff *et al.* 2012) indicates stands with a QMD greater than or equal to 18 inches <u>may</u> be suitable habitat. Although 502 unit acres meet the quadratic mean diameter (QMD) criteria of 18 inches, 490 of these acres do not meet either of the two general habitat criteria: 1) they are not mature or old growth stands, and 2) they do not contain at least two super-dominant overstory trees per acre.

Of the 502 acres, 490 acres do not require pre-disturbance surveys. Although not meeting the protocol criteria for stands requiring surveys, pre-disturbance surveys to 198 acres (including 142 acres in Unit 25-4-17A and Riparian Reserve outside of Unit 25-4-17A) were completed in 2000, prior to the implementation of a commercial thinning project; six (6) active red tree vole nest trees were located during those surveys, but were not protected as red tree voles had been removed from the survey and manage species list in the mesic zone by the time of the timber harvest. As there had been a 15-year gap since that survey effort, and the current status of the nest trees was unknown, the stand was resurveyed for the Back in Black project.

Although the criteria for RTV surveys was not met at the forest operations inventory (FOI) stand level for Unit 24-3-5E, the wildlife biologists review units at a different scale than FOI stand delineations (i.e. habitat function delineations). Habitat delineations are based on habitat function and do not always correspond with FOI stand boundaries. The wildlife biologists reviewed Unit 24-3-5E and determined that 12 of the 15 acres that were previously harvested in the early 1940's as part of a larger FOI unit, but a subset of the original stand was selectively harvested – which simplified the habitat by removing some of the trees within the area. Subsequently, these 12 acres have redeveloped understory and canopy cover over the past 65 years and is now functioning as protocol-quality red tree vole habitat

Thus, because red tree vole habitat within Unit 24-3-5E met the three criteria described above, and Unit 25-4-17A has known red tree vole sites, the Field Office elected to complete pre-project clearance surveys. As a result of the survey effort, a total of 10 red tree vole sites were identified, of which two sites in their entirety and four sites were partially designated as non-high priority (Appendix I) in accordance to the Survey and Manage management options described for Category C species (Uncommon Occurrence, Pre-disturbance Surveys Practical) (USDA FS and USDI BLM 2001, pp. S&G – 10).

8. Noxious Weeds and Non-native Invasive Plants

Manual, mechanical, or chemical treatments would be used to manage invasive plant infestations (Chapter 3, Section 3.6.2.2). Existing infestations of Scotch broom, one-seed hawthorn, English holly, and Himalayan blackberry would be treated prior to road renovation or construction and harvest operations.

Road work and harvest operations would be scheduled in un-infested areas prior to work in infested areas. Logging, road construction equipment, and vehicles would be cleaned, with a pressure washer, and free of weed seed prior to entering BLM-administered lands (BLM Manual 9015-Integrated Weed Management, 1995). If equipment is removed from the contract area, re-cleaning and inspection would be required prior to re-entry onto BLM-administered lands.

Where regeneration is unlikely to prevent weed establishment, seeding and mulching disturbed areas with native grass seed; or re-vegetating with native plant species may take place.

9. Botany

Five sites of yellow-headed pin lichen (*Chaenotheca chrysocephala)*, a Survey and Manage Category B species (USDA, USDI 2001), were located in Units 25-4-17A and 24-3-5E. The following unit-specific measures would be applied in order to retain microclimate conditions and ensure persistence of the species.

Unit 25-4-17A

Two sites found in Unit 25-4-17A are within the Riparian Reserves and would be protected from damage because no harvest would occur within the Riparian Reserves. A third site of yellow-headed pin lichen, located on the edge of Unit 25-4-17A, would be protected by establishing a 100 foot buffer distance from the two host trees.

Unit 24-3-5E

Two sites are located in Unit 24-3-5E. One site is located on the edge of the Riparian Reserve. The host tree would be buffered 100 feet to protect the site. The other site in Unit 24-3-5E contains five (5) host trees; all host trees are within the boundaries of the Riparian Reserve and would be protected, however the site is on the edge of the unit. To protect the microclimate, the host trees would be buffered 25 feet due to the location of the site on the top of the ridgeline of an east-facing slope.

2.4. Alternatives Considered but not Analyzed in Detail

Three additional alternatives were considered but not analyzed in detail. These alternatives, and the rationale for not analyzing them, are addressed in this section.

2.4.1. Commercial Thinning

This alternative was eliminated from detailed analysis because it does not respond to the purpose and need; commercial thinning would not allow BLM to implement its policy objectives for developing a desired age class distribution across the landscape (Chapter 1, Sections 1.3 and 1.4; ROD/RMP, p. 61).

A commercial thinning would not help establish a desired age class distribution in the analysis area over time. The ROD/RMP assumed a regeneration harvest level of 19,250 acres over the first two decades of implementation (PRMP/EIS, p. Appendices 252, Table II-6). Over that period, 1,920 acres or ten (10) percent of that total has actually been harvested in the GFMA, resulting in a substantial departure from the planned acres in the 0 to 20 years age classes over that period. Consequently, there are fewer than anticipated “young” stands on GFMA lands resulting in a departure from the assumed age class distribution (Chapter 3, Section 3.3.2.3).

The ROD/RMP (p. 61) specifies application of silvicultural systems that are planned to produce, over time, forests which have desired species composition, structural characteristics, and distribution of seral or age classes, as set forth in Appendix E of the ROD/RMP. Appendix E objectives include managing Matrix lands for a balance of age classes (ROD/RMP, p. 150). Commercial thinning would not allow for the distribution of seral classes that would support a sustainable yield of timber.

A management objective of the GFMA is a high level of sustained timber productivity, i.e. sustained yield (ROD/RMP, p. 150). The key to achieving sustained yield is to establish a regulated forest with the proper distribution of stand age and size classes so that over time, approximately equal periodic harvests of the desired size and quality are produced. A “regulated forest” consists of tree sizes in approximately equal parts and age classes that correspond to the size classes. To achieve the desired age class distribution, it is necessary for the harvest type to reset the age class or seral stage, i.e. a *regeneration harvest* of selected stands is necessary, including regeneration harvest of intermediate-age classes. Commercial thinning would not reset the age class or seral stage of these stands. Over time, regeneration harvests can transform or convert an irregular forest structure to a regulated one (Chapter 3, Section 3.3.2.3; Hennes *et al.* 1971).

2.4.2. Riparian Reserve Treatment

The Riparian Reserves located within the Back in Black project area were commercially thinned between 1999 and 2006 (except for 5 acres in Unit 25-4-17A), with no-touch buffers 40 feet wide along non-fish bearing streams and 100 feet wide along fish bearing streams. The previously implemented thinning prescription promoted the development of large trees to provide an eventual source of large woody debris to stream channels and to create diversity in the riparian stands. The relative density in the previously thinned areas ranges from 20-39. These relative densities are currently consistent with objectives for maintaining and restoring the species composition and structural diversity of the plant communities (Chan *et al*. 2006).

Additional treatment in the Riparian Reserves would not provide additional benefit at this time beyond what has already been provided by the previous treatment. For this project, Riparian Reserve widths would allow the riparian stand conditions to improve as a response from the previous thinning treatments. The Aquatic Conservation Strategy is discussed in Chapter 3 and describes how the objectives of the ACS are being met (Chapter 3, Section 3.5.2.2).

2.4.3. Helicopter Yarding

Comments on other environmental assessments for timber harvest have suggested that the BLM should consider helicopter yarding as an alternative to any road construction or renovation. This is not considered a reasonable alternative and was not analyzed in detail for the following reasons:

1. Primary road access to the units already exists, therefore it would be uneconomical to not use BLM's existing infrastructure. On a smaller subset of the project, proposed road construction would be principally located within unit boundaries to provide favorable access for cable yarding.
2. Using representative appraisal criteria, helicopter yarding would be three to four times more expensive than cable yarding or ground-based harvest methods, and would make harvest economically unviable. Therefore, helicopter yarding would not meet the purpose and need of the project, to select logging systems based on the suitability and economic efficiency.

2.4.4. Acres Considered but Dropped from Analysis

Through field review, approximately nine acres in Unit 25-4-17A was determined to contain high-quality habitat for the red tree vole. As a result, in order to determine the status of red tree vole on BLM lands within the section, surveys were completed in three stands of high quality habitat outside of the unit, and young habitat within the unit. Subsequently, because this portion of the unit contained high-quality habitat with active red tree vole nest trees, it was dropped from analysis in order to maintain habitat and red tree vole sites for species persistence within the section (Appendix I). In addition, a red tree vole site primarily located within the Riparian Reserve would also be fully protected; two acres of the harvest unit between Riparian Reserves and partially located within the red tree vole site has been dropped from harvest consideration (Appendix I).

2.5. Issues and Resources not Present or Affected

2.5.1. Environmental Justice

The proposed action is consistent with Executive Order 12898 which addresses Environmental Justice in minority and low-income populations. The BLM has not identified potential impacts to low-income or minority populations, internally or through the public involvement process. Employment associated with the timber sales would involve local contractors who engage in similar work throughout Douglas County.

2.5.2. Native American Religious or Ceremonial Sites

No Native American religious concerns have been identified by the interdisciplinary team or through correspondence with tribal governments having historic interests in the area.

2.5.3. Areas of Critical Environmental Concern and Natural Areas

Areas of Critical Environmental Concern, Research Natural Areas, prime or unique farmlands, parklands, Wilderness, and Wild and Scenic Rivers are absent from the project area, and hence would be unaffected by any alternative. Wetlands would be protected by establishment of Riparian Reserves.

2.5.4. Botany

Seventy-two (72) Federally listed Threatened or Endangered, or Bureau Sensitive fungi, lichen and plant species are known or suspected to occur on the Roseburg District: 12 species of fungi, 6 species of lichens, 4 species of liverworts, 11 species of moss, and 39 species of vascular plants. Surveys for Federally listed Threatened or Endangered species and Sensitive botanical species in the Back in Black project area were completed in 2014. Federally listed Threatened or Endangered and Sensitive Species documented or suspected to occur on the Roseburg District, but not in the project area, are discussed in *Appendix G – Botanical Species Considered but Dropped from Detailed Study*. During these surveys, no populations of any federally listed Threatened or Endangered, or Bureau Sensitive botanical species were identified.

There are 188 species of fungi, 40 species of lichens, 15 bryophyte species, and 12 vascular plant species included in the Survey and Manage standards and guidelines. Many of these species may be present on the Roseburg District. Surveyors identified occupied habitat for one Survey and Manage pin lichen species within proposed harvest units during the 2014 surveys. Five sites of yellow-headed pin lichen (*Chaenotheca chrysocephala*) are located in Units 25-4-17A and 24-3-5E. Yellow-headed pin lichen is a Survey and Manage Category B species (USDA, USDI 2003) and requires management to ensure persistence of the species. No other botanical Survey and Manage species were identified. Project design features would be followed in order to retain microclimate conditions and ensure persistence of the species (Chapter 2, Section 2.3.4, #9).

In Unit 24-3-5E, one host tree would be removed during the construction of Road 24-3-6.2. Although removal of the host tree would negatively affect the site, the retention and protection of the other host trees would result in the continued persistence of the site. Removing one host tree retains 80 percent of the site, which amounts to 91 percent of the yellow-headed pin lichen sites remaining in the project area, 99.4 percent in the Roseburg District (174 sites), and 99.7 percent of the total range of the species (370 recorded sites). Thus, there would be a minor effect to the Survey and Manage pin lichen sites found within the unit or the project area.

2.5.5. Cultural Resources

Cultural resource inventories within proposed harvest units and road construction were completed in 2015. These efforts are documented in CRS# SW1501, SW1502, and SW1503. The most recent surveys did not locate any significant cultural resources. One previously identified cultural resource, 35DO859, is a prehistoric archaeological site. The site was tested and determined to be not eligible for listing on the National Register of Historic Places, and will not be managed for conservation. Ultimately, the proposed project would have no impact on historic properties.

Any cultural resources that are located during project implementation would be managed either through avoidance or mitigation. In this way, no cultural resources would be affected by this project. Consequently, the BLM is in compliance with Section 106 of the National Historic Preservation Act under the guidance of the 2012 National Programmatic Agreement and the 2015 Oregon Protocol. In accordance with BLM policy and legal requirements, the locations of these sites are not disclosed in public documents in order to diminish the potential for violations of the Archaeological Resources Protection Act.

2.5.6. Fisheries

Fish populations within the project area would be unaffected. Timber harvest would not occur within Riparian Reserves. All of the units, except Unit 24-4-13E, are on ridge tops away from fish-bearing streams. Unit 24-4-13E is adjacent to a fish-bearing stream, Gossett Creek, and this stream would have a Riparian Reserve of 360 feet (Chapter 2, Section 2.3.4., #1). Hard buffers wider than 33 feet have been shown to be effective at intercepting and filtering any sediment from upslope sites (Rashin *et al*. 2006). The Riparian Reserves in this project are greater than tenfold the width of the buffers in the Rashin study, and would be effective at filtering any project derived sediment before it reaches fish-bearing streams. Additionally Riparian Reserves of 360 feet are more than adequate to protect stream shade and water temperature (Chapter 3, Section 3.5.2.2).

All of the haul routes, except the haul route discussed below, were analyzed under the Calapooya Creek Harvest Plan EA (2015, DOI-BLM-OR-R040-2013-0009-EA). Haul routes for the Back in Black project cross fish-bearing streams six times. Oregon Coast coho salmon (*Oncorhynchus kisutch*) are present along small portions of the haul route (Calapooya Creek Harvest Plan EA, Appendix H. Figures 3 and 7). The Calapooya Creek analysis found that a combination of well vegetated ditches, a durable road surface, and PDFs, which include suspending haul during wet weather if road conditions deteriorate, utilizing sediment reducing measures (hay bales, silt fences, etc.) near stream crossings, and restricting haul on native surfaces to the dry season, would prevent road sediment from entering fish-bearing streams (Calapooya Creek Harvest Plan EA, 2015, pp. 101-102).

The haul routes for Unit 25-4-17A were not analyzed under the Calapooya Creek Harvest Plan EA. The haul routes cross one fish-bearing stream (cutthroat trout) and are not adjacent to Oregon Coast coho salmon-bearing streams. The same haul route PDFs discussed in the Calapooya Creek Harvest Plan EA (vegetated ditches, durable rock surface, and sediment reducing PDFs; Chapter 2.3.4, #3) are included in this EA. All of the other haul routes within the project area that were not analyzed under the Calapooya EA are on ridge tops, away from any fish-bearing streams. By not harvesting within Riparian Reserves and avoiding any impacts from timber haul, fish populations within the Back in Black project area would be unaffected by this project.

2.5.7. Off-Highway Vehicle Use

Off-highway vehicle (OHV) use is limited to existing roads and trails by the ROD/RMP (p. 58). None of the proposed alternatives would affect current opportunities for OHV recreational use as all new proposed roads would be sub-soiled and slash mulched, or water barred and slash mulched to discourage OHV use. It is recognized that unauthorized OHV use can and does occur on the landscape, so there is the potential for OHV use to occur within the project area. However, OHV use in the project area is considered to be low thus the potential for unauthorized use is also considered to be low.

2.5.8. Recreation

There are no developed recreation sites or facilities in the project area. Recreational use of the area primarily includes hunting, forest product gathering, driving for pleasure and target shooting and is considered to be low. While timber activities are occurring, access to these areas may be temporarily blocked, denying opportunities to drive, hunt, target shoot and collect forest products. There are similar opportunities provided in adjacent BLM and Forest Service lands that would not be impacted by this project. After the project has been completed, there would be enhanced opportunities for forest product gathering and hunting success because the canopy closure would be reduced from 50-80 percent to 20-40 percent immediately post-harvest (Chapter 3, Section 3.3.2, Tables 3-2 and 3-7), which would increase sunlight to the forest floor, and simulate understory growth and forage materials.

2.5.9. Visual Resource Management

The objective of Visual Resource Management (VRM) is to manage public lands in a manner which would protect the quality of the scenic (visual) values of these lands (BLM Manual 8400.02). Visual Resource Management includes an inventory of all district lands and their corresponding management level classes, which are ranked I-IV. All of the Back in Black units are within the VRM Class IV. The VRM Class IV objective is to..."provide for management activities which require major modifications to the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention." (BLM Handbook 8410-1, p. 7).

A visual contrast rating analysis was conducted in January 2016 to analyze potential visual impacts of the proposed action. Due to the nearby residences, an area along Nonpareil Road was selected for the contrast rating as it was deemed to have the greatest potential for a visual contrast and would attract the attention of the casual observer. There is a very recent clear-cut on adjacent private land and timber harvest activities are not in a straight line view of drivers along Nonpareil Road. Some of the private residences in the foreground, especially along Bonanza Mine Road would be able to see effects from the timber harvest activities in Unit 25-4-17A. Residences immediately adjacent to the proposed action area would not be able to see timber harvest effects as a dense row of trees and vegetation would block the view of the adjacent ridge.

Strong changes to the form, line, and texture with moderate changes to vegetation would occur. Moderate changes to the form, line, color, and texture of the land would also occur. A screen of trees in the foreground and in the flatter areas would lessen the impacts to visual resources. The changes would be most visible and apparent, the further one looks up the ridge in the background. The cut banks to the existing roads, now hidden in most areas, would also be visible. New road construction to the east of the transmission line corridor is not expected to be visible from Nonpareil Road, but possibly from Bonanza Mine Road, after timber harvest activities take place. To minimize the effects to the visual resource, burning of slash piles and replanting of the site should occur in a timely manner.

Chapter 3. Affected Environment and Environmental Effects

3.1. Introduction

This chapter summarizes the current condition of specific resources present, or with reasonable potential to be present in the project area that could be affected by proposed project activities. Anticipated short-term and long-term effects that may result from implementation of the alternatives are addressed, including those effects that are direct, indirect and cumulative. The Chapter concludes with a "Monitoring" section (Chapter 3, Section 3.10).

The discussion is organized by resource, addressing the interaction of the effects of road construction/renovation/improvement, timber harvest, timber hauling, activity fuels treatments, and road decommissioning with current conditions of this environment. This analysis describes potential effects, how they might occur, and the incremental result of those effects, focusing on direct and indirect effects with a realistic potential for cumulative effects, rather than those of a negligible or discountable nature.

The Council on Environmental Quality (CEQ) provided guidance on June 24, 2005 as to the extent agencies of the Federal government are required to analyze the environmental effects of past actions when describing the cumulative environmental effect of a proposed action in accordance with Section 102 of the National Environmental Policy Act (NEPA). The CEQ noted the "[e]nvironmental analysis required under NEPA is forward-looking," and "[r]eview of past actions is only required to the extent that this review informs agency decisionmaking regarding the proposed action." This is because a description of the current state of the environment inherently includes effects of past actions. Guidance further states that "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historic details of individual past actions."

3.2. Introduction to Cumulative Effects Analysis

The cumulative effects of the BLM timber management program on the Roseburg District have been described and analyzed in the PRMP/EIS (pp. 4-7 to 99), incorporated herein by reference. For all analyzed resources, Alternative One (No Action) would have no cumulative effects because no new BLM management actions would occur at this time.

Past actions and previous decisions have been included in the description of existing conditions. However, the 2006 decision for the Whatagas Timber Sale is not included in the Back in Black cumulative effects analysis. Whatagas was a sold and unawarded timber sale located in the same HUC 10 watershed as the Back in Black units. None of the actions authorized in the Whatagas Decision Document were implemented on the ground, and the sale is now withdrawn.

Ongoing BLM actions in the analysis area include silvicultural maintenance of young stands, including pre-commercial thinning, dispersed recreation, special forest products gathering, road maintenance, fire suppression, and weed control.

The proposed Calapooya Creek Harvest Plan project is considered as a reasonably foreseeable future action, and proposes treatment of 1,245 acres of mid-seral stands with variable density thinning and variable retention harvest. Thinning would occur on 421 acres within GFMA, 274 acres within C/D, and 487 acres within Riparian Reserve. Variable retention harvest would be implemented on 63 upland acres within GFMA. Nine acres would be cleared for spur roads to access the harvest units, including 0.8 acres outside of unit boundaries. There would be approximately 1.8 miles of new spur road construction in Calapooya with 1.3 miles of the new construction decommissioned after use. Approximately 1.4 miles of existing spur roads in the project area would also be decommissioned following use, resulting in a total of 2.7 miles of decommissioning in the project area. Thus there would be no increase in road density in the project area. Twenty-six harvest units in two proposed timber sales, Green Gas and Good Boyd, would provide approximately eight million board feet of timber. The Calapooya Creek Harvest Plan project occurs on Revested Oregon and California Railroad Lands (O&C Lands) within the Calapooya Creek watershed, Lower North Umpqua River watershed, and Elk Creek watershed. Implementation is planned for 2015 and 2016.

It is assumed that most late-seral forest stands on private land have been converted to early-seral conditions and large industrial owners would continue to manage primarily for timber production on a rotation of 40 to 65 years. Intensive timber management on private lands would include the use of herbicides for control of competing vegetation, resulting in simplified vegetative communities.

Cumulative effects analyses are included in the environmental effects for each resource below.

3.3. Forest Vegetation

3.3.1. Affected Environment

The Calapooya Creek Watershed Analysis Unit covers 157,194 acres in which 99 percent of the project area is located (Appendix A, Figure A-2). Less than one percent of the project area is within the Lower North Umpqua River watershed, and therefore effects within this watershed will not addressed in this analysis. Within the Calapooya Creek watershed, 91 percent is in private ownership. Forestry is the most common land use in the watershed at 64 percent of the land base. Agriculture is the second largest land use at 33 percent. The remaining land base is occupied by residential and commercial/industrial uses (Geyer 2003, p. 24).

The Swiftwater Field Office of the BLM Roseburg District manages 11,661 acres (7 percent) of the watershed. Late-Successional Reserves account for eight (8) percent of the BLM ownership with the remainder allocated as GFMA, Connectivity/Diversity Blocks and Riparian Reserves. General Forest Management Areas account for 48 percent of the BLM land base in this watershed at 5,648 acres. The late-seral stage has the largest GFMA BLM land base in the Calapooya Creek watershed at 42 percent. The proposed units are currently in the late-seral stage. The acres of forested GFMA stands managed by the BLM in the watershed are displayed by seral stage in Table 3-1.

The early-seral stage has the least representation on BLM managed lands in the Calapooya Creek watershed at less than one percent while the late-seral stage has the most, at 42 percent (Table 3-1). A key to achieving sustained yield is to establish a regulated forest consisting of age classes/seral stages in approximately equal parts (Hennes *et al.* 1971). The age class distribution on BLM-administered land in the Calapooya Creek watershed does not currently meet nor is it trending towards that condition.

Table 3-1. Seral stage classes in the General Forest Management Areas of BLM managed lands in the Calapooya Creek watershed.

Seral Stages[1]	Age of stands	Forested Acres	Percent of BLM Managed Land
Early-Seral Stage	0-15	2	< 1
Mid-Seral Stage	15-40	1,645	29
Late-Seral Stage	40-100	2,369	42
Mature-Seral Stage	100-200	1,093	19
Old-Growth	200+	539	10
Totals		5,648	100

[1] Seral stages as defined in Chapter 2, Section 2.1.1 (ROD/RMP, p. 112).

The majority of stands proposed for treatment in the Back in Black project originated from timber harvest during the 1940s and 1950s, and have subsequently been actively managed with various silvicultural treatments such as reforestation, pre-commercial thinnings, fertilization, and commercial thinnings. Commercial thinning was previously implemented in all of the units between 1999 and 2006, except for 5 acres in Unit 25-4-17A (subunit b described in detail below). Trees of an older age class may be present in some units, but are not a substantial component of the stand.

Unit 25-4-17A(b) was regeneration harvested circa 1950, but was not commercially thinned with 25-4-17A(a). Subunit b stand attributes and histories are different enough to warrant a separate listing of attributes in Table 3-2.

Stand exams identified current vegetation stand attributes for each unit. Proposed units may contain one or more stands, as mapped in the District's forest operations inventory (FOI), and may contain a mix of tree species, form, and distribution. Stands are not currently estimated to be at culmination of mean annual increment (CMAI); however regeneration harvests may be scheduled in stands as young as 60 years in order to develop a desired age class distribution across the landscape (ROD/RMP, p. 61). A summary of current stand conditions for live trees for the Back in Black project areas is shown in Table 3-2.

Douglas-fir (*Pseudotsuga menziesii*) comprises the majority of overstory tree species. Other overstory tree species include, but are not limited to, western hemlock, *(Tsuga heterophylla)*, western redcedar *(Thuja plicata)*, Pacific madrone *(Arbutus menziesii)*, incense-cedar (*Calocedrus decurrens*), grand fir (*Abies grandis*), and bigleaf maple (*Acer macrophyllum*). The average composition of minor conifer and hardwood species present within the proposed units is 22 percent, ranging from 0 to 38 percent.

Snag surveys conducted in the project area estimated the number of snags to be approximately 0.3 per acre. This is less than the management direction level for retention after a regeneration harvest treatment.

Table 3-2. Current stand conditions. Live trees component in the Back in Black project areas.

Unit		Age of Stands	Timber Harvest History – Past 25 Years	Total Trees Per Acre[1]	Trees Per Acre >6" DBH	Quadratic Mean Diameter >6" DBH	Basal Area (feet^2/acre) >6" DBH	Curtis Relative Density >6" DBH	Canopy Cover (Percent) >6" DBH
24-4-1D		66	Commercial Thinning	85	43	22	110	25	52
24-4-1E		66	Commercial Thinning	54	54	21	125	28	61
24-3-5C, 5 D, 5E[2]		66	Commercial Thinning	244	79	20	165	39	72
24-3-7D		60	Commercial Thinning	196	59	17	95	24	50
24-4-13E		66	Commercial Thinning	87	51	18	85	21	47
25-4-17A[3]	a	66	Commercial Thinning	85	54	20	114	27	55
	b	66	None	455	330	13	280	78	80
24-4-17D		66	Commercial Thinning	104	43	22	115	26	52

[1] Includes all sizes of trees.
[2] Unit 24-3-5C, 5D, and 5E are all part of the same FOI.
[3] Unit 25-4-17A has two FOI's represented by the acreages as listed: a = 139 acres, b = 5 acres

3.3.2. Environmental Effects

3.3.2.1. Methodology

Environmental effects for forest vegetation were qualitatively analyzed at a unit-by-unit spatial scale. Information is displayed for current conditions, and conditions 20 years and 50 years into the future. Seral stage class distribution/age class distribution was analyzed at the Calapooya Creek watershed level for BLM-administered lands. See *Appendix B, Live Vegetation Development Analytical Methodology*, for detailed information.

3.3.2.2. Alternative One - No Action

Forest Stand Development

Forest growth was simulated for 20 and 50 years into the future with the Organon growth and yield model (Hann 2011) to provide predicted stand attribute information for effects analyses. Twenty and 50 year periods were deemed sufficient to illustrate short- and long-term trends of stand development across the alternatives. Predicted stand attributes are shown in Tables 3-3 and 3-4.

Absent regeneration harvest or substantial natural disturbance, stands would continue to develop along current growth trajectories. Canopy cover and relative density in the previously thinned stands would continue to increase, with rates of change varying dependent on current stand structure, age, and site productivity.

Table 3-3. Predicted stand conditions in 20 years in Back in Black under Alternative One.

Unit		Trees/Acre			Quadratic Mean Diameter	Basal Area (feet^2/ac)	Canopy Cover (Percent) >6" DBH	Cumulative Mortality Trees/Acre ≥ 16" DBH	Cumulative Mortality (feet^3/acre)
		All[1]	≥ 6" DBH	≥ 20" DBH					
24-4-1D		74	43	43	21	175	62	< 1	62
24-4-1E		53	53	53	27	210	68	1	117
24-3-5C, 5 D, 5E[2]		226	83	50	14	224	80	1	145
24-3-7D		132	56	37	15	160	74	3	74
24-4-13E		72	54	33	18	135	59	1	158
25-4-17A[3]	a	76	55	38	20	170	63	< 1	94
	b	275	249	31	15	333	80	1	983
24-3-17D		86	54	36	19	175	63	1	156

[1] Includes all sizes of trees.
[2] Unit 24-3-5C, 5D, and 5E are all part of the same FOI.
[3] Unit 25-4-17A has two FOI's represented by the acreages as listed: a = 139 acres, b = 5 acres

Table 3-4. Predicted stand conditions in 50 years in Back in Black under Alternative One.

Unit		Trees/Acre			Quadratic Mean Diameter Trees	Basal Area (feet^2/ac)	Canopy Cover (Percent) >6" DBH	Cumulative Mortality Trees/Acre ≥ 16" DBH	Cumulative Mortality (feet^3/acre)
		All[1]	≥ 6" DBH	≥ 20" DBH					
24-4-1D		68	60	42	26	245	68	1	222
24-4-1E		51	51	51	32	290	72	3	431
24-3-5C, 5 D, 5E[2]		194	103	60	18	325	80	3	486
24-3-7D		98	95	43	21	230	72	4	267
24-4-13E		63	57	41	24	195	64	3	619
25-4-17A[3]	a	65	60	45	26	233	67	1	305
	b	179	177	57	20	378	76	2	2,715
24-3-17D		71	63	41	25	240	68	2	244

[1] Includes all sizes of trees.
[2] Unit 24-3-5C, 5D, and 5E are all part of the same FOI.
[3] Unit 25-4-17A has two FOI's represented by the acreages as listed: a = 139 acres, b = 5 acres

Future forest conditions would be principally influenced by the growth and mortality of overstory trees. Except in areas with lower than average canopy closure, the vigor and survival of the current understory vegetation would decline as the overstory canopy closes (Chan *et al.* 2006; Cole and Newton 2009). While areas of lower than average canopy closure would provide some variability and layering within the stand, the amount would be limited and therefore would not substantially affect stand structure development. In both 20 and 50 years post-harvest, the stand structure class is expected to remain in a simple single-story condition (Chan *et al.* 2006; Cole and Newton 2009).

Forest seral stages in the project area would not be altered other than by normal aging processes. Over the 50 year analytical period, the stands would shift from the late-seral to the mature-seral stage due to change in age. Alternative One would not provide for the redistribution of seral class acres that contribute to the long-term attainment of a balanced age class condition necessary for sustained yield on the GFMA land use allocation.

Fuels Treatments

Under Alternative One, no activity fuels would be generated; therefore fuels treatments (i.e. machine pile and burn) would not be implemented. This would not produce a change to the vegetative resources as no activity fuels would be produced.

Road Activities

Alternative One would not implement road activities including construction, renovation, and decommissioning. This would not produce a change to the vegetative resources as existing roads would continue to be in place and vegetation would not occupy the space.

3.3.2.3. Alternative Two - Proposed Action

Forest Stand Development

Forest growth was simulated for 20 and 50 years into the future with the Organon growth and yield model (Hann 2011) to provide stand attribute information for effects analyses. Twenty and 50 year periods were deemed sufficient to illustrate short and long-term trends of stand development across the alternatives. Predicted stand attributes are shown in Tables 3-5 and 3-6.

Management direction for the GFMA provides for regeneration harvests in stands as young as 60 years, in order to develop a desired age class distribution across the landscape (ROD/RMP, p. 61, 151). The proposed regeneration harvest would help establish the desired (balanced) age class distribution in the analysis area over time. The ROD/RMP assumed that district-wide, regeneration harvest would be implemented on 19,250 acres over the first two decades of RMP implementation (PRMP/EIS, p. Appendices 252, Table II-6). Over that period, 1,920 acres or ten (10) percent of that projected total has actually been regeneration harvested in the GFMA, resulting in a substantial departure from the planned acres in the 0 to 20 years age classes. Consequently, there are fewer than anticipated "young" stands on GFMA lands resulting in a departure from the assumed, age class distribution and a slower pace to a balanced age class/seral-stage distribution. Harvests (regeneration), which contributes to balancing age class distributions, simultaneously contributes to meeting the management objective (ROD/RMP, p. 150) for creation of stands with early-seral stage conditions.

The change in seral stage classes on GFMA lands in the Calapooya Creek watershed due to the proposed action is shown in Figure 3-1. The proposed action converts acres from the late-seral stage to the early-seral stage, which contributes towards attainment of the desired balanced age class distribution for sustained yield management. The proposed harvest units in the Back in Black project would increase the amount of BLM-managed acres in the early-seral stage from near zero to ten percent within the Calapooya Creek watershed.

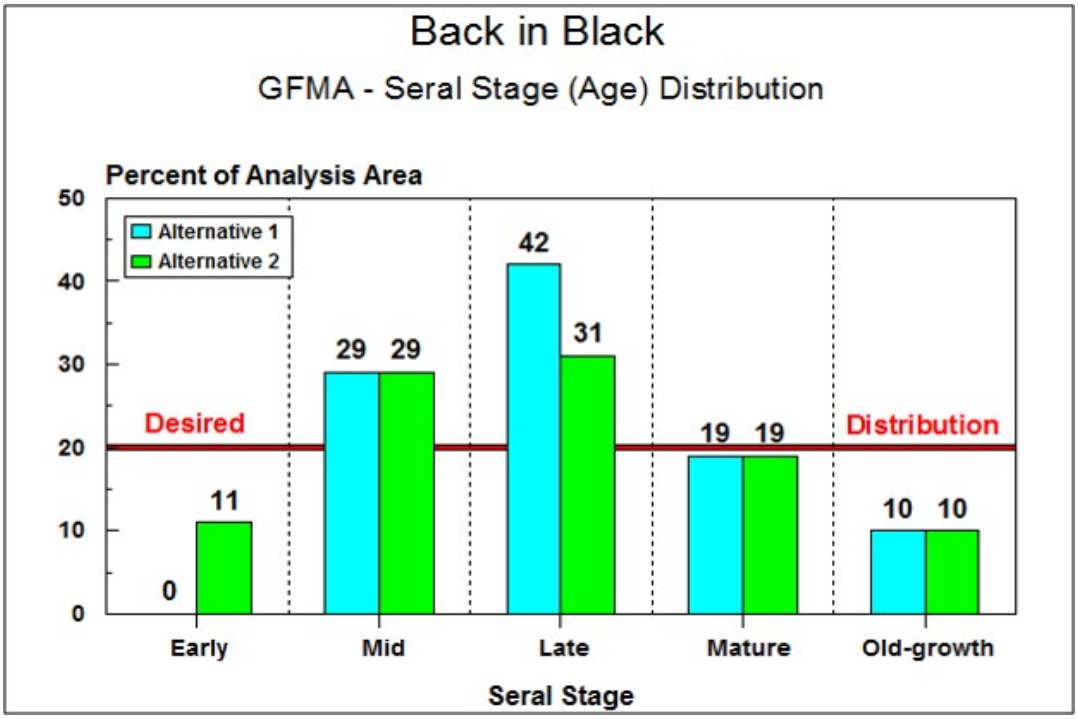


Figure 3-1. Current and predicted seral stage distribution with implementation of Alternative 2 regeneration harvest.

The regeneration harvest would change the stands from late-seral to early-seral. Early-seral (open canopy) conditions are provided within the harvested areas for about two decades, although by definition the stand would be classified as mid-seral stage at 15 years post-harvest.

The degree of harvest induced ground disturbance and intensity of prescribed burning can influence vegetative development. Dyrness (1973) documented vegetative changes within western Cascades clearcuts for seven years post-harvest. Those stands exhibited a mosaic of post-harvest/burning conditions. All units were prescribed burned after harvest, but only about 50 percent of the area had actually been affected by fire. About 34 percent was disturbed by harvest activities, but not burned. The remaining 16 percent was harvested, but without ground disturbance.

Plant cover within the harvested area on the ground surface undisturbed by logging or burning tended to be dominated by residual (present before harvest) species. Disturbed-unburned soil was characterized by a large number of species, both invaders and residuals. Cover on burned soils was dominated by both herbs and invading shrubs. Numbers of residual herbs were substantially lower compared to unburned areas. Few residual shrubs and trees were present on severely burned areas five years after logging, but were more abundant in lightly burned areas.

Similar general patterns of understory development as described above are expected to occur on the proposed project areas following harvest and site preparation.

Options A and B for yarding methods (see Chapter 2, Table 2-3), would affect vegetation to the extent of the amount of ground disturbance resulting from using the different yarding methods.

Table 3-5 shows selected stand attributes projected in Back in Black immediately following harvest under Alternative Two.

Table 3-5. Immediately post-treatment stand conditions[1] within the Back in Black harvested areas of the GFMA land use allocation.

Unit		Green-tree Retention[1]		Quadratic Mean Diameter	Basal Area (feet^2/ac)	Canopy Cover (Percent) >6" DBH
		Trees per acre #	Basal Area per Acre			
24-4-1D		9	28%	23	26	10-15%
24-4-1E		9	24%	24	27	10-15%
24-3-5C, 5 D, 5E[2]		9	20%	23	25	10-15%
24-3-7D		9	24%	22	26	10-15%
24-4-13E		9	28%	23	23	10-15%
25-4-17A[3]	a	9	30%	25	35	10-15%
	b	9	10%	22	30	10-15%
24-3-17D		9	29%	27	35	10-15%

[1] Includes trees with a diameter breast height (DBH) greater than or equal to 20".
[2] Unit 24-3-5C, 5D, and 5E are all part of the same FOI.
[3] Unit 25-4-17A has two FOI's represented by the acreages as listed: a = 139 acres, b = 5 acres

Harvest would change current vegetation structure and composition to one resembling the early-seral stage (ROD/RMP, p. 112). The composite effects of harvest types and distribution would provide during the 50 to 100 years post-harvest, many attributes found in unmanaged mature and old-growth forest stands within the harvested area, trending to a mature stand condition with a multiple-canopy structure.

Retention trees within harvested areas would provide short- and long-term live and dead structural legacies. Mortality of retention trees in regeneration harvest units has been quantified by several recent studies (Buermeyer and Harrington 2002, Busby *et al.* 2006, Maguire *et al.* 2006, Garber *et al.* 2011). Causes of mortality include wind-throw, wind-topping, logging damage, and sunscald. On an annualized basis, these studies report mortality rates ranging from about 0.6 to 2.2 percent for retention trees within the range of retention levels proposed for the proposed project. Approximately 70 percent of the mortality in any period would initially result in the formation of snags and 30 percent would produce down wood (Busby *et al.* 2006).

Based on the literature cited above, a conservative estimate of mortality of ten percent per decade for retention trees for the first two decades after harvest and three percent mortality per decade in subsequent years (Lewis and Pierle 1991) is assumed. It is expected that approximately 70 percent of the mortality in any period would initially result in the formation of snags and 30 percent would produce down wood (Busby *et al.* 2006). This level of mortality would produce the amounts of snags and coarse woody debris required when implementing regeneration harvest in the GFMA (ROD/RMP, p. 34, 64-65).

Schoonmaker and McKee (1988) described a sequence of vegetation development on sites that had been regeneration harvested by clearcutting and promptly reforested in the western Cascades. Early-seral vegetative species heterogeneity and composition peaked between 15 to 20 years post-harvest with conifer dominance occurring within 20 to 30 years post-harvest.

Compared to Schoonmaker and McKee's vegetation development scenario, it is expected that the effect of unharvested adjacent stand areas and retention trees within the harvested areas would slow vegetative development rates due to their shading effects on early-seral vegetation growth (North *et al.* 1996). Individual species growth would differ based on inherent growth capability and differences in response to shading and root competition from retention trees and other vegetation, and herbivory (Harrington 2006, Di Lucca *et al.* 2004). Overall growth rates of tree regeneration are expected to be about 20 percent less than those found within clearcuts, resulting in a longer period of early-seral vegetation persistence due to delayed conifer dominance (Acker *et al*. 1998; Lam and Maguire 2011). Figure 3-2 shows stand conditions one year and 15 years post-regeneration harvest.

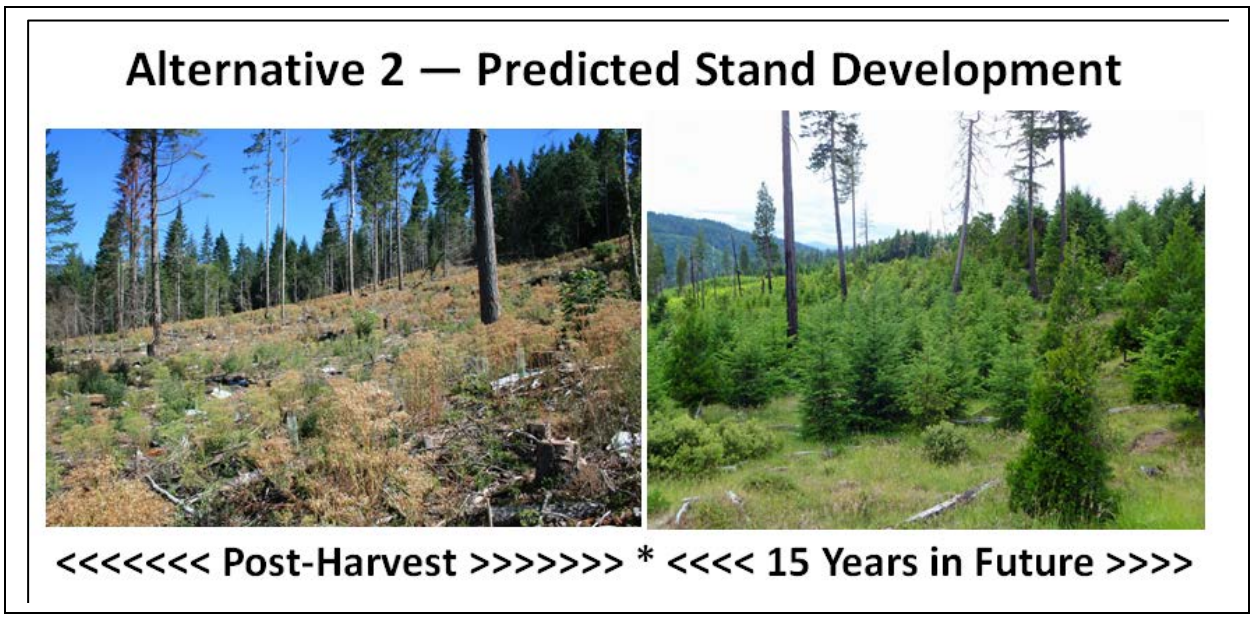


Figure 3-2. Predicted stand conditions in areas where regeneration harvest is implemented.

Planted commercial conifer species would enhance the potential for prompt development of a conifer-dominated forest stand (Tappeiner *et al.* 2007) as directed in the ROD/RMP (pp. 63, 148) and the Oregon and California Revested Lands Act (O&C Act). Mortality rates of planted conifers would be expected to range between 15 to 30 percent in the first 3 to 4 years following planting, then substantially decline after that.

Some existing natural regeneration is likely to survive within the harvested units on areas undisturbed by direct log yarding (Dyrness 1973). Establishment of natural regeneration from adjacent unharvested areas and retention trees is also likely, but not considered a reliable regeneration option for prompt reforestation (Ketchum and Tappeiner 2005).

Tables 3-6 and 3-7 display the predicted conditions for selected attributes of the modeled Back in Black stands at 20 and 50 years post-harvest. Simulations included an assumption of prompt reforestation and precommercial thinning 20 years post-harvest. Cumulative mortality expresses snag and down woody potential, principally from retention tree death.

The combination of retained overstory trees and planted/natural tree regeneration will produce stands with a distinct two-storied structure.

Table 3-6. Predicted stand conditions 20 years post-harvest in the Back in Black project area under Alternative Two (Regeneration Harvest Areas).

Unit		Trees/Acre			Quadratic Mean Diameter	Basal Area (feet^2/ac)	% Basal Area (minor spp.)	Canopy Cover (Percent) >6" DBH	Cumulative Mortality Trees/Acre ≥ 16" DBH	Cumulative Mortality (feet^3/acre)
		All[1]	≥ 6" DBH	≥ 20" DBH						
24-4-1D		259	7	7	6	53	<1	< 40	2	262
24-4-1E		259	7	7	7	38	4	< 40	2	266
24-3-5C, 5 D, 5E[2]		259	7	7	6	53	10	< 40	2	269
24-3-7D		259	7	7	6	50	20	< 40	2	262
24-4-13E		259	7	7	6	49	15	< 40	2	299
25-4-17A[3]	a	259	7	7	6	56	2	< 40	2	269
	b	259	7	7	6	45	<1	< 40	2	261
24-3-17D		259	7	7	7	62	3	< 40	2	309

[1] Includes all sizes of trees.
[2] Unit 24-3-5C, 5D, and 5E are all part of the same FOI.
[3] Unit 25-4-17A has two FOI's represented by the acreages as listed: a = 139 acres, b = 5 acres

Table 3-7. Predicted stand conditions 50 years post-harvest in the Back in Black project area under Alternative Two (Regeneration Harvest Areas).

Unit		Trees/Acre			Quadratic Mean Diameter Trees	Basal Area (feet^2/ac)	% Basal Area (minor spp.)	Canopy Cover (Percent) >6" DBH	Cumulative Mortality Trees/Acre ≥ 16" DBH	Cumulative Mortality (feet^3/acre)
		All[1]	≥ 6" DBH	≥ 20" DBH						
24-4-1D		233	212	7	14	240	3	76	2	523
24-4-1E		224	204	7	15	284	7	80	2	645
24-3-5C, 5 D, 5E[2]		233	210	7	13	215	16	77	2	503
24-3-7D		187	183	7	13	170	33	76	2	535
24-4-13E		225	209	7	14	230	71	77	2	742
25-4-17A[3]	a	232	210	7	13	229	5	77	2	535
	b	233	215	7	11	162	4	73	2	466
24-3-17D		243	213	7	14	251	4		2	624

[1] Includes all sizes of trees.
[2] Unit 24-3-5C, 5D, and 5E are all part of the same FOI.
[3] Unit 25-4-17A has two FOI's represented by the acreages as listed: a = 139 acres, b = 5 acres

Road Activities

Alternative Two would implement road activities including construction, maintenance, renovation, and decommissioning. Existing road surfaces maintained for continuing access would be kept relatively free of vegetation. Additionally, encroachment from vegetation adjacent to the road prism would be discouraged on maintained roads. Decommissioned road surfaces would revegetate over time and/or be subject to encroachment by adjacent trees and shrubs which would utilize the growing space provided. Complete revegetation and encroachment processes may take one or more decades (Figure 3-3).

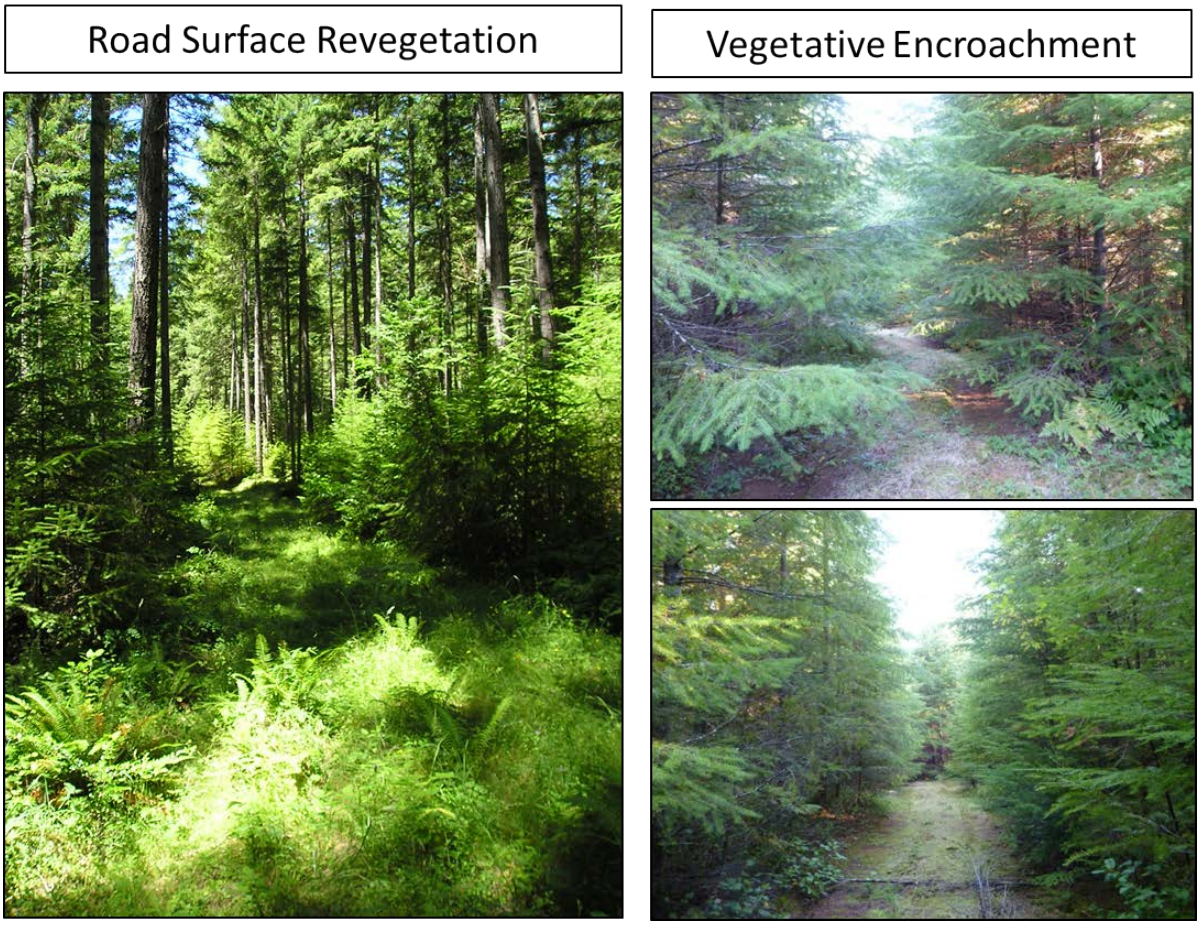


Figure 3-3. Examples of a decommissioned road surface revegetating over time (left) and vegetative encroachment of decommissioned roads by adjacent trees and shrubs (right).

Cumulative Effects

The cumulative effects analysis area for timber resources includes BLM-administered land in the Calapooya Creek watershed. Age class distribution within the GFMA land use allocation is used to assess cumulative effects on vegetation/timber resources, allowing comparison with ROD/RMP desired conditions. Private lands within the watershed are not considered, as they are not a component of sustained yield management on BLM-administered lands.

The Back in Black analysis includes 530 acres of regeneration harvest that would shift acres from the late -seral stage to the early-seral stage. The seral stage changes from the Calapooya Creek Harvest Plan project alone were one percent, going from late-seral to early-seral. The cumulative effects on GFMA age class distribution when considering treatments proposed in Alternative Two of the Back in Black analysis and the proposed Calapooya Creek Harvest Plan Environmental Assessment (USDI BLM 2015) are displayed in Table 3-8. Both projects shift GFMA lands toward the desired condition of balanced seral stages (age classes) acreage. The proposed Calapooya Creek Harvest Plan regeneration harvest acres are included in Table 3-8.

Table 3-8. Seral Stage Classes in the General Forest Management Areas on BLM-administered Lands in the Calapooya Creek Watershed Post-Implementation of Back in Black and Calapooya Projects[1].

Seral Stages	Age of Stands	Forested Acres	Percent
Early-Seral Stage	0-15	595	11
Mid-Seral Stage	15-40	1,645	29
Late-Seral Stage	40-100	1,776	31
Mature-Seral Stage	100-200	1,093	19
Old-Growth	200+	539	10
Totals		5,648	100

[1]This includes the effects of the planned regeneration harvest timber sales in the Back in Black Environmental Analysis and the Calapooya Creek Harvest Plan Environmental Analysis.

Other proposed and ongoing management activities such as commercial thinning, pre-commercial thinning, pruning, manual stand maintenance and roadside fuels reduction would also occur in the analysis area. These activities have no cumulative effects on age class/seral stage distribution because they do not change stand conditions sufficiently to affect them.

3.4. Wildlife

3.4.1. Introduction

This section includes three principal categories (Special Status Species, Survey and Manage Species, and Landbirds) of terrestrial wildlife species addressed in the planning and implementation of BLM management actions.

Special Status Species

Special Status Species addressed in this EA include federally-listed threatened or endangered species under the Endangered Species Act (ESA); and species managed as sensitive under BLM Manual 6840 policy, which includes candidate species or species proposed for Federal listing, under the ESA and Bureau sensitive species. One Special Status Species is also designated for management under the Survey and Manage standards and guidelines and is discussed there, because the management considerations are more directive.

Threatened and Endangered Species

Two federally threatened species occur on the Roseburg District. The proposed project is outside of the distribution range of the marbled murrelet (*Brachyramphus marmoratus*) and therefore, the Back in Black project would have no effect to the species or its critical habitat. Thus, the northern spotted owl *(Strix occidentalis caurina)* is the only ESA-listed terrestrial species in the proposed project area.

Bureau Sensitive Species

Twenty-six (26) Bureau Sensitive wildlife species known or suspected to occur on the Roseburg District were considered in this analysis. Appendix C: *Bureau Sensitive & Bureau Strategic Wildlife Species* contains a summary of general habitat requirements, status of species within the project area, and specific habitat impacts of the proposed action on each of the species (Table C-1).

All 26 of the species are eliminated from detailed discussion for reasons documented in Appendix C: Wildlife, Table C-1.

Survey and Manage Species

The second category consists of wildlife species designated for protection under the Survey and Manage Standards and Guidelines established in the Northwest Forest Plan (USDA and USDI 1994b).

The December 2003 species list (except for changes/removals made in 2001 and 2003 to the red tree vole) (USDI BLM 2014) applies to the Back in Black project (Chapter 1, Section 1.8.3). Of the five Survey and Manage species on the Roseburg District, the red tree vole is analyzed in detail in this EA, as well as summarized in Appendix D: *Survey and Manage Wildlife Species* (Table D-1) and in Appendix I: *Red Tree Vole Non-High Priority Site Evaluation*. The remaining four species are eliminated from detailed discussion for reasons documented in Appendix D: *Survey and Manage Wildlife Species*, Table D-1.

Landbirds

The third category consists of bird species subject to protection under the Migratory Bird Treaty Act of 1918, as amended; the Bald and Golden Eagle Protection Act, "Birds of Conservation Concern," focal species identified by Partners In Flight in the Habitat Conservation for Landbirds in the Coniferous Forests of Western Oregon and Washington (Altman and Alexander 2012), and "Game Birds Below Desired Condition," as defined by the FWS, and are included in Appendix E – Landbirds, Table E-1.

All of western Oregon lies within the Northern Pacific Forests Bird Conservation Region (USDI FWS 2008b). Within this region there are several species of landbirds which have been exhibiting downward population trends for several years and some appear to be vulnerable to forest management actions. These species of concern have been recognized by the FWS as "Birds of Conservation Concern" and "Game Birds Below Desired Condition" (USDI FWS 2008b). Additionally, within Oregon and Washington, the Partners in Flight program recognized several land bird species as "Priority Species" and "Focal Species" (Altman and Alexander 2012).

Golden Eagle

The golden eagle is protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Birds of Conservation Concern

The most recent "Birds of Conservation Concern" list (USDI FWS 2008b) identifies 32 species of concern in Region 5 (North Pacific Rainforest), an area that includes the Roseburg District BLM. Of those 32 species, there are 10 species that occur on the Roseburg District. These species are priorities for conservation action, with the goal to prevent or remove the need for ESA listings by implementing proactive management and conservation actions. It is anticipated that by focusing attention on these highest-priority species, as well as habitats and ecological communities upon which these species depend, would thereby contribute to healthy avian populations and communities.

Of the 10 species on District, 7 species are suspected or known to occur within the project area. General effects to habitat are addressed in this EA and specific habitat effects to each species are addressed in Table E-1 in Appendix E.

Focal Avian Species

Partners in Flight is an international coalition of government agencies, conservation groups, academic institutions, private organizations, and citizens dedicated to long-term maintenance of healthy populations of native landbirds. The primary goal of Partners in Flight Landbird Conservation Planning is to ensure long-term maintenance of healthy populations of native landbirds. Their *Conservation Strategy for Landbirds in Coniferous Forests of Western Oregon and Washington* (Altman and Alexander 2012) provides information on suitable habitat used by each focal species native to the Pacific Northwest. This conservation strategy document is used as a guide by the BLM, which provides information on suitable habitat for each focal species native to the Pacific Northwest and provides information (if available) on how these species may respond to management of conifer forest habitats. By managing for a group of species (i.e. focal species) representative of important components in a functioning coniferous forest ecosystem, many other species and elements of biodiversity would also be conserved.

The conservation strategy identifies 20 focal species to consider during forest management actions (Altman and Alexander 2012). Of the 20 species, 18 species would be expected to occur within the proposed project area, including within the proposed units and/or within adjacent habitat (Appendix E: Landbirds, Table E-1). Due to an absence of habitat, the black swift *(Cypseloides niger)* and the Lincolon's sparrow *(Melospiza lincolnii)* are not expected to occur within the project area.

Ten of the 17 species are known or suspected to be present within the proposed harvest units. These species are also associated with mature and old growth forests adjacent to proposed units. The remaining seven species are associated specifically with either early seral (three species) or mature and old growth forests (four species) habitats. General effects to habitat are addressed in this EA and specific habitat effects to each species are addressed in Table E-1 in Appendix E.

Game Birds Below Desired Condition

Game Birds Below Desired Condition identifies six species documented or suspected on the Roseburg District. Three of the six game bird species, including the mourning dove *(Zeneida macroura*), wood duck *(Aix sponsa),* and band-tailed pigeon *(Columba fasciata)* are suspected or known to occur within the vicinity of the Back in Black project area, however, the wood duck and mourning dove would not be expected within the unit boundaries because their habitats are not present.

Because it is associated with conifer forest habitat, the band-tailed pigeon is the single game bird species expected to occur within or adjacent to the Back in Black harvest units. This species is also identified as a focal avian species and addressed previously and in Appendix E, Table E-1, therefore, *Game Birds below Desired Condition* will not be discussed in further detail.

3.4.2. Affected Environment

3.4.2.1. Methodology

Special Status Species

Threatened and Endangered Species

The analysis area for the northern spotted owl is the extent defined by a composite of a 1.2-mile radius around proposed timber sale units and home-range diameter circles around the most recent occupied northern spotted owl activity centers (Appendix A, Figure A-13). For the Back in Black project, due to the distribution of the units there are two Analysis Areas for the northern spotted owl (Appendix A, Figure A-13): 1) the Black in Black Analysis Area encompasses eight of the nine proposed units, and 2) the Little Hoss Analysis Area encompasses Unit 25-4-17A (Figure A-13). Environmental effects to the northern spotted owl were considered at the 50 year post-harvest temporal scale.

Survey & Manage Species

The red tree vole analysis area includes three sixth-field watersheds (Appendix I, Figure I-11). These sixth-field watersheds were selected as the analysis area because they share similar ownership patterns and red tree vole habitat conditions within the general area; contain the high-quality red tree vole habitat affected by proposed actions; allow for appropriate analysis of habitat connectivity and habitat distribution; and when combined, these sixth-field watersheds (78,372 acres) approximate the size of an average fifth-field watershed in the range of the species (Appendix I, Table I-3). Environmental effects to the Survey & Manage Species were considered at the 50 year post-harvest temporal scale.

Landbirds

The conservation priority for coniferous forests is forest management that provides habitat conditions and attributes for focal and/or declining species at site and landscape scales. Environmental effects to habitat for Landbirds were qualitatively analyzed at a unit-by-unit spatial scale and 20 year post-harvest temporal scale. At the landscape scale, the Landbirds analysis area includes BLM-administered lands in the fifth-field watersheds in the Western Cascades within the Swiftwater Resource Area. BLM-administered lands within the Landbirds analysis area currently provide approximately 119,000 acres of forest habitat. Refer to Appendix E, Table E-1 for species specific information.

Cumulative Effects

Environmental effects for Special Status Species and Survey and Manage Species were qualitatively and quantitatively analyzed at a fifth-field watershed level (HUC10), to determine impacts to forest habitat from 2004 to 2017 for reasonably foreseeable future actions.

3.4.2.2. Special Status Species

Threatened and Endangered Species

Northern Spotted Owl (Federally Threatened)

For this analysis, northern spotted owl habitat is categorized into two types: 1) suitable and 2) dispersal. Although suitable habitat also functions as dispersal habitat, these terms are used separately for this analysis.

Suitable Habitat

In general, forested stands 80 years and older that provide nesting, roosting, and foraging habitat (NRF) is commonly referred to as suitable habitat. Suitable habitat contains the following structural components that distinguish superior suitable northern spotted owl habitat from less suitable habitat (as described by Thomas *et al*. (1990)):

- a multi-layered, multi-species canopy dominated by large (>30 inches DBH) conifer overstory trees, and an understory of shade-tolerant conifers or hardwoods;
- a moderate to high canopy cover (60 to 80 percent);
- substantial decadence in the form of large, live coniferous trees with deformities – such as cavities, broken tops, and dwarf mistletoe infections;

- numerous large snags;
- ground-cover characterized by large accumulations of logs and other down wood; and
- a tree canopy that is open enough to allow owls to fly within and beneath it.

Approximately 1,783 acres (9 percent of all ownerships) of suitable habitat occurs on Federal lands within the Analysis Areas.

With the exception of Units 24-3-5E and 24-3-17D, approximately 13 acres of suitable habitat present within the initial unit boundaries were dropped and are not proposed for harvest because of the following two reasons:

1. Four (4) acres were contiguous with adjacent stands considered older and more structurally complex multi-layered conifer forest habitat as defined under Recovery Action 32 in the Revised Recovery Plan for the Northern Spotted Owl (USDI FWS 2011a, pp. III-66-III-67). As recommended in the Recovery Plan, acres of habitat were dropped in order to maintain this high quality habitat on the landscape.

2. Nine (9) acres were high quality red tree vole habitat containing active nest sites and therefore, retained for species persistence; although this stand did not meet the habitat definition under Recovery Action 32, this stand does contain nesting, roosting, and foraging habitat for the northern spotted owl.

Based on field review, of the 530 acres in the proposed unit boundaries analyzed in detail in this EA, approximately 14 acres are considered suitable habitat because these areas contain large trees, snags, down wood, and/or more than one canopy layer, these include 12 acres of Unit 24-3-5E and 2 acres of Unit 24-3-17D. However, the suitable habitat in these units was not considered more structurally complex multi-layered conifer under Recovery Action 32 because previous harvest had simplified the stand by removing one or more components (i.e. largest and oldest trees).

Dispersal Habitat

Dispersal habitat is defined by Thomas *et al.* (1990) as conifer-dominated forest stands with canopy cover of 40 percent or greater and an average diameter at breast height of 11 inches or greater. Conifer-dominated forest stands approximately 40 to 79 years old, such as the stands proposed for regeneration harvest in the Back in Black project area, provide dispersal habitat. Dispersal habitat may contain snags, coarse down wood, and prey sources, which are habitat components allowing northern spotted owls to move and forage between blocks of suitable habitat (USDI FWS 2008a). Dispersal habitat is essential for the movement of juvenile and non-territorial (e.g. single birds) northern spotted owls to fill territorial vacancies and provide adequate gene flow across the range of the species (USDI FWS 2008a).

Approximately 2,437 acres (12 percent of all ownerships) of dispersal habitat occur on Federal lands within the Analysis Areas.

Of the 530 acres proposed for harvest, 516 acres are considered to be northern spotted owl dispersal habitat because the stands contain relatively small tree sizes (quadratic mean diameter 11 to 22 inches), relatively moderate tree densities *(*Chapter 3, Section 3.3.1., Table 3-2), and lacks suitable habitat components (i.e. nest structure, large snags, large trees, and multiple canopy layers).

Prey Species

Habitat use by northern spotted owls is influenced by prey availability (Ward 1990, Zabel *et al.* 1995). The composition of the northern spotted owl's diet varies geographically and by forest type, but it is primarily comprised of small mammals. Flying squirrels (*Glaucomys sabrinus*) are the most prominent prey for northern spotted owls in Douglas-fir and western hemlock forests (Forsman *et al.* 1984) and are the key prey species for northern spotted owls in the Back in Black project area. Flying squirrels are associated with several habitat components including high canopy cover, large trees, snags, abundant coarse down wood, understory cover, patch-level changes in vegetation composition, and availability of fungi (Wilson 2008).

Woodrats and other prey species of the northern spotted owl, such as red-backed voles, rabbits, Douglas squirrels, chipmunks, and deer mice are associated with early- and mid-seral forest habitat (Maser *et al.* 1981, Sakai and Noon 1993, Carey *et al.* 1999) and comprise nearly 50 percent of the prey biomass (Forsman *et al.* 2004).

Some units have well-developed understories with patches of hardwoods and shrubs, and are expected to be used by flying squirrels. During field review, there was very little evidence of use (i.e. stick house mounds) by dusky-footed woodrats and bushy-tailed woodrats within the stands, but both species are expected to be present.

Most wildlife species, including northern spotted owls and their prey, use snags greater than 18 inches DBH to provide multiple life-cycle needs (Mellen-McLean *et al*. 2009). Small diameter snags are used primarily as foraging habitat by wildlife (Hagar 2008, Mellen-McLean *et al*. 2009). In addition, at least 10 percent coarse down wood cover is needed to ensure high northern spotted owl prey populations in southwestern Oregon Douglas-fir forests (Carey *et al.* 1999). Table 3-3 *(*Chapter 3, Section 3.3.1.) shows the number of snags less than 20 inches DBH averages 0.2 snags per acre and snags at least 20 inches DBH averages 0.1 snags per acre within the Back in Black project area. The analysis in the Draft Resource Management Plan/Final Environmental Impact Statement (herein 2016 Final RMP) determined the average number of snags per acre by structural stage and structural group using data from BLM's current vegetation survey (CVS) plots (USDI BLM 2016). In general, the proposed units would be expected to contain an average of 19.7 snags per acre for all sizes of snags, with 1.4 snags per acre > 20 inches DBH (USDI BLM 2016; Appendix S; Table S-22; p. 1660). Comparing the values in Table 3-3 (Chapter 3, Section 3.3.1.) to those values in the 2016 Final RMP, the snag densities for prey species within the proposed units are well below the average snag density for all snags sizes, as well as, for large snags (> 20 inches).

The Umpqua Basin Terrestrial Wildlife Level 1 Team has determined that the down wood cover target-level sufficient to support high northern spotted owl prey populations is 10 percent (USDI FWS 2016). Based on general observations during field review, individual pieces or pockets of large down wood were observed within some of the units. The 2016 Final RMP determined the average percent down woody material cover within mature stands with a single-layered canopy, which best represents the forest structural stage within the units, is 4.5 percent (USDI BLM 2016; Appendix S; Table S-27; p. 1662). Based on fuel loading estimates of 11-20 tons per acre (Chapter 3, Section 3.8.2.1.), down wood material present in the units is estimated at approximately 1- 3 percent cover. The estimated percent down wood material cover is currently below the 10 percent cover target-level needed to support high northern spotted owl prey populations within these stands.

Site Occupancy

A northern spotted owl activity center is defined as a known or historic nest tree location with evidence of use by an individual or pair of northern spotted owls. There may be one or more activity centers within a northern spotted owl territory. The analysis in this EA was based on the most recently occupied northern spotted owl site associated with each territory in the Analysis Areas.

With the exception of surveys being completed annually at the Mill Creek MS site since 2002, the BLM did not complete protocol surveys for northern spotted owls within the Back in Black project area from 2001 through 2007. Beginning in 2008, random visits to historic sites were completed within the Back in Black project area to establish occupancy status in years prior to beginning protocol surveys. Consecutive annual protocol surveys were then completed from 2013-2015. Table 3-9 summarizes the status of the northern spotted owl sites from 2010 to 2015, including occupancy and reproduction.

All suitable habitat within 1.2 miles of the proposed units had at least two consecutive years of protocol surveys at the end of the 2015 breeding season. In subsequent years and as funding is available, full protocol surveys are planned to continue through the first year of the harvest contract and would be followed, as needed, by spot check surveys as described in the survey protocol within 0.25 mile of proposed units during the final two years of the harvest operations (USDI FWS 2012a).

There are a total of eight historic northern spotted owl activity centers within the Back in Black Analysis Area. However, of the eight spotted owl activity centers, four have been removed as a result of timber harvest including: 1) the original site (IDNO 0355O) and first alternate activity center (IDNO 0355A) associated with Gossett Creek, were on BLM-administered lands within the same section and harvested prior to 1992; and 2) the original (IDNO 3900O) and second alternate activity center (IDNO 3900B) associated with the Mill Creek MS site were located on private lands east of the remaining two activity centers.

There is one activity center (Sunset View – IDNO 3100A) present within the Little Hoss Analysis Area and two northern spotted owl activity centers (Gossett Creek- IDNO 0355B and Mill Creek MS – IDNO 3900C) present within the Back in Black Analysis Area (Table 3-9; Appendix A, Figure A-13). The remaining Mill Creek MS activity center alternate (IDNO 3900A) is located within the same stand as the current activity center 3900C.

Based on northern spotted owl survey results to date, the closest known northern spotted owl activity center, Gossett Creek, is located 0.4 miles (640 yards) east of Unit 24-3-7D (Appendix A, Figure A-13). The Sunset View site is located just over one mile (1,947 yards) to the southwest of Unit 25-4-17A, and the two Mill Creek MS alternate activity centers are each located slightly under one mile (approximately 1,700 yards) from proposed Unit 24-4-1E.

Based on pre-disturbance survey efforts within the Back in Black Analysis Area, the Mill Creek MS site has been determined to be unoccupied by northern spotted owls since 2013 (Table 3-9). As of 2015, the Gossett Creek site was occupied by a northern spotted/barred owl hybrid and is paired with a barred owl. As of 2014, both sites were determined to be occupied by barred owls, which were first detected in 2004 and 2007 in the Mill Creek MS and the Gossett Creek territories, respectively. Within the Little Hoss Analysis Area, the Sunset View site had a pair of non-nesting northern spotted owls in 2014 and 2015.

Table 3-9. Site Status for Northern Spotted Owl for the proposed Back in Black Project.

SITE NAME	IDNO[1]	YEAR SITE ESTABLISHED	NSO STATUS SUMMARY		
			LAST YEAR OF KNOWN PAIR STATUS[1]	LAST YEAR OF KNOWN NESTING/ REPRODUCTION[1]	SUMMARY OF SITE STATUS 2009-2014
GOSSETT CREEK	0355B	1983	1990 (0355A)	1983 (0335O)	Occupied by Northern Spotted / Barred Owl Hybrid x Barred Owl (2015) Unoccupied (2013-2014) Unknown (2010-2012)[2]
MILL CREEK MS	3900C	1992	2004	2002	Unoccupied (2010, 2013-2015) Resident Single (2011-2012)
SUNSET VIEW	3100A	1993	2015	1996	Pair (2014-2015) Unknown (1998-2011)[3]

[1]Only includes IDNOs (activity centers) within Analysis Areas. However, additional alternate activity centers associated with a northern spotted owl territory that occurs outside of the analysis area may be identified in the summary for pair status, nesting status, and reproduction status for the site.
[2] Unknown status = site was surveyed, but not to protocol, and no owls were detected during surveys.
[3] Site occupancy status was unknown because the site was not surveyed during the years indicated.

Habitat at Analytical Spatial Scales

Habitat at analytical spatial scales are used to determine habitat condition for a known northern spotted owl site and is generally assessed by evaluating available suitable and dispersal habitat at four analytical scales: physiographic province, home range (1.2-mile radius), core area (0.5-mile radius), and nest patch (300-meter radius). The most recently occupied activity center and its corresponding nest patch, core area, and home range were used to determine habitat impacts for each northern spotted owl site within the proposed Back in Black project area.

Physiographic Province

Physiographic provinces also serve as Recovery Units as identified in the Final Revised Recovery Plan for the Spotted Owl (USDI FWS 2011a, p. III-1). The proposed Back in Black project lies within the Western Oregon Cascades Physiographic Province which encompasses 6.64 million acres. The intended function of this Recovery Unit, inclusive of the Action Area, is to support high quality northern spotted owl suitable and dispersal quality habitats.

The recovery plan identified threats to the northern spotted owl which were ranked by importance within each province. As a result, the West-side provinces, including the Western Oregon Cascades, generally ranked high on threats from the negative effects of habitat fragmentation and ongoing habitat loss as a result of timber harvest. However, of the 12 physiographic provinces within in the range of the northern spotted owl, the Western Oregon Cascades province was determined to have the fewest number of threats (USDI FWS 2011a, p. I-7).

Table 3-10 presents environmental baseline acres of suitable habitat within the Western Oregon Cascades physiographic province.

Table 3-10. Environmental Baseline of Habitat within the Western Cascades Physiographic Province.

Physiographic Province	All Lands	Suitable Habitat on Federal Lands[1]					
		BLM		USFS		Total	
	Acres	Acres	Percent	Acres	Percent	Acres	Percent
Western Cascades	6,640,784	2,112,585	32	2,371,400	36	4,483,985	68

[1]Data obtained from USDI BLM 2016, p. 1772.

Home Range

Home range size varies by physiographic province. The northern spotted owl home range in the Western Cascades Province is a 1.2-mile radius circle centered on an activity center, encompassing 2,895 acres, and is used by northern spotted owls for nesting, roosting, and foraging (Thomas *et al.* 1990 and Courtney *et al.* 2004). The home ranges of several northern spotted owl pairs may overlap with the habitat shared by adjacent owl pairs and other non-territorial owls. The home range is important for the survival and productivity of northern spotted owls because they are non-migratory birds that remain within their home range year-round (Thomas *et al.* 1990).

Available science suggests that as the amount of suitable habitat in a northern spotted owl's home range decreases, so does site occupancy, reproduction, and survival (Bart and Forsman 1992, Bart 1995, Forsman *et al.* 2005). Based on the studies cited above, suitable habitat of at least 40 percent or higher at the home range scale is necessary for maintaining northern spotted owl life history functions, although site-specific conditions may warrant deviations from this guideline. Bart and Forsman (1992) found that areas with less than 20 percent suitable habitat had few northern spotted owls and less reproductive success than areas with more suitable habitat. Additionally, Bart (1995) concluded that northern spotted owl reproduction and survival decreased as suitable habitat decreased from 40 to 20 percent.

The suitable habitat threshold of 1,158 acres is considered necessary to maintain northern spotted owl life functions, and is 40 percent of the total home range acres (Thomas *et al.* 1990 and Courtney *et al.* 2004). Table 3-11 demonstrates that both home ranges within the Back in Black Analysis Area are below the viability threshold of 40 percent suitable habitat, at 9 and 14 percent for Gossett Creek and Mill Creek MS, respectively. The Sunset View site within the Little Hoss Analysis Area has approximately seven percent suitable habitat and is below the viability threshold of 40 percent.

Table 3-11 presents environmental baseline acres of suitable habitat and dispersal habitat within each analytical spatial scale for the three known northern spotted owl sites located within the Back in Black Project Area (Appendix A, Figure A-13).

Table 3-11. Environmental Baseline of Habitat at each Spatial Scale on BLM-administered Lands for the Northern Spotted Owl within the Analysis Area.

SITE NAME	NEST PATCH (70 ACRES) [1]			CORE AREA (500 ACRES) [1]			HOME RANGE (2,895 ACRES) [1]		
	BLM LANDS	SUITABLE	DISPERSAL	BLM LANDS	SUITABLE	DISPERSAL	BLM LANDS	SUITABLE	DISPERSAL
	ACRES			ACRES *[PERCENT ACRES]*			ACRES *[PERCENT ACRES]*		
GOSSETT CREEK *IDNO 0355B*	66	39	16	306 *[61%]*[2]	129 *[26%]*[2]	22	923 *[32%]*[2]	263 *[9%]*[2]	333
MILL CREEK MS *IDNO 3900C*	38	29	0	212 *[42%]*[2]	130 *[26%]*[2]	38	1,336 *[46%]*[2]	405 *[14%]*[2]	505
SUNSET VIEW *IDNO 3100A*	50	5	0	206 *[41%]*[2]	91 *[18%]*[2]	0	739 *[26%]*[2]	210 *[7%]*[2]	237

[1] Total acres within the spatial scale being analyzed in GIS: Nest patch= 700-meter radius; Core-Use Area = 0.5-mile radius; and Home Range = 1.2-mile radius.
[2] Percent based on the total BLM acres within the spatial scale being analyzed.
[3] Percent based on total BLM acres of respective habitat present within the spatial scale being analyzed.

A total of 254 acres, including 14 acres of suitable habitat and 240 acres of dispersal habitat within 7 of the 9 proposed units are located within the home range of one or more northern spotted owl activity centers (Table 3-12; Appendix A, Figure A-13).

Table 3-12. Northern Spotted Owl Habitat by Unit and Analytical Spatial Scales within the proposed Back in Black Units under Alternative Two.

UNIT	UNIT (ACRES) WITHIN EACH NSO SPATIAL SCALE									TOTAL
	5C	5D	5E	7D	17D	1D	1E	13E	17A	
UNIT ACRES	*161*	*8*	*15*	*18*	*39*	*31*	*22*	*94*	*142*	*530*
HABITAT TYPE										
DISPERSAL HABITAT	161	8	3	18	37	31	22	94	142	516
SUITABLE HABITAT	0	0	***12*** [1]	0	***2*** [1]	0	0	0	0	***14*** [1]
ANALYTICAL SCALE										
HOME RANGE	17	0	***12*** [1]	18	***2*** [1]	0	21	43	141	***254*** [1]
CORE AREA	0	0	0	12	0	0	0	0	0	12
NEST PATCH	0	0	0	0	0	0	0	0	0	0

[1] Regular font indicates dispersal habitat. ***Bold italicized*** **font indicates suitable habitat is included in total acres**.

Core Area

The northern spotted owl core area is a 0.5-mile radius circle centered on an activity center, encompassing an area of approximately 500 acres. The core area is used to describe the area most heavily utilized during the nesting season (USDI FWS 2008a). Core areas are defended by territorial northern spotted owls and generally do not overlap with other northern spotted owl pairs. The suitable habitat threshold considered essential to maintain northern spotted owl life functions is 50 percent (250 acres) of the core area (Irwin *et al.* 2005, Glenn *et al.* 2004, and Carey *et al.* 1992). Approximately 13 acres of dispersal habitat are proposed for regeneration harvest within one core area (Table 3-14).

Nest Patch

The 70-acre nest patch is centered within the core area and represented by a circle with a 300-meter radius, centered on the nest tree (Perkins 2000; Swindle *et al*. 1997; Miller 1989). The proposed Back in Black project would not occur within a nest patch (Table 3-11 and Table 3-12). Nest patches will not be discussed further in this analysis.

Known Owl Activity Center (KOAC)

A KOAC is a designation on Matrix lands, of approximately 100 acres of the best northern spotted owl habitat near, and usually encompassing, nest sites known as of January 1, 1994 (ROD/RMP, pp. 34 and 48). The KOACs are managed as unmapped Late-Successional Reserves (ROD/RMP, p. 29) and timing restrictions for activities are applied to eliminate disturbance to nesting northern spotted owls (ROD/RMP, p. 48).

There are two designated Known Owl Activity Centers (KOAC) within the Analysis Areas for the northern spotted owl. The KOAC associated with the Gossett Creek northern spotted owl site within the Back in Black Analysis Area, which includes the nest site (IDNO 0355B) analyzed in this assessment, is located adjacent to proposed Unit 24-3-7D and occupied by a northern spotted/barred owl hybrid and barred owl. The KOAC associated with the Sunset View site is currently occupied by barred owls.

Disruption

Noise, human intrusion, and mechanical movement may cause some form of disruption or disturbance to the normal behavioral patterns of nesting northern spotted owls. The **disruption threshold** is the distance activities occurring during the critical breeding period could disrupt the normal behavior pattern of an individual or breeding pair (i.e. flushing from a nest or cause a feeding attempt to fail) (USDI FWS 2003).

Critical Habitat

Critical habitat is the habitat in a specific geographical area designated by the FWS as containing the physical and biological features essential to the conservation of a species.

The proposed harvest units are not located in critical habitat for the northern spotted owl and therefore, there are no concerns for critical habitat and will not be discussed further in this analysis.

Two Principle Threats to the Northern Spotted Owl

The two main threats to the northern spotted owl's continued survival are 1) habitat loss from timber harvest and catastrophic wildfire, and 2) competition from the barred owl for habitat and prey (USDI FWS 2011a, I-6 through I-9).

Habitat Loss

Lint (2005) indicated that the Northwest Forest Plan recognized wildfire as an inherent part of managing northern spotted owl habitat in certain portions of the range. He further noted that loss of northern spotted owl habitat did not exceed the rate expected under the Northwest Forest Plan, and that habitat conditions were no worse, and perhaps better than expected. In particular, the percent of existing northern spotted owl habitat removed by harvest during the first decade was considerably less than expected.

Courtney *et al.* (2004) also identified the primary source of habitat loss as catastrophic wildfire. Although the total amount of habitat affected by wildfires has been small, there is concern for potential losses associated with uncharacteristic wildfire in a portion of the species range. Courtney *et al*. (2004) noted that the risk to northern spotted owl habitat from uncharacteristic stand replacement fires is sub-regional, confined to the dry eastern and to a lesser extent the southern fringes of the northern spotted owl range. Wildfires accounted for 75 percent of the natural disturbance loss of habitat estimated for the first decade of Northwest Forest Plan implementation.

Courtney *et al.* (2004) also indicated that models of habitat growth suggested significant in-growth and development of habitat throughout the Federal landscape.

Barred Owl

Barred owls (*Strix varia*) are native to eastern North America, but have moved west into northern spotted owl habitat. The barred owl's range now completely overlaps that of the northern spotted owl (Gutiérrez *et al.* 2004). The barred owl is considered a threat to the northern spotted owl because it is a direct competitor for prey and habitat and largely excludes northern spotted owls from their territories, especially during the breeding season (Hamer *et al.* 2007).

Barred owls are considered generalists and make use of a variety of vegetation and forage species (Wiens 2014). Existing evidence suggest that barred owls compete with northern spotted owls for habitat and prey with near total niche overlap and that interference competition (Dugger *et al.* 2011, Van Lanen *et al.* 2011, Wiens 2014) is resulting in increased northern spotted owl site abandonment, reduced colonization rates, and likely reduction in reproduction (Olson *et al.* 2005, Dugger *et al.* 2011, Forsman *et al.* 2011, Wiens 2014), ultimately resulting in probable range-wide population reductions (Forsman *et al*. 2011). Barred owl effects on northern spotted owl survival and colonization appear to be substantial and additive to effects of reduction and fragmentation of habitat in northern spotted owl home range area. The magnitude of the barred owl effect may increase somewhat as habitat quantity decreases and fragmentation increases (Dugger *et al.* 2011).

The Wiens *et al.* (2014) study did not find evidence that the two species differed in their use of young, mature, and riparian-hardwood forest types. Additionally, similarities between northern spotted owls and barred owls were observed in resource use indicating a high potential for exploitative competition, especially in times of low prey abundance or in cases where individuals shared overlapping foraging areas (Wiens *et al.* 2014). However, Olsen (1999) suggests that because barred owls are generalist predators, habitat selection may be influenced more by prey availability than by a strong affinity for any specific

type of forested habitat. Northern flying squirrels, woodrats, and lagomorphs (i.e. brush rabbits) were primary prey for both owl species, accounting for 81 percent and 49 percent of total dietary biomass for northern spotted owls and barred owls, respectively (Wiens *et al.* 2014).

It has been established that activities that reduce the quantity of older forests adjacent to northern spotted owl activity centers reduce the probability of continued occupancy, survival, and reproduction (Franklin *et al.* 2000, Olson *et al.* 2004, Dugger *et al*. 2005, Dugger *et al.* 2011, Schilling *et al.* 2013). When barred owls are present, the effect of such activities on northern spotted owl pair survival (estimated as probability of extinction of a single territory and termed "extinction probability") may be exacerbated by 2-3 times (Dugger *et al.* 2011). However, some northern spotted owls appear to be able to successfully defend territories and reproduce when barred owls are present (Dugger *et al*. 2011, Wiens *et al.* 2014), but the mechanism that allows them to persist is currently unknown.

Although barred owls and northern spotted owls use the same forest types and both appear to prefer older forests, barred owls appear to use forest stand types in proportion to their availability, while northern spotted owls are reliant on older forests (Dugger *et al*. 2011, Wiens *et al.* 2014). Manipulation of older forest stand structure through silvicultural or other means would alter habitat conditions for both the barred owl and the northern spotted owl. The relative effect on barred owls may be less because they do not appear as dependent on older forests as northern spotted owls, but there is no evidence that modification would facilitate barred owl invasion into areas as they do not appear to select disproportionately for young or low density stands (Wiens *et al.* 2014). Northern spotted owls displaced by habitat modification are unlikely to successfully establish a new territory in areas where barred owls are present (Dugger *et al.* 2011, Yackulic *et al.* 2013). Displaced northern spotted owls may survive for some period but if they are not able to establish a new territory, their contribution to the population is minimal at best.

Modeling of the relationship between northern spotted owl site extinction probability and proportion of habitat at the core scale indicates that decreasing amounts of old forest increases extinction rates for northern spotted owls, and when barred owls are detected in northern spotted owl core use areas the extinction rate is two to three times higher than it would be if barred owls were not detected. The relative effect of barred owls on extinction probability increases as proportion of older forest habitat at the core area scale decreases (Dugger *et al.* 2011). Based on the modeling done by Dugger *et al.* (2011) when there is 95 percent habitat within the core circle, the extinction probability for northern spotted owl sites is 0.11, with barred owls it increases to 0.33, at 50 percent habitat the extinction probability is ~ 0.17, increasing to ~ 0.42 with barred owl and at 20 percent it is 0.21 without barred owls, increasing to 0.5 with barred owls. This is likely because any reduction of habitat increases the effect of the habitat loss (habitat reduction plus the effect of exclusion from habitat due to barred owl competition) disproportionally.

The presence of barred owls affects detectability rates during surveys and/or social instability of northern spotted owl pairs, thus affecting occupancy, reproduction, and survival at these sites (Olson *et al.* 2005, Pearson and Livezey 2003). Barred owls were initially detected in the proposed project area in 1995.

The most recent meta-analysis of northern spotted owl data was conducted in January of 2014 (Dugger *et al.* 2016). The analysis incorporated the long history of northern spotted owl data, which includes survey and banding data on 11 individual study areas for the past 22 to 29 years (see Anthony *et al.* 2006 and Forsman *et al.* 2011). The Back in Black project is situated between four of the eleven study areas including the H.J. Andrews (~40 miles to the northeast) within the Western Cascades, the South Cascades (~45 miles to the southeast), Klamath (~30 miles south), and the Tyee (~12 miles west) within the Coast Range.

Data were analyzed for each area separately and in a meta-analysis of all areas combined. Study results indicated that northern spotted owl populations were declining throughout the range of the subspecies and that annual rate of decline was accelerating in many areas. Estimated mean annual rates of population change suggested that northern spotted owl populations declined from 1.2 percent to 8.4 percent per year depending on the study area. The weighted mean estimate of population change for all study areas was 0.962 (±0.019 standard error (SE); 95 percent confidence interval (CI): 0.925-0.999). Table 3-13 shows specific results for each of the four study areas in proximity to the Back in Black project area.

Table 3-13. Estimates, standard errors, and confidence intervals of mean annual rate of population change for northern spotted owls in 4 of the 11 study areas in Oregon.1

Study Area	Population Change (λ)	Standard Error	Confidence Interval	Annual Change
H.J. Andrews	0.965l	±0.008	0.949-0.980	-3.5%
Klamath	0.972	±0.017	0.940-1.005	-2.8%
South Cascades	0.963	±0.024	0.916-1.010	-3.7%
Tyee	0.976	±0.017	0.944-1.008	-2.4%

[1] Summarized from Table 4 in Dugger *et al.* 2016.

Based on these results, it can be assumed that the population within the project area is following these same trends and is expected to follow similar trends as documented in the H. J. Andrews study site given it is located within the Western Cascades and contains habitat conditions most similar to those within the project area. Factors likely influencing occupancy include competition with barred owls and/or the interactive effects of barred owls and habitat loss on a northern spotted owl territory (Dugger *et al.* 2016)

There is no data indicating a relationship between forest treatments or lack of treatments and an increase or decrease in the distribution of the barred owl. Independent of the proposed action, the barred owl would remain in the project area and is expected to continue increasing its distribution and numbers, displacing northern spotted owls.

3.4.2.3. Survey and Manage

Oregon Red Tree Vole

The analysis area is not located within the area covering the North Oregon Coast distinct population segment identified as a candidate for Federal Endangered Species Act protection in October 2011 (USDI FWS 2011b).

There are 2,146 acres of habitat that meet the survey protocol criteria on the BLM lands within the analysis area (methodology is discussed in Appendix I).

In addition, for BLM modeling purposes for the non-high priority site analysis, BLM stands that are between 40 and 90 years old are considered to be young forest habitat. Within the analysis area, there are 4,364 acres that fall within these age classes.

Of the 530 acres within the proposed treatment units, 516 acres are considered young forest resulting from previous regeneration harvest treatments. With the exception of 5 of the 530 acres, all of the stands proposed for harvest were previously thinned between 1999 and 2006. These stands generally are comprised of a homogenous overstory canopy of Douglas-fir and lack canopy complexity (including two (2) or more super-dominant conifer trees per acre).

The proposed harvest would occur in or adjacent to protocol-quality habitat (Appendix I, Figures I-4-I-9) that are located in the General Forest Management Area land use allocation. For the red tree vole analysis, two analysis blocks were identified (Appendix I). These red tree vole analysis blocks are located in the valley margin of the Western Cascades, separated from large areas of contiguous federal ownership by at least three (3) miles (Appendix I, Figure I-3).

- Analysis Block 1 is 376 acres of federally owned land near the north boundary of the Roseburg District and includes Unit 24-3-5E (15 acres; 12 acres of protocol-quality habitat) which is contiguous with red tree vole habitat into the southwest corner and along the south boundary of the block. This habitat is contiguous with habitat in the northeast corner of the adjacent section to the southwest (Appendix I, Figures I-4, I-6, and I-7). Block 1 is separated from other federal lands to the north and east by three to seven miles of forest managed for intensive timber production (Appendix I, Figure I-3). The block includes 55 acres of red tree vole protocol-quality habitat.
- Analysis Block 2 is 311 acres of federally owned land and includes Unit 25-4-17A (152 acres) (Figures I-5, I-8 and I-9). There are 41 acres of red tree vole protocol-quality habitat in the block. Block 2 is adjoined on all sides by private land and is separated from other federal lands to the north by approximately 12 miles and to the east by five (5) miles of forest managed for intensive timber production (Appendix I, Figure I-3). Federal lands, currently comprised of early seral forest are adjacent to the southwest corner of the block.

The BLM completed a non-high priority site designation (Appendix I) in accordance to the Survey and Manage management options described for Category C species (Uncommon Occurrence, Pre-disturbance Surveys Practical) (USFS and BLM, 2001, pp. S&G - 10). The site management proposal is included in Appendix I. Required concurrence with the U.S. Forest Service, BLM Eugene District, and the U.S. Fish and Wildlife Service was completed in 2016.

3.4.2.4. Landbirds

The appropriate avian species lists, indicated below, were reviewed for the Back in Black project. Those species and habitat that are within the project area are incorporated and effects discussed in this analysis. Table D-1 in Appendix D: *Landbirds* summarizes general habitat requirements, status of species within the project area, and impacts of the proposed action for each of the 18 Landbirds on the Roseburg District.

Golden Eagle

On the Roseburg District, the golden eagle is associated with late-successional conifer forests with multi-canopies, typically with nests trees located on steep slopes and in the largest trees of forested stands that often afford an unobstructed view of the surrounding habitat, particularly open habitats used for foraging activities.

The proposed project contains 12 acres of older forest habitat in Unit 24-3-5E which would be considered suitable nesting habitat for golden eagles. Because removal of suitable habitat and disturbances (i.e. visual and/or noise) due to timber harvest activities within 0.5-mile of a nest site during the breeding season (January – August) can cause direct disturbance to nesting golden eagles, suitable habitat outside Unit 25-4-17A and within Unit 24-3-5E was surveyed for eagle nest structures. No eagle nest structures or golden eagles were observed outside or within these units.

Birds of Conservation Concern

The olive-sided flycatcher (*Contopus cooperi*), purple finch (*Carpodacus purpureus*), rufous hummingbird (*Selasphorus rufus*), and willow flycatcher *(Empidonax traillii)* are typically associated with early seral forest habitats and are known or suspected to be present within early seral habitats adjacent to proposed units that border younger forest habitat. General effects to habitat are addressed in this EA and specific habitat effects to each species are addressed in Table E-1 in Appendix E.

Focal Avian Species

Eight of the 18 species are known or suspected to be present within the younger (< 80 years old) or mature conifer forest habitat that is present within the proposed harvest units. The remaining 10 species are associated specifically with either early seral (four species) or mature and old growth forests (four species) habitats. General effects to habitat are addressed in this EA and specific habitat effects to each species are addressed in Table E-1 in Appendix E.

3.4.3. Environmental Consequences

3.4.3.1. Alternative One – No Action

Special Status Species

Threatened and Endangered Species

Northern Spotted Owl (Federally Threatened)

Effects to Habitat

The current quality and amount of northern spotted owl habitat would be unaffected under Alternative One. Suitable and dispersal habitat would continue to function where present and develop along trajectories described in Chapter 3, Section 3.3.2.1. A majority of the stands would lose understory conifer, hardwood tree, and shrub vigor and growth as the canopy closes, although there would be variability within the stand. Small gaps within the proposed Back in Black units are developing understory diversity and complexity. These areas would continue to provide dispersal and/or suitable habitat over the next 20-50 years (Chapter 3, Section 3.3.2.1, Tables 3-4 and 3-5).

Effects on Habitat Use

The forest habitat would provide additional roosting and foraging opportunities for the northern spotted owl as snags and downed wood develop. Therefore, habitat use by northern spotted owls is expected to increase as dispersal habitat quality increases over time.

Effects on Prey Species

Populations of northern spotted owl prey species, such as northern flying squirrels, would remain at existing levels and existing habitat would be subject to natural processes. The current open canopy conditions would provide forage and habitat conditions for small mammal prey species, including woodrats. As canopy cover increases over time, a continuous closed canopy would eventually decrease the horizontal and vertical heterogeneity in vegetation structure and species diversity providing less habitat complexity important to small mammals (Carey and Harrington 2001). However, habitat would persist in pockets where canopy gaps remain or are created through natural processes.

Alternative One would produce the highest amount of dead wood from passive recruitment due to suppression mortality (Chapter 3, Section 3.3.2.1, Tables 3-4 and 3-5). Snags and coarse down wood would provide microsite habitat for northern spotted owl prey species.

Effects to Habitat at Analytical Spatial Scales

Current northern spotted owl occupancy would not be directly affected by Alternative One. No habitat modification or removal would occur that could affect the present viability of home ranges and core areas within the project area. These sites would continue to function in their present condition. Other habitat components, including understory and mid-story canopy layers and species diversity, would continue to improve from conditions created during the previous harvest activities that occurred 10 to 17 years ago. However, based on predicted canopy cover conditions in 50 years, the existing understory component is expected to diminish within the proposed Back in Black stands (Chapter 3, Section 3.3.2.1; Table 3-5). Understory stand conditions would persist in areas of lower than average canopy closure which would continue to provide some variability within the stand.

Physiographic Province

Alternative One would not alter the baseline condition or the capability to support breeding northern spotted owls in the Western Oregon Cascades physiographic province.

Home Range

Home ranges would continue to function in their current condition with dispersal habitat conditions improving over time. As canopy cover increases within the stands of dispersal habitat, desirable suitable habitat characteristics most likely would not develop except in areas were canopy cover remains lower than average. Therefore, suitability of home ranges to support nesting northern spotted owls would be slow to improve in the future through natural stand development. Without the development of suitable habitat in the long-term, these home ranges would be unlikely to support life history functions of northern spotted owls into the future.

Core Area

Core areas would continue to function in their current condition with dispersal habitat conditions being maintained. The development of desirable suitable habitat characteristics (i.e. shrubs) may develop or persist where currently present in areas where the canopy cover remains lower than average. In core areas with less than 50 percent (250 acres) suitable habitat, dispersal habitat plays an important role in allowing northern spotted owls to move between and forage in patches of suitable habitat. Even if the current dispersal habitat within both core areas developed into suitable habitat in the future, both core areas would still remain below the 50 percent suitable habitat threshold (Table 3-11).

Known Owl Activity Centers (KOAC)

Dispersal habitat adjacent to the Gossett Creek KOAC would be maintained and continue to provide dispersal opportunities between stands of suitable habitat and KOAC.

Disruption

Current northern spotted owl occupancy and home range viability would not be affected by disruption from the No Action Alternative because no timber harvest activities, including fuels treatment and road activities would occur within disruption distances to known northern spotted owl sites.

Consistency with the 2011 Northern Spotted Owl Recovery Plan

Because Alternative One would not directly impact habitat or northern spotted owl sites, the alternative would be consistent with the Recovery Actions relevant to conserving northern spotted owl sites (Recovery Action 10) and high-quality habitat (Recovery Actions 10 and 32).

Alternative One would indirectly meet the intent of Recovery Action 6 by maintaining stands of younger habitat to provide structural diversity and complexity within stands that were previously homogenous.

Survey and Manage

Oregon Red Tree Vole

Existing canopy cover of Douglas-fir would persist within the units and continue to provide habitat conditions favorable for the species. Unit 24-3-5E would continue to provide high-quality habitat and the remaining units of young habitat would continue to differentiate and develop interconnecting crowns as canopy cover increases. Interconnecting crowns would increase the ability for red tree voles to travel through the canopy, as well as increase foraging and nesting opportunities within the stand. These stands would continue to provide connectivity between stands of high-quality habitat

Landbirds

Under the No Action Alternative, forest development would proceed along trajectories described in the Chapter 3, Section 3.3.2.1.

Birds of Conservation Concern

Foraging habitat for the rufous hummingbird would continue to persist at varying levels depending on habitat conditions within the stand. However, as stand canopy cover increases and understory shrubs and forbs are shaded out, foraging opportunities would decrease for the rufous hummingbird. Foraging opportunities would remain available in areas of stands where canopy cover remains open allowing for shrubs and forbs to persist.

Focal Avian Species

Nesting and foraging habitat would persist within the units, particularly for those species that utilize tree canopy for these activities. For species that utilize the forest floor, habitat conditions for nesting and foraging would continue to persist until an increase in canopy cover shades out understory vegetation within the stands. Nesting and foraging opportunities would remain available in areas of stands where canopy cover remains open allowing for shrubs and forbs to persist.

3.4.3.2. Alternative Two – Proposed Action

For this analysis, reforestation, and fuels management are considered and analyzed as part of the timber harvest activities in general and not addressed specifically (unless stated otherwise) in regards to affects to species and/or their habitat. In addition, because yarding and road surfacing Options A and B would not have measurable differences to habitat effects (as stated in Section 3.3.2.3), these options are not addressed specifically (unless stated otherwise).

Special Status Species

Threatened and Endangered Species

Northern Spotted Owl (Federally Threatened)

Effects to Habitat

Suitable Habitat

Regeneration harvest would remove 12 acres of suitable habitat in Unit 24-3-5E under Alternative Two (Table 3-12), affecting 0.7 percent (of the 1,723 acres) of suitable habitat within the northern spotted owl analysis areas (Appendix A, Figure A-13). Regeneration harvest would remove habitat features important to northern spotted owl dispersal, nesting, roosting, and foraging, including horizontal and vertical structure, canopy cover, and hardwood trees. Removal of suitable habitat would result in fewer acres available to the northern spotted owl for nesting, roosting, foraging, and dispersal activities within the action area.

Development of suitable habitat would occur as the stands regenerate. Retained habitat components would contribute to future development of suitable habitat; providing the necessary habitat diversity such as multi-layered canopy, large trees and snags. Without future management, the stands would be expected to begin functioning as suitable habitat in approximately 80 years (USDI FWS 2016, p. 65).

Although not proposed for harvest, yarding and renovation of Spur BIBr would occur within 2 acres of suitable habitat in Unit 24-3-17D (Table 3-12). Road renovation and yarding would modify suitable habitat by removing forest floor vegetation and overstory canopy of individual trees. However, the habitat is expected to continue to function as suitable habitat because canopy cover would remain above 60 percent and nesting structure would not be removed.

There is no new road construction proposed within suitable habitat outside of unit boundaries; therefore, no additional habitat removal would result from road construction.

Dispersal Habitat

Regeneration harvest would remove 516 acres of dispersal habitat under Alternative Two (Table 3-12), decreasing the amount of dispersal habitat on federal lands by 21 percent within the analysis areas. Retained habitat components would contribute to future development of dispersal habitat; providing habitat diversity, such as snags and coarse wood. This loss of dispersal habitat would persist for approximately 40 years. In approximately 40 years, treated areas would begin functioning as dispersal habitat when canopy cover reaches 40 percent (Chapter 3, Section 3.3.2.3; Table 3-6). There would be a reduction of habitat available to use by dispersing northern spotted owls within the analysis area, which would continue until the stands develop into dispersal habitat.

There is no road construction proposed within dispersal habitat outside of unit boundaries; therefore, no additional habitat loss would result from road construction.

Effects to Habitat Use

Habitat modification or removal could influence the behavior or use of a territory by northern spotted owls within their home range. Regeneration harvest would have areas of concentrated harvest with an average of nine trees per acre retained in variable patterns. Although important components of suitable habitat (snags, down wood, hardwoods, legacy conifers and residual green trees) would be retained, regeneration harvest would create conditions that would not support northern spotted owl use. Regeneration harvest would create larger openings where northern spotted owls moving through the stands would be subject to a greater risk of predation from other raptors until the regenerated stands begin to function as dispersal habitat in approximately 40 years. However, the retention trees and Riparian Reserves would reduce the risk of predation by an unquantifiable amount by providing travel corridors for the northern spotted owl, as well as protection from weather, as they travel across the landscape.

Areas where regeneration harvest occurs would promote the establishment and growth of herbaceous plants, forbs and shrubs that would provide organic nutrients, shelter, and forage for an array of birds, mammals, and invertebrate species, including prey species for the northern spotted owl.

Effects on Prey Species

Regeneration harvest would remove 530 acres of flying squirrel habitat, reducing the flying squirrel prey base for the northern spotted owl. Removal of dispersal habitat would fragment forest habitat within the proposed Back in Black units. Grouped retention trees would provide travel corridors for flying squirrels from adjacent late-seral stands, which would continue to provide habitat and the flying squirrel prey base for the northern spotted owl.

Approximately 530 acres would shift from providing prey species associated with mature forest to prey species associated with early-successional habitats. For species like brush rabbits, woodrats, and other rodents that are found in early- and mid-seral forest habitat (Maser *et al.* 1981; Sakai and Noon, 1993; Carey *et al*. 1999), populations would increase by creating 530 acres of early-seral habitat with diverse communities of flowering and fruiting shrubs, herbs and grasses that would provide cover and abundant forage.

Wiens *et al.* (2014, p. 32) found that high-contrast edges, mostly associated with clear-cuts, were a landscape feature that influenced use of foraging sites; northern spotted owls selected foraging sites within the interior of forest patches, usually 300-500 meters from edges. During the study individual northern spotted owls were observed foraging along newly created forest-and non-forest edges bordering active timber sales. Although uncommon, it may reflect short term response of owls taking advantage of vulnerable prey animals being displaced by ongoing timber harvest activities (Wiens *et al.* 2014, p. 33).

Site Occupancy

Thomas *et al.* (1990), Bart and Forsman (1992), Bart (1995), Olson *et al.* 2004, and Dugger *et al.* (2005) suggest that when northern spotted owl home ranges are comprised of less than 40 to 60 percent suitable habitat, they were more likely to have lower occupancy and fitness (USDI FWS 2016, p. 58). In addition, results of Dugger *et al.* (2005) and Olson *et al.* (2004) suggest that younger stands do not necessarily contribute to overall habitat-fitness. Pre-harvest habitat quantities are below amounts that best available information indicates for habitat-fitness potential and therefore, removing 12 acres of suitable habitat and 516 acres of dispersal habitat under Alternative Two would not change the habitat-fitness within the three northern spotted owl sites.

Effects to Habitat at Analytical Spatial Scales

Table 3-14 presents effects to habitat baseline for each of the three northern spotted owl sites at the home range and core area scale within the Analysis Area.

Table 3-14. BLM Acres of Habitat Proposed for Removal under Alternative Two at each Spatial Scale and Effects to Habitat Baseline for the Northern Spotted Owl within the Analysis Area.

SITE NAME	CORE AREA (500 ACRES)[1] [PERCENT ACRES]					HOME RANGE (2,895 ACRES)[1] [PERCENT ACRES]				
	BLM ACRES	SUITABLE		DISPERSAL		BLM ACRES[1]	SUITABLE		DISPERSAL	
		BLM ACRES	ALT 2 BLM ACRES REMOVED	BLM ACRES	ALT 2 BLM ACRES REMOVED		BLM ACRES	ALT 2 BLM ACRES REMOVED	BLM ACRES	ALT 2 BLM ACRES REMOVED
GOSSETT CREEK *IDNO 0355B*	306 *[61%]*[2]	129 *[26%]*[2]	0	22	13 *[55%]*[3]	923 *[32%]*[2]	263 *[9%]*[2]	12 *[5%]*[3]	333	69 *[21%]*[3]
MILL CREEK MS *IDNO 3900C*	212 *[42%]*[2]	130 *[26%]*[2]	0	38	0	1,336 *[46%]*[2]	405 *[14%]*[2]	0	505	32 *[6%]*[3]
SUNSET VIEW *IDNO 3100A*	206 *[41%]*[2]	91 *[18%]*[2]	0	0	0	739 *[25%]*[2]	210 *[7%]*[2]	0	237	141 *[60%]*[3]

[1] Total acres within the spatial scale being analyzed in GIS: Core-Use Area = 0.5-mile radius; and Home Range = 1.2-mile radius.
[2] Percent based on the total BLM acres within the spatial scale being analyzed.
[3] Percent based on total BLM acres of respective habitat present within the spatial scale being analyzed.

Physiographic Province

The proposed project would affect 14 acres (0.0003 percent) of the 4,483,985 acres of suitable habitat on federally-administered lands within the Western Oregon Cascades physiographic province (USDI BLM 2016, p. 1772). While removal of suitable habitat would be locally impactful, the removal of this habitat would not appreciably alter the baseline condition or the capability to support breeding northern spotted owls in the physiographic province.

Home Range

Regeneration harvest would remove 254 acres of northern spotted owl habitat, including 12 acres of suitable habitat and 242 acres of dispersal habitat, within three northern spotted owl home ranges (Table 3-11). The northern spotted owl sites within both of the Analysis Areas are habitat-limited because their respective home ranges are currently below the 40 percent suitable habitat threshold (Table 3-14). Of the three home ranges, Sunset View is currently occupied by non-nesting northern spotted owls (Table 3-12).

Suitable habitat would not be removed within the Mill Creek MS and Sunset View sites and therefore, these two sites would continue to function in their current condition. The removal of 12 acres of suitable habitat within the Gossett Creek home range would reduce the amount of suitable habitat by five percent, resulting in 251 acres of suitable habitat available at post-harvest within the home range. However, because this site is currently below the suitable habitat threshold, the removal of five percent of suitable habitat would not change the habitat-fitness of the home range.

Additionally, regeneration harvest would reduce the amount of dispersal habitat available on federal lands within each home range (Table 3-14). The two unoccupied sites, Gossett Creek and Mill Creek MS would lose 69 acres (21 percent) and 32 acres (6 percent), respectively. The Sunset View site would lose 141 acres of dispersal habitat affecting 60 percent of the dispersal habitat available within its home range (Table 3-14). However, Dugger *et al.* (2005) indicate that there was little evidence for any relationship between intermediate-aged forests types and northern spotted owl demographics in their study. The amount of these younger-forest types does not appear to affect northern spotted owl fitness directly (Dugger *et al.* 2005). Northern spotted owl demographic rates (e.g., survival and productivity) appear to be more directly tied to the amount of older forest habitats close to the nest site/within the core-use area (Ripple *et al.* 1991, Swindle *et al.* 1999, Bart and Forsman 1992, Franklin *et al.* 2000, Olson *et al.* 2004 and Dugger *et al.* 2005). Therefore, removal of 6-60 percent of dispersal habitat would not change the habitat-fitness within the habitat-deficit home ranges.

Because the Gossett Creek and Mill Creek MS sites are unoccupied by northern spotted owls, harvest activities within these home ranges would not cause disruption to northern spotted owl life history behaviors. In the outer portions of the Sunset View home range, 141 acres of dispersal-only habitat would be removed by regeneration harvest (Table 3-14). The proposed harvest of the Sunset View site would occur beyond the core-use area where northern spotted owls spend a disproportionate amount of time for breeding, feeding and sheltering activities. Therefore, the FWS determined the proposed action would not lead to disruption in northern spotted owl breeding, feeding or sheltering activities. Analysis shows habitat connectivity should be sufficient for northern spotted owl dispersal and associated foraging. For these reasons, collectively, disruption of northern spotted owl life history behavior is not anticipated (USDI FWS 2016, p. 94).

Core Area

Harvest activities are proposed within the core area associated with the Gossett Creek northern spotted owl site. Alternative Two would remove more than half (12 of 22 acres) of the dispersal habitat within this core area (Table 3-14). This core area currently contains just over half (26 percent) of the suitable habitat determined necessary to maintain northern spotted owl life history functions. Current habitat conditions may explain why (separate from the pressure of barred owls) this core area has been unoccupied by northern spotted owls. Although harvest activities would decrease the amount of dispersal habitat within the core area, disruption to northern spotted owl life history behaviors is not expected because the site is unoccupied and currently below the suitable habitat threshold of 50 percent.

Effects to Known Owl Activity Centers (KOACs)

Proposed units do not overlap any KOACs and therefore, there would be no direct effects to designated KOACs as a result of the proposed Back in Black project. However, removal of dispersal habitat adjacent to the Gossett Creek KOAC would have indirect impacts by removing connectivity with nearby stands of dispersal and suitable habitats in the southwest quarter of T. 24 S., R. 3 W., Section 7.

The KOAC associated with the Sunset View northern spotted owl is located more than 0.9 miles from proposed Unit 25-4-17A and therefore, would not be directly or indirectly impacted by the proposed action.

Disruption

Activities resulting from the proposed action may cause disruption to behavior or use of a territory by northern spotted owls within the home range. Project design features associated with the proposed action would minimize potential adverse effects to the northern spotted owl and its habitat (USDI FWS 2016, p. 21).

Under Alternative Two, there would be no disruption concerns for northern spotted owls because all harvest activities would be conducted outside of the disruption thresholds established by the FWS from any northern spotted owl site (Chapter 2, Section 2.3.4, #6). For activities associated with the Back in Black project, the disruption threshold distance for use of chainsaws is 65 yards, use of heavy equipment is 35 yards, and prescribed burning is 440 yards. If nesting northern spotted owls move within the disruption distance, seasonal restrictions would be applied from March 1st to September 30th (Chapter 2, Section 2.3.4, #6). This would ensure that noise disruption and habitat removal would not cause northern spotted owls to abandon nests or fledge prematurely.

Consistency with the 2011 Northern Spotted Owl Recovery Plan

The Back in Black Project was evaluated against the following Recovery Actions in the Revised Recovery Plan for the Northern Spotted Owl (USDI FWS 2011a). The FWS determined the proposed action is reasonably consistent with Recovery Actions 6, 10, and 32 of the northern spotted owl recovery plan (USDI FWS 2016, p. 109).

> ***Recovery Action 6****: In moist forests managed for spotted owl habitat, land managers should implement silvicultural techniques in plantations, overstocked stands and modified younger stands to accelerate the development of structural complexity and biological diversity that will benefit spotted owl recovery (USDI FWS 2011a, p. III-43).*

With the exception of 12 acres in Unit 24-3-5E and 2 acres in Unit 24-3-17D, the proposed action is comprised of younger stands within dispersal habitat. Project design features retain and/or promote structural diversity and complexity within the treated stands. In addition, Recovery Action 6 places an emphasis on retaining the oldest and largest trees in the stand or any trees that create stand diversity. The harvest prescription in Alternative Two include retaining legacy structures, large trees, and structural complexity (i.e. large snags and/or down wood, multiple canopy layers and vegetative shrub and hardwood diversity). The intent of Recovery Action 6 was met because efforts were made to locate forest management activities in younger stands and design the prescription under Alternative Two to minimize impacts to the northern spotted owl.

> ***Recovery Action 10****: Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl population (USDI FWS 2011a, p. III-43).*

With the assistance of the FWS through their involvement in interdisciplinary team meetings, the BLM made efforts to avoid and conserve sites that are currently contributing to demographic support of the species. Three northern spotted owl sites in the Back in Black project area were evaluated based on site occupancy status and habitat conditions within their respective home range. As a result, the proposed action does not include harvest activities or road construction within a nest patch.

Thirteen acres of dispersal habitat would be removed from a northern spotted owl core area associated with a northern spotted owl site that is currently below the 50 percent suitable habitat threshold. Reducing the amount of dispersal habitat in a core area with less than 50 percent suitable habitat reduces the ability for northern spotted owls to move between and forage in suitable habitat. However, no core area or home range of any known northern spotted owl site would be reduced below habitat thresholds by the proposed action (i.e., no site would be taken from above a threshold to below a threshold by the proposed action). Therefore, the intent of Recovery Action 10 has been met by altering harvest prescriptions, shifting the configuration of units, and removing units from the proposed action in attempts to minimize impacts to northern spotted owls.

> ***Recovery Action 32****: Because spotted owl recovery requires well distributed, older and more structurally complex multi-layered conifer forests on Federal and non-federal lands across its range, land managers should work with the Service[FWS] as described below to maintain and restore such habitat while allowing for other threats, such as fire and insects, to be addressed by restoration management actions. These high-quality spotted owl habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees (USDI FWS 2011a, p. III-67).*

Regeneration harvest would not impact "older and more structurally complex multi-layered conifer forests" as described in Recovery Action 32 (USDI FWS 2011a). Original unit boundaries were adjusted to withdraw any forest habitat identified as "high-quality" northern spotted owl habitat under Recovery Action 32. Because no structurally complex, multi-layered stands potentially meeting Recovery Action 32 would be included in the timber harvest prescription or road construction for the Back in Black project, the proposed action is consistent with the intent of Recovery Action 32 in the northern spotted owl recovery plan (USDI FWS 2011a).

Survey and Manage

As described for Special Status Species, Survey and Manage Species associated with structurally complex forests would not benefit from treatment under Alternative Two in the short term (50 years), because some existing suitable habitat components (e.g. large remnant trees or snags retained from previous harvest activities) associated with mature or late-seral forest habitat would be removed. Regeneration harvest would change microclimate conditions and disturb habitat features, exposing microsites to harsher environmental conditions, increasing predation risks, reducing food sources and other habitat features required for survival.

In the long-term, retention trees would provide suitable habitat structure (i.e. super dominant canopy). Retention trees and untreated areas in Riparian Reserves would provide for persistence of Survey and Manage Species and serve as a source population for re-colonization of regeneration harvested areas and would provide for reasonable assurance of species persistence within the stand.

Oregon Red Tree Vole

Acres in this portion of the environmental assessment may not match the acres in *Appendix I. Red Tree Vole Non-High Priority Site Designation Back in Black Regeneration Harvest Plan Roseburg District*. Portions of Unit 25-4-17A contained high-quality habitat with active red tree vole nest trees, and were dropped from analysis in order to maintain habitat and red tree vole sites for species persistence within the section (Chapter 2, Section 2.4.4.; Appendix I). The dropped unit acres are not discussed in the EA (with the exception of Chapter 2, Section 2.4.4.), but are discussed as part of the analysis in the red tree vole non-high priority site designation in Appendix I.
A **red tree vole nest tree** contains a nest structure with signs (i.e. some examples include observing resin ducts, vole cuttings, debarked twigs, vole fecal pellets, or seeing a red tree vole) that indicate it may be occupied or was used by a red tree vole. All red tree vole nest trees discussed in this analysis have been confirmed to have an "active" activity status based on diagnostic features indicating occupancy within one of three categories: 1) animal was observed; 2) likely or very recently occupied; or 3) moderately recently occupied (Huff *et al.* 2012, p. 15). A **red tree vole site** is an individual red tree vole nest tree or a collection of red tree vole nest trees within an area (all red tree vole nest trees in a stand and adjacent stands that are not isolated from other clumps of red tree vole nest trees by more than 100 meters (330 feet)) (Huff *et al.* 2012, p. 13).

Of the 100 active red tree vole nest trees located during the Black in Black surveys, 60 of the trees would not be harvested under the proposed action because:

1. Four (4) red tree vole sites, including nine (9) active red tree vole trees, are located in areas outside of harvest unit boundaries;
2. Four (4) red tree vole sites are partially located in the harvest unit boundary and adjacent habitat; for these four (4), a total of 51 active red tree vole trees would be retained and managed in habitat adjacent to the timber sale units, and 15 active red tree vole trees would be protected in as part of a retention area within the unit (25-4-17A) boundary. These 15 active red tree vole trees are contiguous to adjacent habitat.

The remaining 40 active red tree vole nest trees would be impacted by regeneration harvest. The following is a summary of impacts within each red tree vole analysis block:

BLOCK 1: Regeneration harvest in Unit 24-3-5E would remove approximately 15 acres, 3 acres of young forest habitat and 12 acres of protocol-quality habitat (Appendix I, Table I-7; Figures I-6 and I-7).

Three (3) known red tree vole sites (which include nine (9) active red tree vole nests) are located within Block 1.

- One (1) known red tree vole site (which includes one (1) active red tree vole nest tree) would be fully retained within 41 acres of contiguous protocol-quality habitat in the southwest corner of the block.
- One (1) red tree vole site that includes two (2) active red tree vole nest trees is located at the north end of the stand outside of the harvest boundary but within approximately 110 feet of the timber harvest boundary (Appendix I, Figure I-7); although the two (2) active red tree vole nest trees themselves would be retained, a site-tree buffer (180 feet) would not be fully provided and therefore, canopy cover would be removed within 110-180 feet of the red tree vole nest trees. The contiguous stand (43 acres) of red tree vole habitat adjacent to and including this site would be maintained; three (3) of the nine (9) active red tree vole trees known within Block 1 would remain in this protected habitat.
- The third red tree vole site, containing six (6) active red tree vole nest trees, is located almost exclusively within Unit 24-3- 5E and is proposed for regeneration harvest (Appendix I, Figure I-6). Although two (2) of the six (6) active nests would be retained within the Riparian Reserve, a site-tree buffer (180 feet) would not be provided. The remaining four (4) red tree vole nest trees within the unit would be retained, where feasible.

Retention areas in the uplands and "no-treatment" areas in Riparian Reserves would support red tree voles in treated areas and provide connectivity to the remaining habitat in the southern portion of the block (Appendix I, Figure I-6). Active nest trees would be retained as much as practicable.

BLOCK 2: No protocol-quality habitat would be harvested in Block 2. Regeneration harvest in Unit 25-4-17A would remove approximately 143 acres of young habitat (Appendix I, Table I-7), including approximately 71 acres (59 percent) of a 120-acre red tree vole habitat management area (Appendix I, Figures I-8 and I-9).

To protect active red tree vole trees and habitat features associated with older forest (e.g. large snags, large trees, large down wood) in the southeast corner of the unit, a retention area (~3.6 acres) encompassing this area would be retained. Additional red tree vole nest trees would be retained within the unit boundary, where practicable. Riparian Reserves would not be treated and all three (3) stands of habitat (totaling 41 acres) would be maintained in the western and southern portions of the block (Appendix I, Table I-7, Figures I-8 and I-9). At least 60 percent of the 41 red tree vole nest trees located within the young habitat to be harvested (outside of Riparian Reserve and 3.6 acre retention area) would be retained.

Seven (7) red tree vole sites (includes 91 active red tree vole nest trees) are located within Block 2.

- Three (3) red tree vole sites would be fully retained in habitat outside of the timber harvest boundary, including two (2) sites (one (1) active red tree vole tree each) located within protocol quality habitat and one (1) site (six (6) active red tree vole trees) located in the Riparian Reserve.
- Three (3) red tree vole sites would be partially retained:
    1) 36 active red tree vole trees are distributed within three (3) stands of protocol-quality habitat adjacent to Unit 25-04-17A, and

2) 13 active red tree vole nest trees within young habitat in the southeast corner of Unit 25-04-17A would be protected in the 3.6 acre skip mentioned above; this area is contiguous with adjacent habitat. The young habitat within the remaining two (2) red tree vole sites would be harvested.

- One (1) entire red tree vole site, containing nine (9) active red tree vole nest trees, would be harvested. This site is not within protocol quality habitat (Appendix I, Figure I-14).

Where regeneration harvest occurs, forest stands would not be considered red tree vole habitat for approximately 60 years or until QMD exceeds 18 inches (Appendix I). Although active nest trees may be retained, red tree voles would be vulnerable to predation in the concentrated harvest area. Retention trees would provide important nesting habitat structures in future habitat. Habitat connectivity, including nesting potential, would be expected to develop in approximately 40-50 years, or when canopy cover reaches 60 percent (Swingle 2005, p. 39).

Non-high Priority Sites Identified

Appendix I includes the non-high priority site designation evaluation, which is summarized below.

To fulfill the Survey and Manage requirement for red tree voles, the forest habitat in the planned timber sale units has been evaluated against the requirements of the "Criteria for determining the need for pre-disturbance surveys" (USDA/FS-USDI/BLM. 2011d, pp. 14-16). A portion of one proposed harvest unit meets the pre-disturbance survey requirements (Chapter 2, Section 2.3.4, #7). The ground transects and tree climbing components of the pre-disturbance survey protocol were completed in 2015 and 10 active red tree voles sites were identified. The sites were evaluated to determine if they are necessary for the persistence of the red tree voles.

Two (2) red tree vole sites and a portion of four (4) others are identified as non-high priority, unnecessary to protect, to provide a reasonable assurance of species persistence within the analysis area. Of the 100 active red tree vole nest trees located in the Black in Black project area due to the survey effort, 60 would continue to be managed within maintained red tree vole sites (Appendix I, Table I-12).

Of the 40 active red tree vole nests identified as non-high priority, 32 are within young forest habitat, while eight (8) are within protocol-quality habitat. Of the 34 non-high priority red tree vole nests within young forest habitat, 15 would be protected within a skip that is contiguous to adjacent protocol-quality habitat; however, they would not receive full site-tree buffers (180 feet). Of the eight (8) non-high priority red tree vole nest trees within protocol-quality habitat, two (2) would be retained just outside of the unit boundary and therefore, would not receive full site-tree buffers. Refer to Appendix I for additional details on red tree vole site designations.

The non-high priority site designation evaluation determined that all four of the criteria indicating little to no concern for persistence within the analysis area have been met, based on the following:

1. Based on the amount of protocol-quality habitat within the analysis area (at least 2,146 acres), and the overall likelihood of it being occupied (61-88 percent), there is a moderate number of likely extant sites in the analysis area. Completed surveys and database analyses validate this conclusion.
2. A high proportion (66 percent) of the protocol-quality habitat within the analysis area is reserved or within land-use allocations similar to reserves, and there is a high likelihood that habitat is occupied by red tree voles.

3. Red tree vole habitat, which is highly likely to be occupied, is well distributed on BLM lands within the analysis area, and hence, sites (and potential sites) are well distributed throughout the analysis area. In addition, red tree voles utilize younger forest throughout this portion of their range. Both protocol-quality habitat and young forest habitat are well-distributed on BLM lands, and young habitat on non-federal lands allows for connectivity throughout the analysis area- this allows for red tree voles to disperse throughout this landscape (Appendix I, Figure I-11).
4. Given the high amount of the analysis area reserved, a high amount of protocol-quality habitat reserved, and a high likelihood that habitat is occupied, coupled with the rate of harvest in the Matrix land base, the rapid recolonization of thinned stands by red tree voles, and the use of younger forests by red tree voles in this portion of the species range, Matrix land management within the analysis area may provide a reasonable assurance of species persistence for red tree voles.

In conclusion, the BLM would fully designate two red tree vole sites and a portion of four others as non-high priority sites and conduct proposed harvest treatments in stands where the sites are located.

Landbirds

Habitat

Under Alternative Two, the proposed action would directly affect individual land bird species by removing conifer forest stands used for nesting and foraging (Appendix E). The resulting creation of early-successional habitat patches would be favorable to other land bird species (Hagar and Friesen 2009) (Appendix E). At the scale of the Northern Pacific Forests Bird Conservation Region, this proposed action would have no discernable effects on populations of land bird species that are associated with mid-seral/mature forest habitat because:

- Mid-seral/mature forest habitat is currently abundant (4,320 acres) on BLM-administered lands in the Calapooya Creek watershed; and,

- The species of landbirds most closely associated with mid-seral/mature forest (e.g. hermit warbler, winter wren, Wilson's warbler) are widely distributed in the Western Cascades, and among the most common species in Pacific Northwest forests (Altman and Alexander 2012).

Disturbance

For portions of units requiring northern spotted owl seasonal restrictions (April 1st – July 15th), nesting landbirds would also be protected during their breeding season. In units where seasonal restrictions would not be implemented, harvest activities would occur during the landbird breeding season. This would cause disturbance to nesting land birds, including destruction of nests and eggs, and death of young birds, during up to three breeding seasons.

There may be noise disturbance associated with timber harvest activities within 0.25 mile of nesting raptors during the nesting season (January through August). It is unknown if these species are present within the late-successional stands adjacent to the units.

Cumulative Effects

Special Status Species

Threatened and Endangered Species

Northern Spotted Owl (Federally Threatened)

Effects to Habitat

Of the approximately 157,194 acres (Federal and private) within the Calapooya Creek watershed, approximately 8 percent (11,661 acres) are Federally owned. The watershed currently contains 33 percent (3,932 acres) suitable habitat and 35 percent (4,180 acres) dispersal habitat for the northern spotted owl on BLM-administered lands. Alternative Two would remove approximately 0.3 percent of suitable habitat and approximately 12 percent of the dispersal habitat on Federal lands within the Calapooya Creek watershed.

On BLM-administered lands, 10 percent (1,125 acres) have been thinned in the past 10 years. Future projects to be implemented within the next 3-5 years by the Calapooya Creek Harvest Plan project would thin an additional 10 percent (1,182 acres) and variable retention harvest 0.5 percent (63 acres) in the Calapooya Creek watershed (Chapter 3, Section 3.2.). After implementation of the Calapooya and Back in Black projects, approximately 0.3 percent (12 acres) of the suitable habitat would be removed, 51 percent (2,127 acres) of the dispersal habitat would be modified, and 14 percent (579 acres) of previously thinned stands of dispersal habitat would be removed.

Modification of dispersal habitat would not alter its dispersal function and would continue to allow movement of northern spotted owls across the landscape. The removal of 8 percent of habitat (12 acres suitable and 579 acres of dispersal) would decrease the amount of habitat available for northern spotted owls within the watershed. However, the remaining 7,533 acres of habitat (suitable and dispersal) in the watershed would continue to provide adequate habitat for northern spotted owls to disperse through the watershed.

Effects to Prey Species

Cumulative effects from timber harvesting would benefit prey species for the northern spotted owl. Although 5 percent of stands providing habitat for northern spotted owl prey species would be removed, thinning 55 percent of young forest habitat within the watershed would create stand conditions (i.e. understory development) beneficial to prey species. Additionally, 10,276 acres of habitat would continue to provide adequate habitat for northern spotted owl prey species throughout the watershed. Therefore, the Back in Black project would not preclude or appreciably reduce habitat or affect northern spotted owl prey species within the watershed.

Site Occupancy and Habitat at Analytical Spatial Scales

The Mill Creek MS (IDNO 3900C) and Gossett Creek (IDNO 0355B) northern spotted owl sites are within the Calapooya Creek Harvest Plan and Back in Black project areas (Table 3-15). There are no other proposed or future actions planned within the core areas or home ranges of these two northern spotted owl sites.

The Calapooya Creek Harvest Plan project would remove 6 acres and modify 180 acres of dispersal habitat within the home range of the Mill Creek MS site (Table 3-15). The Back in Black project would remove an additional 32 acres of dispersal habitat in the home range. The cumulative effects to the home range would include the removal of 8 percent, and the modification of 36 percent of dispersal habitat, affecting 43 percent (218 acres) of the dispersal habitat (Table 3-15). There would be no modification or removal of suitable habitat within the Mill Creek MS home range for either project. There would be no modification or removal of suitable or dispersal habitat within the Mill Creek MS core area for either project. Since no suitable habitat would be modified or removed in the Mills Creek MS core area or home range, no cumulative effects to the suitable habitat would occur at either spatial scale. The Mill Creek MS northern spotted owl site is below the suitable habitat threshold in both the core area and home range, so this site in its current habitat condition is unable to support a breeding northern spotted owl pair due to the lack of suitable habitat at either spatial scale.

The Calapooya Creek Harvest Plan project would modify 127 acres (38 percent) of dispersal habitat within the home range of the Gossett Creek site (Table 3-15). The Back in Black project would remove 12 acres (5 percent) of the suitable habitat, and remove 70 acres (21 percent) of dispersal habitat within the Gossett Creek home range (Table 3-15). These projects would affect 59 percent (197 acres) of the dispersal habitat within the Gossett Creek home range (Table 3-15). No suitable habitat within the core area of Gossett Creek would be affected by either project. The Calapooya Creek Harvest Plan would modify 5 acres (23 percent) of the dispersal habitat within the core area, and the Back in Black project would remove 13 acres (59 percent) of the dispersal habitat within the core at the Gossett Creek site. Since no suitable habitat would be modified or removed in the Gossett Creek core area, no cumulative effects to the suitable habitat within the core area would occur. The Gossett Creek northern spotted owl site is below the suitable habitat threshold in both the core area and home range, so this site in its current habitat condition is unable to support a breeding northern spotted owl pair due to the lack of suitable habitat at either spatial scale. Additionally, because the percent of BLM ownership within the home range is less than 50 percent (32 percent), the suitable habitat viability threshold of 40 percent would not be achievable under any scenario due to the lack of sufficient federal ownership and intensive timber management on private lands. Therefore, cumulative impacts of harvest projects within the watershed would not change the viability of the home range.

Table 3-15. Cumulative Effects for the two Northern Spotted Owl Sites within the Analysis Area at the Core Area and Home Range Analytical Spatial Scales.

SITE NAME	CORE AREA (500 ACRES) [PERCENT FED ACRES]												
	FEDERAL ACRES	SUITABLE						DISPERSAL					
		BASELINE ACRES[1]	CALAP.[2] ACRES REMOVED	CALAP.[2] ACRES MODIFIED	BIB[2] ACRES REMOVED	BIB[2] ACRES MODIFIED	TOTAL ACRES IMPACTED[3]	BASELINE ACRES	CALAP.[2] ACRES REMOVED	CALAP.[2] ACRES MODIFIED	BIB[2] ACRES REMOVED	BIB[2] ACRES MODIFIED	TOTAL ACRES IMPACTED[3]
GOSSETT CREEK *IDNO 0355B*	306 *[61%]*	132 *[26%]*	0	0	0	0	0	22	0	5	13	0	18 *[82%]*
MILL CREEK MS *IDNO 3900C*	212 *[42%]*	130 *[26%]*	0	0	0	0	0	38	0	0	0	0	*0*
SITE NAME	HOME RANGE (2,895 ACRES) [PERCENT FED ACRES]												
	FEDERAL ACRES	SUITABLE						DISPERSAL					
		BASELINE ACRES[1]	CALAP.[2] ACRES REMOVED	CALAP.[2] ACRES MODIFIED	BIB[2] ACRES REMOVED	BIB[2] ACRES MODIFIED	TOTAL ACRES IMPACTED[3]	BASELINE ACRES	CALAP.[2] ACRES REMOVED	CALAP.[2] ACRES MODIFIED	BIB[2] ACRES REMOVED	BIB[2] ACRES MODIFIED	TOTAL ACRES IMPACTED[3]
GOSSETT CREEK *IDNO 0355B*	923 *[32%]*	263 *[9%]*	0	0	12	0	12 *[5%]*	333	0	127	70	0	197 [59%]
MILL CREEK MS *IDNO 3900C*	1,336 *[46%]*	405 *[14%]*	0	0	0	0	0	505	6	180	32	0	*218 [43%]*

1. Percent of suitable habitat within the core area or home range.
2. Calap. = Calapooya EA Project. BIB = Back in Black EA Project
3. Percent of habitat baseline acres.

Physiographic Province

Cumulatively, timber harvest would affect 0.04 percent (2,977 acres of 6.64 million acres) of the habitat within the Western Oregon Cascades physiographic province. The intended function of this Recovery Unit, inclusive of the project area, is to support high quality northern spotted owl suitable and dispersal quality habitats. The Back in Black project would not preclude or appreciably reduce northern spotted owl habitat within the physiographic province, and therefore would continue to function as intended.

Critical Habitat

Approximately 1.5 percent (2,407 acres) of the watershed is in designated critical habitat for the northern spotted owl, of which 10 percent (237 acres) has been affected by thinning and 1 percent (33 acres) by regeneration harvest since 2004. Because the Back in Black project is not located within designated critical habitat for the northern spotted owl, there would be no additional affects.

Effects of Private Land Management

Given the distribution of BLM ownership within this watershed, BLM lands alone cannot provide adequate habitat for dispersal. Cumulative effects to northern spotted owls would continue within the Back in Black and Little Hoss Analysis Areas from private land harvest activities. The Oregon Forest Practices Act requires protection of a 70-acre area around occupied nest sites, and does not provide any protection or conservation of other surrounding habitat on private lands. Therefore, the BLM assumes harvest activities on private timber lands would disrupt nesting northern spotted owls and reduce available habitat, rendering some core areas and/or home ranges unable to support northern spotted owl life functions. However, some forest industry stands that have reached 40 years of age may provide additional dispersal conditions within the watershed until they are harvested.

Summary

Although the Back in Black project, when considered with the Calapooya Creek Harvest Plan project, may temporarily reduce the quality and amount of dispersal habitat within the project area, the watershed would still continue to function for the dispersal of northern spotted owls because suitable and dispersal habitats would allow owls to move among blocks of suitable habitat throughout the watershed and into adjacent watersheds. The Back in Black project would not preclude or appreciably reduce northern spotted owl movement within the watershed, between critical habitat units, or within the Physiographic Province.

Survey and Manage Species

The analysis area currently provides approximately 3,932 acres (33 percent) of older (≥80 years) forest habitat. The Back in Black project would remove approximately 12 acres (0.3 percent) of the suitable habitat within the project area. The Calapooya Creek Harvest Plan project would not remove or modify any suitable habitat within the project area. The combination of the Back in Black and Calapooya Creek Harvest Plan projects would not preclude or appreciably reduce habitat or affect the persistence of Survey and Manage species present within the watershed.

For red tree vole specifically, given the low amount, distribution and fragmented BLM ownership, BLM management alone cannot provide for a reasonable assurance of persistence of Survey and Manage Species throughout the entire watershed. At best, BLM lands can provide some population hubs within habitat meeting the survey protocol criteria, with connectivity within and between watersheds relying on young forest habitat on private lands. The non-high priority site designation (Appendix I) received concurrence by the U.S. Forest Service, BLM Eugene District, and the U.S. Fish and Wildlife Service that the red tree vole population hubs are adequate within the analysis area. Therefore, the non-high priority sites are removed with assurances of red tree vole persistence on BLM-administered lands. Additionally, privately owned lands are not expected to provide habitat that meets the red tree vole survey protocol criteria, but would provide young forest red tree vole habitat in varying spatial patterns and patch sizes over time, in a transitory manner.

Landbirds

BLM lands within the project area currently provides approximately 3,549 acres of early and mid-seral (< 40 years), 4,180 acres of late-seral (40 to 79 years), and 3,932 acres of mature and old-growth forests (≥80 years) for landbirds. The Back in Black project, in combination with the planned Calapooya Creek Harvest Plan project, would modify approximately 1,182 acres (28 percent) of late-seral forest habitat through thinning, and remove approximately 593 acres (14 percent) of late-seral forest habitat through regeneration harvest.

Removal of late-seral stands would create 593 acres of complex early-seral habitat within the watershed. Although early-seral forest is prevalent on private forest industry lands, these areas are generally regarded as simple early-seral habitat due to the lack of large remnant trees and snags. Therefore, complex early-seral habitat from regeneration harvests on BLM lands would benefit landbirds that rely on snags in early-seral forests.

The disturbance and habitat effects from the Back in Black and Calapooya Creek Harvest Plan projects would not have measureable effects to Landbirds. Mid- and late-seral forests would help maintain viable populations within the Calapooya Creek and adjacent watersheds. In addition, mid-seral forest habitat on private lands would provide suitable habitat where key habitat attributes occur for landbird species associated with this habitat type.

3.5. Water Resources

3.5.1. Affected Environment

The Back in Black project area lies within the Coon Creek, Buzzard Roost Creek, Oldham Creek, Fair Oaks, Foster Creek, and Cooper Creek Reservoir 14 digit Hydrologic Unit Code (HUC) Drainages (Appendix A, Figure A-3) of the Hinkle Creek-Calapooya Creek, Oldham Creek, Gassy Creek-Calapooya Creek, and Sutherlin Creek 12 digit HUC Subwatersheds of the Calapooya Creek and Lower North Umpqua 10 digit HUC Watersheds (Appendix A, Figure A-2). Two acres of treatment would occur in the Lower North Umpqua Watershed along the divide with the Calapooya Creek Watershed.

Average annual precipitation in the project area ranges from 43 to 61 inches, occurring primarily between October and April. Elevations in the project area range from 800 to 2,940 feet. Most of the project area (69 percent) lies within the rain dominated hydroregion where snow accumulation is uncommon (i.e. below 2,100 feet elevation). The rest (31 percent) of the project area lies within the rain-on-snow hydroregion (i.e. 2,100-4,000 feet in elevation) where some snow accumulation occurs transiently throughout the wet season.

3.5.1.1. Water Quantity and Water Quality

There are approximately 30 first- or second-order headwater streams and 2 higher order streams (Gossett Creek and an unnamed tributary to Coon Creek), adjacent to or within the proposed units totaling 4.6 miles of stream length. Approximately 40 percent of this stream length is classified as perennial (i.e. surface water flows year-round with the channels passing some volume of water throughout the year) and 60 percent is classified as intermittent (i.e. surface water stops flowing in the dry season and is no longer transported downstream). All of the streams within and adjacent to harvest units in the Back in Black project area are high gradient cascade and step-pool stream types.

The potentially affected beneficial uses of water within the project area are for resident fish, aquatic life, and salmonid spawning and rearing. Beneficial uses of water immediately downstream from the project area include fish and aquatic life, domestic use, and irrigation. There are approximately 60 diversion points registered as water rights listed by the State of Oregon within one mile downstream of the project area. The Back in Black project lies within three municipal drinking water source areas. The City of Sutherlin intake is 10 miles downstream, the City of Oakland intake is 9 miles downstream, and the intake for the Umpqua Basin Water Association is 18 miles downstream.

Calapooya Creek, which is 0.4 miles downstream from the closest harvest unit, had previously been placed on the Clean Water Act 303(d) list for exceeding water temperature standards essential to salmon and trout rearing and migration. The 303(d) list identifies streams where water quality is impaired or threatened and a Total Maximum Daily Load (TMDL) is needed. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that load among the various sources of that pollutant. Once a TMDL for a listed stream has been approved by the U.S. Environmental Protection Agency (EPA), the stream is removed from the 303(d) list. Calapooya Creek is now covered by the Oregon Department of Environmental Quality's 2006 Umpqua Basin Total Maximum Daily Load and Water Quality Management Plan, which was approved by the EPA on April 12, 2007.

Canopy Opening Impacts on Peak Flow Susceptibility

Stream flows are dependent upon the capture, storage, and runoff of precipitation. Timber harvest can alter the amount and timing of peak flows by changing site-level hydrologic processes. These hydrologic processes include changes in evapotranspiration, snowmelt, forest canopy interception of rain and snow, road interception of surface and subsurface flow and changes in soil infiltration rates and soil structure (USDI BLM 2008 Final EIS, p. 352). Based on a compilation of watershed studies in the Northwest, completed in small catchments, a peak flow response is detected when at least 29 percent of the drainage area is harvested (Grant *et al.* 2008). No experimental study shows a peak flow increase when less than 29 percent of a drainage area in the rain dominated hydroregion has been harvested (USDI BLM 2008 Final EIS, p. 353).

The USDI BLM 2008 Final EIS (pp.753-759) analyzed peak flow effects from forest management on subwatersheds across western Oregon. Although some subwatersheds within the BLM planning area would be susceptible to increases in peak flows, this does not automatically imply adverse effects on stream form. None of the subwatersheds within the Back in Black project area were identified as susceptible (USDI BLM 2008 Final EIS, p. 755). It is presumed that hydrologic impacts, such as peak flow increases, would vary depending on the intensity of a treatment (i.e. regeneration harvest having the greatest impact and thinning having the least impact), although past experimental studies in the Pacific Northwest did not fully examine the differences (Grant *et al*. 2008; USDI BLM 2008 Final EIS, p. 353). Stream flow fluctuates with climate and over time, channels have developed under a wide range of stream flows including infrequent peak flows. These stream flows have the potential to affect the frequency of sediment transport and the depth of scour. However, the potential for peak flow effects would vary depending on stream type (Grant *et al*. 2008). The USDI BLM 2008 Final EIS (p. 758) indicated within high gradient cascade and step-pool stream types there is little potential to affect sediment transport and peak flow enhancement. All of the streams within and adjacent to harvest units in the Back in Black project area are these types of streams.

Area harvested in each of the six HUC 14 drainages on BLM-administered lands ranges from 0.07 to 4.4 percent. To assess the potential sensitivity to hydrologic impact, the amount of Equivalent Clearcut Area (ECA) was determined from aerial photography and GIS data for all six of the drainage areas in the project area on private and federal lands. Equivalent Clearcut Area is an accounting method which includes area in roads within a watershed and unrecovered canopy openings resulting from recent timber harvest.

Existing ECA in these drainages ranges between 5 and 21 percent (Section 3.5.2.2, Table 3-16). Coon Creek has the highest ECA at 21 percent, due to approximately 2,000 acres of private timber harvest within the last 15 years.

Road Impacts on Peak Flow Susceptibility

Roads total 380 miles in the six drainages encompassing the project area. The average road density in the project area is 5.3 road miles per square mile. Assuming a 40-foot average width, these roads cover 729 acres and represent an average area of about 4 percent of the 6 drainages.

Increases in peak flow can also occur when roads and other impermeable areas occupy more than 12 percent of a drainage in rain-on-snow hydroregions (USDI BLM 2008 Final EIS, p. 355). Within the project area, roads occupy 3 to 4 percent of the drainages and do not pose a risk of increased peak flows.

Sedimentation from Roads

According to Reid and Dunne (1984), forest roads can be a major contributor of fine sediment to streams, through down-cutting of ditch lines and erosion of unprotected road surfaces by overland flow. Roads crossing streams represent potential sources of sediment to streams depending upon road conditions and the volume of water passing at a given time. Road segments linked to the channel network also increase flow routing efficiency and offer a mechanism for peak flow increases (Wemple *et al.* 1996). Within the Back in Black project area, there are 50 stream crossings; 10 within the proposed timber harvest units, and 40 along the associated haul routes.

3.5.1.2. Aquatic Conservation Strategy (ACS)

The Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems on public lands. The ACS approach strives to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats. This approach seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds (Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl, 1994, page B-9).

The assessment of the Aquatic Conservation Strategy (Chapter 3, Section 3.5.2.2) focuses on affects to the Calapooya Creek Watershed. Ridge top harvest of two acres in the Lower North Umpqua Watershed would have no measurable affect to any indicator of watershed health or function. Ridge top locations generally lack water features, are more stable, and are the furthest distance from aquatic resources compared to mid or lower slope positions. Also, 2 acres represents 0.002 percent of the 91,230 acre Lower North Umpqua River Watershed. Therefore, the effects of the Back in Black project on the Lower North Umpqua Watershed will not be discussed in detail.

Range of Natural Variability within the Watershed

Based on the dynamic, disturbance-based nature of aquatic systems in the Pacific Northwest, the range of natural variability at the site scale would range from 0-100 percent of potential for any given aquatic habitat parameter over time. Therefore, a more meaningful measure of natural variability is assessed at scales equal to or greater than the fifth-field watershed scale. At this scale, spatial and temporal trends in aquatic habitat condition can be observed and evaluated over larger areas, and important cause/effect relationships can be more accurately determined.

Natural disturbance events to aquatic systems in the Pacific Northwest include wildfires, floods, windstorms, and landslides. Average fire return intervals at the drainage scale for similar watersheds were calculated between 50 and 75 years (prior to the advent of fire suppression). The more destructive stand replacement fires probably occurred irregularly at intervals from 150 to 350 years as this is the recurrence intervals found in the adjacent Elk Creek Watershed (Elk Creek/Umpqua River Watershed Analysis, USDI BLM 2004, p. 9). The Calapooya Creek Watershed Analysis (USDI BLM 1999) used an estimate based on data from the HJ Andrews Experimental Forest to determine a mean fire return interval for stand replacement fires of 130-150 years. Lightning caused fires occur every year in the Cascades and Coast Range. If not for fire suppression, lightning caused fires would kill trees and create openings in stands every summer.

The Calapooya Creek watershed is situated in the Coast Range Geographic Province (western three quarters) and the Western Cascade Province (eastern one quarter). The topography is highly variable ranging from rugged, highly dissected mountain slopes along the western margins of the watershed and on the east side typically low lying hills with broad flood plains and terraces in between. The Tyee Mountain-Yellow Creek Mountain scarp on the western fringe of the Calapooya Creek Watershed (The Tyee Formation and the similar Flournoy Formation) and the scarps and stream canyons of the Western Cascades (Fisher-Colestin and Little Butte Formations) have high densities of very steep, highly dissected slopes. These locations probably have the highest concentration of moderate to high landslide potentials, mainly of the shallow, rapid variety and debris flow variety (Calapooya WA 1999, pp. 6-7).

Timber harvesting and road construction over the past 70 years have substantially increased the frequency and distribution of landslides above natural levels in the Calapooya Creek watershed. However, there is a downward trend in landslide incidence over the last 25 years that is associated with improved management practices. On BLM-managed land, future landslides, occurring mostly during large storm events, are expected to deliver large wood and rock fragments to lower-gradient streams. This is intentional, and is a direct result of Riparian Reserve protection and the recognition of their role as critical source areas for large wood and sediment to downstream habitats. As a result, these events would more closely resemble landslides within relatively unmanaged forests. These disturbance events are the major natural sources of sediment and wood to a stream system and are very episodic in nature.

Due to the dynamic nature of these disturbance events, stream channel conditions vary based on the time since the last disturbance event. This results in a wide range of aquatic habitat conditions at the site level.

Stream temperatures vary naturally in this watershed as a result of variation in geographic location, elevation, climate, precipitation, and distance from the source. Stream temperatures also naturally vary as a response to the natural disturbance events mentioned in the previous paragraphs, as well as current practices on private forest, agricultural, and residential properties. Due to the large amount of riparian clearing that has occurred over the last 150 years (converting forest into farmland), coupled with management-induced channel widening, irrigation withdrawals, and loss of gravels, it is likely that stream temperature increases have been greater over larger spatial and temporal scales than observed naturally. One of BLM's objectives for managing Riparian Reserves is to maintain and enhance shade providing vegetation along streams.

Changes in stream flow can result from consumptive withdrawals and effects of land use activities on storm water runoff, infiltration, storage and delivery. Agricultural and domestic withdrawals are common along Calapooya Creek. Many tributaries within the Calapooya Creek watershed have also been cleaned (had large wood removed) or salvage logged. BLM forest management in the Calapooya Creek watershed would be designed to reduce or prevent watershed impacts.

3.5.2. Environmental Effects

3.5.2.1. Alternative One - No Action

Water Quantity and Water Quality

Canopy Opening Impacts on Peak Flow Susceptibility

Under Alternative One, no canopy openings would be created. Therefore, peak flow would not be affected and there would be no susceptibility of increased peak flow.

Road Impacts on Peak Flow Susceptibility

There would be no increase in road density within the project area since there would be no road construction. Therefore, peak flow would not be affected and there would be no susceptibility of increased peak flow.

Sedimentation from Roads

Under Alternative One, routine road maintenance would not fully repair existing sediment sources (e.g. culvert failures, natural surface road erosion, or cut slope failures). The lack of road maintenance would be most prominent on roads that are infrequently used or blocked. As they age, existing roads and drainage structures are subject to ongoing degradation or failure in the event of a storm. Most road or culvert failures would result in direct inputs of sediment to the drainage network. The amount of introduced sediment would vary depending on the size of the storm event and the infrastructure's condition, stability, and proximity to a stream. Road failures have the potential to deliver large amounts of sediment to the aquatic environment (as much as five times more than compared to background levels from a mature forest (May 2002)).

Sedimentation from Harvesting/Yarding Operations

Under Alternative One, very little sediment would be delivered to the stream network because there would be no ground disturbance near streams and the duff layer and stream banks would remain intact to intercept overland flow and filter any sediment naturally moving downslope.

Stream Temperature

Effective stream shade would be maintained at current levels. Vegetation that provides primary shading for perennial streams would remain, which would maintain canopy closure and prevent increased stream and air temperatures (USDI BLM 2008 FEIS, p. 761).

Fuels Treatments

Alternative One would not create activity fuels. There would be no changes to water resources because implementation of fuels treatments would not occur.

3.5.2.2. Alternative Two - Proposed Action

Water Quantity and Water Quality

Canopy Opening Impacts on Peak Flow Susceptibility

Timber harvesting proposed in the Back in Black project would increase the ECA by 1 to 4 percent for 4 of the HUC 14 drainages (Table 3-16). The ECA would remain unchanged by the Back in Black project in the Buzzard Roost Creek and Cooper Creek Reservoir drainages. All of the drainages would be less than the 29 percent threshold, where measurable increases in peak flows would be expected (Grant *et al.* 2008). No measurable change in hydrologic response would be expected from the proposed treatment compared to current conditions.

Table 3-16. Equivalent clearcut area (ECA) by alternative for HUC 14 drainages within the Back in Black project area.

HUC 14 Drainages	Drainage Size (acres)	ECA Threshold (%)	ECA (%)	
			Alternative One	Alternative Two
Coon Creek	8,055	29	21	24
Buzzard Roost Creek	4,356	29	20	20
Foster Creek	1,156	29	11	13
Fair Oaks	2,704	29	5	9
Oldham Creek	13,117	29	8	9
Cooper Creek Reservoir	16,739	29	9	9

Road Impacts on Peak Flow Susceptibility

During the project, there would be a minor increase in active road density within the project area. A total of 1.9 miles of road would be constructed, resulting in an increase in the area of roads varying from 0 to 0.05 percent across the project area drainages. Following the project, those same 1.9 miles would be decommissioned and approximately three additional miles of existing roads in the project area would also be decommissioned following use (Table 2-2). This would result in a decrease in the area of roads varying from 0 to 0.11 percent across the project area drainages. Although the net amount of active roads within the project area would decrease, the resulting area covered by roads within the project area drainages would remain unchanged at about 4 percent, which is less than the 12 percent threshold where measurable increases in peak flows would be expected (Harr *et al.* 1975).

Sedimentation from Roads

Road maintenance associated with the Back in Black project would occur prior to timber haul and would install cross drains and maintain ditchlines along proposed haul routes to disconnect roads from the stream system. This would reduce the amount of road related sediment entering streams in the project area. This work would occur during the dry season so that road conditions can stabilize prior to the first seasonal rains (Chapter 2, Section 2.3.4, #3).

Timber hauling would occur in both the dry and wet seasons. During the dry season, there is no mechanism (i.e. water flowing over the road surface) for sediment transport from the roads to the streams. However, with the first seasonal rains, there could be a small pulse (up to 6 percent increase over background) of sediment at stream crossings. During the wet season, sediment carried by runoff from road surfaces to ditchlines can result in sediment transport and delivery to the aquatic system. This sediment has the potential to impact water quality by increasing turbidity. However, with this project the potential total sediment inputs from existing roads would be negligible because these roads would have well vegetated ditchlines to filter and trap sediments, as well as PDFs to control road sedimentation during wet weather (Chapter 2, Section 2.3.4, #3). Past monitoring of timber haul and sediment delivery on similar road systems indicates that vegetated ditchlines are effective at filtering sediment from water in road ditchlines (McEnroe 2012) (Figure 3-4). Option A for road surfacing (see Chapter 2, Tables 2-1 and 2-2) proposes 6.3 miles of native surface roads and 25.7 miles of rocked roads, whereas Option B proposes rocking all roads being used by the project. Native surface roads may be subject to higher rates of erosion than rocked roads. The PDFs and Sediment Control Plan (Chapter 2, Section 2.3.4, # 2 and #3) would implement strategies to avoid and minimize sediment production and disconnect roads from stream networks to prevent adverse impacts to aquatic systems regardless of which type of road surface is present. Following the first seasonal rains, erosion rates would stabilize and sediment delivery would be indistinguishable from background levels, resulting in no measureable change to water quality.

Figure 3-4. Example of durable rock surface on a Back in Black haul route (24-3-21.0 road). Note the vegetated ditchlines that filter and trap road derived sediment. This photo was taken during a large rain event.

It is difficult to quantify the amount of sediment that could be delivered to aquatic systems because sedimentation rates are highly variable and depend on many factors such as precipitation, geology, road surface type, road drainage, and traffic levels. However, using published erosion rate estimates from the Southern Oregon Coast Range (Reneau and Dietrich 1991) and sediment production rates from roads (Coe 2006), the amount of sediment that could be contributed from roads within the project area would range from approximately 0.6 percent to 10.5 percent of the total estimated amount of natural background

sediment produced by these drainages each year. This estimate assumes all sediment produced from these roads would reach streams, which would not be the case. Previous studies have indicated that road-stream connectivity is a relatively simple relationship between annual precipitation and the presence of engineered drainage structures (Coe 2006). Properly designed roads with regular drainage will decrease road connectedness and therefore road sediment delivery by at least 40 percent (MacDonald and Coe 2008). Sediment discharge rates in streams are naturally highly variable and any remaining sediment that may reach streams would be within the range of natural variability.

Road segments must be connected directly to channels in order to deliver sediment-laden water. All road construction would be located on ridgetops or away from streams and would not be connected to the streams through ditchline drainage, and therefore would have no effect on stream sediment. Road construction would be limited to the dry season and the spurs would be over-wintered in a condition that is resistant to erosion and sedimentation (Chapter 2, Section 2.3.4, #3).

Roads would be monitored during hauling activity to determine if drainage problems are present. Timber hauling would be suspended during wet weather if road runoff would deliver higher sediment concentrations than those seen prior to haul. Haul would be suspended until drainage problems are corrected or wet weather conditions end. Therefore, the combination of well vegetated ditches, PDFs, and the ability to suspend wet weather haul is expected to prevent unacceptable sediment delivery to the aquatic system (Chapter 2, Section 2.3.4, #3).

Sedimentation from Harvesting/Yarding Operations

Potential effects of timber harvest on aquatic systems usually come from potential increases in landslide frequency and road activities, including road renovation, construction, and timber haul close to streams. Unstable areas identified by the project soil scientist would be included within the Riparian Reserves. This would result in a low risk of increased landslide activity and delivery of sediment to streams as a result of regeneration harvest (Chapter 2, Section 3.7.2.2, Slope Stability).

Riparian Reserves of 180-360 feet would be untreated along all streams (Chapter 2, Section 2.3.4, #1), and would provide root strength sufficient to maintain bank stability (USDI BLM FEIS 2008), protect eroding banks, and prevent additional sediment from entering streams. Rashin *et al.* (2006) found that sediment delivery is unlikely when potential erosion features (e.g. skid trails and yarding corridors) are more than 33 feet from stream channels. In this project, the Riparian Reserves provide a buffer 5 to 10 times this distance, which would eliminate ground disturbance near streams and maintain an intact duff layer that would be effective at intercepting and filtering sediment from upslope sites and not concentrating in gullies or yarding/skidding trails (Rashin *et al*. 2006).

Yarding may be allowed through Riparian Reserves where necessary, subject to pre-designation of the yarding corridors and authorization by the contract administrator, potentially causing localized soil disturbance and erosion. However, the PDF requiring full suspension, where practical, when yarding across streams, would reduce the risk of sedimentation arising from streambank and channel disturbance (Chapter 2, Section 2.3.4, #2).

The establishment of Riparian Reserves and application of PDFs described above would result in similar protections to water resources regardless of which yarding method option is selected (see Chapter 2, Table 2-3).

Stream Temperature

Under Alternative Two, effective stream shade would be maintained because the vegetation that provides primary shading for perennial streams would be protected by a 180-360 foot Riparian Reserve. The untreated Riparian Reserve and use of PDFs would maintain canopy closure and prevent increased stream and air temperatures.

Fuels Treatments

Alternative two would implement fuels treatments including landing and fuel accumulation pile burning (Chapter 2, Section 2.3.3). These activities would not produce a change to the water resources as they would be outside of Riparian Reserves.

Aquatic Conservation Strategy (ACS)

Based upon the information presented below, this project would not retard or prevent attainment of ACS objectives. Therefore, this action is consistent with the ACS and its objectives at both the site and watershed scales.

There are four main ACS components and nine ACS objectives, discussed in detail below.

ACS Components

1. **Riparian Reserves (ACS Component #1)**

   Riparian Reserves were established. The ROD/RMP (p. 24) specifies Riparian Reserve widths equal to the height of two site potential trees on each side of fish-bearing streams and one site-potential tree on each side of perennial or intermittent non-fish bearing streams, wetlands greater than one acre, and constructed ponds and reservoirs. The site-potential tree height for the Calapooya Creek and Lower North Umpqua River Watershed is 180 feet (Chapter 2, Section 2.3.4, #1). Commercial thinning was previously implemented in all of the units between 1999 and 2006 except for 5 acres in Unit 25-4-17A. As a result, most of the Riparian Reserves were treated by past thinning projects. Objectives of the previous thinning projects included managing for the development of late-seral characteristics and to control stocking, manage stands, and acquire desired vegetation characteristics needed to attain ACS objectives.

2. **Key Watersheds (ACS Component #2)**

   Key Watersheds were established "as refugia . . . for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species [ROD/RMP, p. 20]." None of the watersheds within the Back in Black project were identified as Key Watersheds in the ROD/RMP (p. 20).

3. Watershed Analysis (ACS Component #3) and other pertinent information

In developing the project, the Calapooya Creek Watershed Analysis (1999) was used to evaluate existing conditions, establish desired future conditions, and assist in the formulation of appropriate alternatives. Watershed Analysis is used to help inform the project analysis, but does not direct BLM actions within the watershed. The Calapooya Creek Watershed Analysis is available for public review at the Roseburg District office or can be viewed under "Plans & Projects", "Inventories", on the Roseburg District website at www.blm.gov/or/districts/roseburg/index.php.

In 2003, the Partnership for the Umpqua Rivers watershed council completed a watershed assessment for Calapooya Creek. That assessment is available at http://www.umpquarivers.org/watershed-assessments/.

Existing watershed conditions are described in the Water Resources section of this EA (Chapter 3, Section 3.5). The short and long term effects to aquatic resources are also described in this section of the EA.

4. Watershed Restoration (ACS Component #4)

The primary purpose of Riparian Reserves is to project aquatic resources from the effects of upland treatments. In the Back in Black project, Riparian Reserves would not be treated while the upland areas would be treated with a regeneration harvest. Previous thinning treatments within the Riparian Reserves between 1999 and 2006 applied thinning prescriptions for the development of large trees to provide an eventual source of large woody debris to stream channels and create diversity in the riparian stands. Therefore, the previous thinning actions functioned as a watershed restoration project. For this project, no harvesting in the Riparian Reserve width of 180 feet (360 feet along the fish-bearing portion of Gossett Creek) would allow the riparian stand conditions to continue to develop as intended by the previous thinning treatments. The Riparian Reserves would also maintain current stream conditions by protecting them from effects of the upland treatments.

The BLM has limited ownership within the Calapooya Creek watershed (11,946 acres out of 157,470 acres (8 percent)). Therefore, watershed restoration opportunities have been limited. Since 1994, numerous stream enhancement projects have been implemented in the Umpqua Basin. This includes placing instream structures (e.g. trees, logs, boulders and/or root wads) to improve aquatic habitat, replacing culverts identified as barriers to fish passage to open up access to additional habitat, or improving or decommissioning roads to reduce road sediment impacts to aquatic systems. This work has been done in a collaborative effort with private timber companies, Partnership for the Umpqua Rivers Watershed Council, and the Oregon Department of Fish and Wildlife (ODFW). Future opportunities for restoration are discussed in the Calapooya Creek Watershed Analysis. This work would be implemented as budgets allow, but is not part of the proposed action here.

Table 3-17. Individual aquatic conservation strategy objective assessment

ACS Objective	Site/Project Scale Assessment	Watershed Scale Assessment
	Scale Description: Units identified in this project are located in six drainages. The BLM manages 6,500 acres in these drainages (14 percent). Units proposed for treatment represent from 0.07 to 4 percent of the total area of the drainages and from 7 to 25 percent of the BLM-administered lands in the drainages (Appendix A, Figure A-3, Hydrologic Unit Code 14 (HUC 14) – drainage level).	Scale Description: The project is located in the Calapooya Creek watershed. This watershed is 157,500 acres in size. The BLM manages 11,900 acres in this watershed (8 percent). Units proposed for treatment represent 0.3 percent of the watershed, and 5 percent of the BLM-administered lands in the watershed (Appendix A, Figure A-2, Hydrologic Unit Code 10 (HUC 10) – watershed level).
1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.	There would be no harvest within the Riparian Reserves under the Back in Black project. Previous treatments within the Riparian Reserves between 1999 and 2006 applied thinning prescriptions for the development of large trees to provide an eventual source of large woody debris to stream channels and to create diversity and complexity in the riparian stands. Therefore, the previous thinning actions functioned as a watershed restoration project. A total of 214 acres of the Riparian Reserves in the vicinity of Back in Black were treated by these previous thinnings. Trees within these treated stands are expected to attain more diversity and complexity in a shorter amount of time than if they had been left untreated. For this project, the Riparian Reserves serve as a 180 foot no-harvest area along all non-fish bearing streams, and a 360 foot no-harvest area along Gossett Creek. The Riparian Reserves would maintain primary shade zones and the current stream temperature regime. The Riparian Reserves would prevent disturbance to stream channels and stream banks and intercept surface run-off allowing sediment transported by overland flow to be filtered out before reaching active waterways (Chapter 3, Section 3.5.2.2) and would prevent impacts to aquatic resources. For the reasons stated above, this objective would be maintained at the project scale.	This objective would also be maintained at the watershed scale. The Riparian Reserves would protect aquatic systems and would not retard or prevent attainment of this objective for the same reasons stated for the project scale.

ACS Objective	Site/Project Scale Assessment	Watershed Scale Assessment
2. Maintain and restore spatial and temporal connectivity within and between watersheds.	Riparian Reserves would not be harvested. Past riparian treatments have not inhibited spatial and temporal connectivity, but rather sought to restore conditions to a more natural state, over time, by reducing stand density and releasing hardwoods. Untreated areas would maintain a contiguous corridor along stream channels, providing habitat for riparian dependent species while previously treated portions of Riparian Reserves created diverse habitat throughout the watersheds. Therefore, this project would maintain the existing aquatic connectivity condition.	Spatial and temporal connectivity would be maintained at the site-scale and therefore also at the watershed scale.
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.	Upland timber harvest would remain below the threshold of watershed area harvested such that stream flows would not be influenced (Chapter 3, Section 3.5.2.2). In addition, Riparian Reserves along streams would prevent disturbance to stream channels and stream banks (Chapter 3, Section 3.5.2.2). Therefore, this project would maintain the physical integrity of the aquatic system.	Since the physical integrity of the aquatic systems would be maintained at the site scale, they would also be maintained at the watershed scale.
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.	Project design features (PDFs), such as Riparian Reserves established along streams, would retain shading and maintain water temperature to ensure water quality would not be adversely impacted by the proposed action. Riparian Reserves along streams would prevent disturbance to stream channels and stream banks and intercept surface run-off allowing any sediment transported by overland flow to be filtered out before reaching active waterways (Chapter 3, Section 3.5.2.2). Therefore, this project would maintain the existing water quality.	Since water quality would be maintained at the site scale, it would also be maintained at the watershed scale.
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved.	Riparian Reserves along streams would prevent disturbance to stream channels and stream banks and intercept surface run-off allowing sediment transported by overland flow to settle out before reaching active waterways (Chapter 3, Section 3.5.2.2). Road maintenance/renovation associated with the project would occur prior to timber haul and would install cross drains and maintain ditch lines along proposed haul routes to disconnect roads from the stream system (Chapter 3, Section 3.5.2.2). Therefore, this project would maintain the existing sediment regime.	Since the existing sediment regime would be maintained at the site scale, it would also be maintained at the watershed scale.

ACS Objective	Site/Project Scale Assessment	Watershed Scale Assessment
6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing.	Upland timber harvest would remain below the threshold of watershed area harvested such that canopy cover would not be reduced to an extent that stream flows would be influenced (Chapter 3, Section 3.5.2.2). Road maintenance/renovation associated with the project would occur prior to timber haul and would install cross drains and maintain ditch lines along proposed haul routes to disconnect roads from the stream system. Road construction would not extend the drainage network or contribute to a potential increase in peak flow because the new roads would be located on ridge tops or stable side slopes with adequate cross drains. When the project is completed, decommissioning roads would decrease the amount of active roads and the potential for peak flow effects and sediment routing (Chapter 3, Section 3.5.2.2). Therefore, this project would maintain stream flows within the range of natural variability which would be sufficient to create and sustain riparian and aquatic habitats, and to retain patterns of sediment, nutrient, and wood routing.	Since in-stream flows and patterns of sediment, nutrient, and wood routing would be maintained at the site scale, they would also be maintained at the watershed scale.
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and woodlands.	As discussed in #6 above, this project would maintain stream flows within the range of natural variability. Therefore, it would also maintain current stream interactions with the floodplain and respective water tables.	Since this project would maintain stream interactions with the floodplain and respective water tables at the site scale, it would also maintain them at the watershed scale.
8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.	Riparian Reserves would not be treated. The intent of past riparian treatments was to restore conditions to a more natural state, over time, by providing adequate thermal regulation, nutrient filtering, appropriate erosion rates, and amounts of coarse woody debris sufficient to sustain physical complexity and stability. Riparian Reserves would maintain a contiguous corridor along stream channels, providing habitat for riparian dependent species while previously treated portions of the Riparian Reserves created diverse habitat throughout the watersheds.	Since Riparian Reserves would not be treated, this project would also maintain the existing species composition and structural diversity of plant communities in riparian areas at the watershed scale.

ACS Objective	Site/Project Scale Assessment	Watershed Scale Assessment
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.	Riparian Reserves would not be treated in this project. The intent of past riparian treatments was to set riparian stands on a trajectory that would trend toward historical conditions to support populations of riparian-dependent species. Under the current proposed action, Riparian Reserves would maintain a contiguous corridor along stream channels, providing habitat for riparian dependent species.	Since Riparian Reserves would not be treated, this project would also maintain the existing habitat for riparian dependent species in the project area at the watershed scale. Over time, implementation of riparian restoration projects would produce adequate habitat to restore and support riparian-dependent species.

Cumulative Effects

The BLM has planned 220 acres of timber harvest within the Coon Creek Drainage and 470 acres in the Oldham Creek Drainage. Most of this treatment would be thinning projects including 7 acres of heavy thinning and gap creation in the Coon Creek and 42 acres in the Oldham Creek drainages. The treatment of these acres would not result in an increase in ECA for the Coon Creek drainage, which would remain at 24 percent but would increase from 9 to 10 percent for the Oldham Creek drainage. The ECA in these drainages would still be less than the 29 percent threshold where measurable increases in peak flows would be expected (Grant *et al.* 2008). Therefore, no measurable change in hydrologic response would be expected from this additional treatment when considered together with the Back in Black project.

Under the Calapooya Creek Harvest Plan EA, the Coon Creek drainage would have 0.3 miles of road construction and 0.35 miles of decommissioning. When combined with the Back in Black project, the amount of area occupied by roads would increase to 0.07 percent within the Coon Creek drainage, but would decrease by 0.12 percent after the decommissioning of roads. The Oldham Creek drainage would have 0.5 miles of road construction and 1.48 miles of decommissioning under the Calapooya Creek Harvest Plan, when combined with the Back in Black project would decrease the miles of road by 0.05 percent after the decommissioning of roads. Although the amount of roads within the project area would change slightly during and after these projects are implemented, the area covered by roads within the project area would remain unchanged at about 4 percent. This is less than the 12 percent threshold where measurable increases in peak flows would be expected (Harr *et al.* 1975).

Some haul routes are the same between this EA and the Calapooya Creek Harvest Plan EA. Implementing the project design features described in Chapter 2 would prevent or reduce impacts from log hauling, so there would be no measureable difference in road related sediment from the combination of these projects compared to each individual project as described in both EAs. The same can be said for stream temperature, water quality and quantity, sedimentation from harvest activities, and fuel treatments, which were also analyzed in both EA. Implementing the project design features in the Back in Black and Calapooya Creek Harvest Plan projects would intercept surface runoff and prevent sediment from entering streams, prevent disturbance to aquatic systems, and maintain effective stream shade so there would be no direct or indirect impacts on water quality, beneficial uses of water, or municipal drinking water sources in or downstream from the project area. There are no other projects planned in the Calapooya Creek watershed at this time.

It is expected that timber harvesting would continue at current rates on private lands. As a result, older harvested areas would reach a point of hydrologic recovery while newer areas are harvested, which would maintain a constant level of watershed disturbance.

3.6. Noxious Weeds

3.6.1. Affected Environment

The BLM manages noxious weed populations under the authority of the *Roseburg District Integrated Weed Control Plan and Environmental Assessment* (EA #OR- OR-100-94-11; USDI BLM 1995b). The Roseburg District BLM Noxious Weed list is a subset of the Oregon State (ODA Noxious Weeds List, 2015) and the Douglas County lists. It contains Category A and T species that occur in the District and are targeted for detection and control (USDI BLM 1995b). Category B species are treated at high priority sites, such as Special Status plant sites, special areas, and within project areas where there is a risk of spreading weeds during project implementation.

Surveys for noxious weeds were conducted within the project area in 2013 and 2014 (*Appendix F, Noxious Weeds*, Table F-1). Eleven noxious weed species were identified in the Back in Black project area. Many of these have migrated into the watershed from adjacent watersheds. Most populations occur along road systems and were introduced and spread during road construction and subsequent vehicular travel.

The surveys located Scotch broom (*Cytisus scoparius*), Himalayan blackberry (*Rubus armeniacus*), English holly (*Ilex aquifolium*), and English hawthorn (*Crataegus monogyna*). Scotch broom and Himalayan blackberry are Oregon State designated Category "B" Noxious Weeds, which are weeds of economic importance and regionally abundant, but may have limited distribution in some counties (Oregon Department of Agriculture, 2015). English holly and English hawthorn are Douglas County designated Category "B" Noxious Weed species, which means these noxious weeds are common and well established in Douglas County. Eradication at the county level is not likely but containment is possible in some cases and is encouraged (Douglas County Noxious Weed Policy and Weed List 2014). Because noxious weed surveys cover less than 10 percent of the drainages (BLM NISIMS Database 2015), additional populations of noxious weeds probably occur in the vicinity of the proposed harvest units.

Scotch broom is a pioneer species known to displace native plant species. The seeds are long lived (up to 30 years) and mature plants are prolific seed producers (hundreds to thousands of seeds per plant (Zouhar 2005)) establishing persistent seed banks. These seed banks can be stimulated to germinate by creating canopy openings that allow light to reach the ground (McAlpine and Drake 2002). Reducing the size of or eradicating populations requires long-term management.

Himalayan blackberry is highly competitive relative to native plant species, partially due to its increased photosynthetic capacity (McDowell 2002), reduced water stress (Caplan and Yeakley 2010), high fruit production, averaging 720 fruits per cane (McDowell and Turner 2002), extensive vegetative growth (up to 23 feet per year per cane), and ubiquitous vegetative reproduction (Hoshovsky 2000). Himalayan blackberry is a wide spread noxious weed problem in Douglas County and has an economic impact on right-of-way maintenance and forest production.

English holly individuals can live for at least 250 years and reproduce mainly by seed (Peterken and Lloyd 1967), which are carried by birds into forests (Zika 2010). Dense thickets are formed that dominate the shrub layer and suppress germination and growth of native tree and shrub species. Seed can persist in the seed bank for 4–5 years (Arrieta and Suarez 2004).

English hawthorn spreads rapidly by seeds carried into woodlands and open fields by birds. They often create a dense thicket, which crowds out native trees and other species (Sallabanks 1992).

Other noxious weed species found in the project area include: Stinky Bob (*Geranium robertianum*), Slender false brome (*Brachypodium sylvaticum*), bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), St. Johnswort (*Hypericum perforatum*), meadow knapweed (*Centauria debeauxii*), and tansy ragwort (*Senecio jacobaea*). These species are Oregon State listed "B" noxious weeds and generally found sparsely invading disturbed areas along roadsides and off-road vehicle tracks.

Noxious weeds that are present in the project area but outside of the units include: striated broom (*Cytisus striatus*), English ivy (*Hedera helix*), and gorse (*Ulex europaeus*) (BLM NISIMS Database, 2015; Oregon Department of Agriculture WeedMapper, 2015). They are primarily clustered in previously disturbed habitats in developed areas, pastures, and fields used for hay production, and recently regenerated stand, and along roads on private lands.

3.6.2. Environmental Effects

3.6.2.1. Methodology and Assumptions

Environmental effects for noxious weeds were qualitatively analyzed by unit and at the, sixth-field watershed level.

3.6.2.2. Alternative One - No Action

Under Alternative One, the BLM would not implement timber harvesting that could result in ground disturbance, changes in canopy cover, or importation of noxious weed seeds or plant parts into the Back in Black project area. Noxious weed populations within the project area would not be treated and would spread or decrease at their natural rate dependent on favorable growing conditions. Therefore, implementing Alternative One would result in minor direct or indirect changes in noxious weed populations.

3.6.2.3. Alternative Two - Proposed Action

Soil disturbance and vegetation removal by regeneration timber harvests, without control measures, would result in the introduction or spread of noxious weeds into or within the project area. Without control measures, noxious weed seeds or plant parts would be brought from infested areas into non-infested areas on vehicles or equipment used in the logging operations. Seeds and plant parts could also be spread from one area to another by vehicles or equipment. However, the BLM pre-treats noxious weeds along roads in the project area; this in turn reduces the amount of noxious weed in the project area prior to harvest activities. By pre-treating noxious weeds along roads within the project area prior to harvest, and by following the PDFs of washing equipment and vehicles before entry into the sale units (Chapter 2, Section 2.3.4, #8), the spread of noxious weeds would be reduced.

Harvest operations (e.g. ground-based yarding, cable yarding corridors, road maintenance/renovation, road construction, road decommissioning, and pile burning) would create areas of exposed mineral soil, which would provide conditions suitable for seed germination and seedling establishment of noxious weeds (Gray 2005, Sutherland and Nelson 2010). New weed infestations on exposed mineral soil would be expected as long as openings in the canopy and available seed sources are present. This would be kept to a minimum by following the PDFs; however, this would not change the existing noxious weed seedbed. Noxious weeds would decrease in abundance as the canopy closes, due to reforestation and stand maintenance (Tables 3-8 and 3-9), and native understory species would eventually overtop and out-compete the weeds for sunlight, soil moisture, and soil nutrients.

It is impossible to provide a quantitative measure of impacts of the Proposed Action on invasive plant frequency and cover, due to the high level of uncertainty associated with unknown, unmeasurable variables, such as the size, location, and composition of the existing non-native seed bank or the stochastic events that influence propagule germination. However, expected post-harvest trends can be described qualitatively based upon research in other similar systems and individual species' life histories.

A flush of noxious weeds would be expected in the first five (5) years following the Proposed Action, as the existing seed bed is stimulated to germinate and propagules from surrounding weed sites become established within the areas of soil disturbance. These would include thistle species, Himalayan blackberry, and Scotch broom. Because trees would be planted within harvested units (Chapter 2, Section 2.3.1), thistle species and St. Johnswort would decline after 5-10 years, when the tree canopy cover prevents light from reaching the ground (Gray 2005, Parendes and Jones 2000). Himalayan blackberry would decline slowly, after 15-20 years, with lower light levels (Caplan and Yeakley 2006, Gray 2005, McAlpine and Drake 2002, Zouhar 2005). This is not the case with Scotch broom, where populations are found in differing light-levels and frequently in the forest understory. Germination of new Scotch broom plants would diminish as canopy cover increases; however, mature plants would persist and live for up to 30 years (Zouhar 2005). Herbicide treatments would be applied when needed and revisited at 5-10 year intervals, depending on funding and the priority of treatment projects.

Yarding Option A consisting of 392 acres of cable yarding and 138 acres of ground-based yarding would have a moderate risk of noxious weed spread on up to 9 percent of the project area because of soil disturbance from ground-based logging. Yarding Option B consisting of 530 acres of cable yarding and no ground-based yarding has a lower risk of noxious weed spread because 3 percent of the project area would have soil disturbance from cable yarding operations (Chapter 3, Section 3.7.2).

Pile burning on 144 acres within the units would have a low risk of spreading noxious weeds under both Option A and Option B. The proximity of the piles to roads makes it easy to treat noxious weeds. Option B would have 24 more acres of pile burning, which would produce a higher risk of spreading noxious weeds than Option A. However, both Options would remain at a low risk of noxious weed spread by implementing PDFs, which includes power washing the machines used to create the piles (Chapter 2, Section 2.3.4, #8).

Noxious weed spread is not expected to differ among the two road surfacing options; Option A (rocked = 25.7 miles, native = 6.7 miles) and Option B (rocked = 32.4 miles, native = 0 miles). Option A contains 6.7 miles of native surface roads, which may be subsoiled as part of decommissioning. This would allow vegetation to grow on the road after decommissioning, while decommissioned rocked roads may never see a full vegetative recovery (Forest Vegetation, Section 3.3.2.3). The vegetation growing on decommissioned roads would be native species and nonnative/noxious weeds. The 6.7 miles of native surface roads would be more susceptible to noxious weed invasion than the rocked surface, making Option A the higher risk for noxious weed invasion.

Cumulative Effects

The cumulative effects analysis area for noxious weeds is the 29,385 acre area covering the drainages encompassing the proposed project. The current conditions analyzed are a culmination of past and present activities and are described in the affected environment. Future actions that may increase the spread of noxious weeds include timber harvest of up to 1,245 acres within twenty six (26) units analyzed under the Calapooya Creek Harvest Plan EA (USDI BLM 2015), continued timber harvesting on private industrial lands, and continued use of lands for pastures and hay production. Alternative Two would contribute to the risk of weed establishment by disturbing soil and opening canopies by regeneration harvesting 530 acres and 0.22 miles of road construction outside of the proposed units. Implementing the noxious weed prevention PDFs in the Calapooya Creek Harvest Plan EA (USDI BLM 2015, p. 26) and the Back in Black EA (Chapter 2, Section 2.3.4, #8) would produce little or no cumulative effect on noxious weeds beyond what is already included in the environmental effects section of the EAs.

3.7. Soils

3.7.1. Affected Environment

Issue #1

How would regeneration harvest, associated road activities, and fuels management affect soil productivity?

Soil Productivity

Severe soil compaction can reduce soil productivity, resulting in reduced height and volume growth of conifer species (Wert and Thomas 1981). Extensive displacement of the mineral surface soil and mixing with the subsoil can reduce site productivity because subsoils are generally denser and lower in nutrients and organic matter. Extensive soil displacement can also alter slope hydrology, increasing the potential for surface soil erosion (Page-Dumroese *et al.* 2009).

The soil's susceptibility to reductions in productivity from regeneration harvest and road construction is a function of soil type and slope. The landscape within the Back in Black project area consists of terrain ranging from gently sloping broad ridges, foot slopes, and side slopes to steep side slopes and very steep side slopes, with occasional headwalls (Johnson *et al.* 2004). About 70 percent of the unit acres are located on stable broad ridges and foot slopes, and gentle to moderately sloping convex to concave side slopes, with slopes of 30 percent or less. These soils are deeply weathered with moderate to high amounts of clays in the subsoil, predominantly with silty clay loam, clay loam, silt loam or gravely clay loam textures. These soils are moderately to highly susceptible to compaction and displacement by heavy equipment because of the clay content and the low to moderate amount of gravels.

Twenty-nine percent of the unit acres are located on moderate slopes of 30 to 60 percent, with convex and concave topography. The soils in these areas are moderately deep, 20-40 inches, to deep, more than 60 inches. The soil textures are loams, clay loams, and silty loams with moderate amounts of gravels. Slopes in these areas are stable to moderately stable but would be moderately susceptible to displacement, based on slope steepness. If disturbed, there is a potential productivity loss from erosion, due to the steeper slope gradient of these soils.

The remaining acres (about 1 percent) are deep soils located on steep to very steep side slopes of 60 to 90 percent. Soil textures are gravelly loams. These very steep slopes are susceptible to productivity loss due to erosion after disturbance unless mitigated with waterbars or slash cover.

A field review of units proposed for harvest show evidence of soil disturbance from the timber harvesting that occurred in the 1940s and 1950s and commercial thinning that occurred between 1999 and 2006. Soil disturbance was noted on five percent of the project area; the majority of existing disturbance is located in areas where ground-based harvest has occurred. Existing primary skid trails exhibit compacted subsoil with dense soil structure in the top five to six inches or more over the running surface. The primary skid trails are predominantly vegetated with forbs, moss, or shrubs with some conifers, and little erosion was noted. Secondary skid trails are generally compacted to depths of three to four inches along tread areas, which are three to four feet wide, and are generally well vegetated with forbs, moss, shrubs and conifers. Soil productivity is recovering very slowly where the topsoil was displaced and the subsoil was exposed.

Timber Production Capability Classification (TPCC) mapping was reviewed and field verified to determine if timber harvest would negatively impact sustained yield (USDI BLM 1986). Two classifications were considered; restricted where sustained yield is attainable with the use of BMPs and non-suitable woodland where future production would be reduced even with BMPs. Out of the 530 acres of proposed regeneration harvest, 225 acres are classified as restricted and about 1 acre is mapped as non-suitable. After a field review of the mapped non-suitable area, it was determined to be suitable for timber harvest and TPCC mapping was updated.

Issue #2

How would regeneration harvest and associated road activities affect slope stability?

Slope Stability

Geology of the project area consists of intrusive basalt and andesite rocks, marine sedimentary deposits including sandstones, siltstones, and mudstone, as well as Fisher and Eugene formation sedimentary and volcanic rocks. These rock types have the potential to produce sporadic, deep-seated slump/earth flow movements because of large concentrations of very deep, clayey soils and subsurface flows (USDI BLM 1999). However, other types of landslides including shallow rapid landsides and debris flows can also occur in these geologic units. Landslides of all types can occur as a result of natural or management related causes.

Aerial photograph landslide inventories have been completed for the Calapooya Creek watershed and the Elkton-Umpqua watershed, covering the period from 1959 through 1994 (USDI BLM 1999). Results from these inventories indicated that the majority of slope failures were shallow rapid landslides (less than 1/10 acre in size) that occurred from 1959 to 1983. Most of the identified landslides occurred during the 1964 storm event in areas that had been clearcut or were in an early-seral condition. These aerial photo inventories have shown a declining number of landslides during those 25 years. The reduction in landslide occurrence corresponded with the implementation of improved management practices, especially in road location and construction.

In addition to aerial photograph landslide inventories, units in the Back in Black project were reviewed in the field for signs of active landslide activity and landslide risk. Slopes within the units are currently stable; areas noted as having signs of instability are in Riparian Reserves or would be excluded from harvest units.

3.7.1.1. Methodology

Analysis Indicators

Soil productivity and slope stability are the issues analyzed in this EA to respond to internal and external scoping and to evaluate compliance with management direction. The indicator for soil productivity is percent of harvest area impacted by detrimental soil compaction, displacement, and heating. This indicator measures compliance with the soil management direction in the RMP to improve and/or maintain soil productivity. For ground-based harvest operations, BMPs in the RMP (p. 131) specify that landings, main skid trails and large slash piles should cumulatively affect no more than ten percent of the ground-based harvest area in order to maintain productivity. This was further clarified in plan maintenance implemented since adoption of the RMP (USDI BLM 2001pp. 70-71). Monitoring from previous timber sales on the Roseburg District was used to estimate the extent of compaction and displacement to occur by implementing the proposed activities.

The indicator for slope stability is the relative risk rating for landslides as a result of regeneration harvest and associated road activities. Fuels activities were not included in this indicator because the piling and burning of logging slash would not impact slope stability. This indicator measures attainment of Aquatic Conservation Strategy (ACS) objectives by protecting unstable and potentially unstable areas. A matrix is used to determine the relative risk of shallow, rapid landslides (Table 3-18). These types of landslides are most common on steep, forested slopes in Oregon and can be sensitive to impacts from timber harvesting and road construction. The probability rating is based on the Calapooya Creek Watershed Analysis (USDI BLM 1999) and an ODF study, "Storm Impacts and Landslide of 1996" (Robison *et al.* 1999). The consequence rating is based on soil and water objectives in the RMP.

Table 3-18. Risk assessment for shallow rapid landslides following a regeneration harvest.

PROBABILITY	CONSEQUENCE		
	Minor	**Moderate**	**Major**
	• No delivery to streams • Small and isolated slides; soil productivity not impacted • Safety or property not impacted	• Delivery to non-fish bearing streams • Larger or more frequent slides; combined impacts from slides and harvest impacts up to 10% of unit • Moderate property damage	• Delivery to fish bearing streams • Larger and/or more frequent slides; combined impacts from slides and harvest impacts more than 10% of unit • Safety concerns and major property damage
Low potential ***0 to 10 % chance*** • 0 to 35 percent slopes	Very Low	Low	Moderate
Moderate potential ***10 to 30 % chance*** • 35 to 70 percent slopes • Headwalls and inner-gorges • Low soil cohesion	Low	Moderate	High
High potential ***>30 % chance*** • >70 percent slopes • Concave slopes, hollows, swales + headwalls and inner-gorges • Low to moderate soil cohesion	Moderate	High	Very High

Spatial and Temporal Context

The spatial context of soil productivity includes activities within the proposed harvest units and roads because this is the limit of where disturbing activities would occur. Direct effects would include detrimental soil displacement and soil compaction from activities such as landing construction, and ground-based and cable yarding of logs. Direct effects include soil displacement deeper than the organic-enriched surface layer and high compaction deeper than four inches. Indirect effects would include any resulting soil erosion and any subsequent slope failures resulting from soil disturbance and the removal of forest cover.

Soil nutrients moved through displacement can take decades to accumulate. Soil compaction from ground-based equipment can also persist for decades (Amaranthus *et al.* 1996, Powers *et al.* 2005). The temporal context to evaluate impacts to productivity from compaction and displacement is 30 years. This takes into account the fact that in some areas, compaction recovers faster through natural processes and by subsoiling, but in other areas the effects of compaction and displacement lasts longer than 30 years.

The spatial context for slope stability includes activities within the proposed harvest units and roads. The indirect effects of regeneration harvest on slope stability are loss of root strength and loss of transpiration from live trees, which increases the risk of shallow transitional landslides. The temporal context for slope stability is the first ten years after regeneration harvest; the potential for slope failures would generally be within the first decade or until rooting strength in the soil is reestablished (USDI BLM 2008a Robison *et al.* 1999).

3.7.2. Environmental Effects

3.7.2.1. Alternative One - No Action

Under Alternative One, there would be no effect on soil productivity in the project area because there would be no soil displacement or compaction associated with harvest operations (e.g. ground-based yarding, cable yarding corridors, road maintenance/renovation, road construction, road decommissioning and machine piling and burning). The percent of harvest area impacted by compaction and displacement from this alternative is zero. Surface and soil organic matter would continue to increase slowly with the accumulation of needles, twigs and small branches, and decomposing larger woody material, absent a fire of sufficient intensity to consume the material. The compacted soils in the skid trails from past disturbance would continue to recover very slowly, especially at depths greater than six inches (Amaranthus *et al.* 1996, Powers *et al.* 2005). These compacted soils would recover as the processes of freezing and thawing, the penetration of plant roots, and the burrowing of small animals break up the compaction and incorporate organic matter into the soil.

There would be no change in the stability of the soils within the project area as a result of Alternative One. The relative risk of shallow, rapid landslides would remain low (Table 3-19). However, there could be occasional shallow, rapid slope failures during major storm events. During extended periods of intense rainfall, deep-seated landslides could become re-activated. The stands in the project area are 60 to 66 years old. A study by the Oregon Department of Forestry found that landslide numbers, resulting from the intense 1996 storms, were lowest in stands 31-100 years old followed by mature forests older than 100 years (Robison *et al.* 1999). Young stands less than 10 years old had the highest rates of landslides according to this study.

Table 3-19. Results of risk assessment for shallow rapid landslides for Alternative One.

Unit	Probability	Consequence	Risk
24-3-5C	Low	Minor-Moderate	Very low-Low
24-3-5D	Low	Minor-Moderate	Very low-Low
24-3-5E	Low	Minor-Moderate	Very low-Low
24-3-7D	Low	Minor-Moderate	Very low-Low
24-3-17D	Low	Minor-Moderate	Very low-Low
24-4-1D	Low	Minor-Moderate	Very low-Low
24-4-1E	Low	Minor-Moderate	Very low-Low
24-4-13E	Low	Minor-Moderate	Very low-Low
25-4-17A	Low	Minor-Moderate	Very low-Low

3.7.2.2. Alternative Two - Proposed Action

Soil Productivity

Ground-based yarding, cable yarding, machine piling and burning, and road construction are proposed activities that are likely to impact soil productivity through detrimental soil compaction, displacement, and soil heating. Ground-based and cable yarding would each result in up to 12 acres of detrimental soil disturbance or roughly 2 percent of the project area. Machine pile burning can impact soil productivity through nutrient loss and changes to soil structure and biology due to soil heating on approximately 9 acres of the burn pile footprints. Road construction would result in an additional 7 acres of soil disturbance or around 1 percent of the project area. The total acres of detrimental soil disturbance from these activities represent up to 40 acres or eight percent of the project area for Option A and 32 acres or six percent of the project area for Option B. This represents a minor portion of the treated acres and would not result in loss of stand productivity. According to guidance in the RMP, the effects from this project are within the 10 percent standard for soil disturbance.

Ground-Based Yarding

Monitoring of ground-based operations, which include rubber-tired skidders, tractors, excavators, and harvester/forwarder systems on the Roseburg District from 2000 through 2012, has shown that with the application of appropriate PDFs and BMPs (RMP p. 131) the spatial extent affected by ground-based machinery ranged from three to nine percent of the ground-based harvest area, depending on the equipment used and number of landings and large pile areas (USDI BLM 2004, 2006, 2007, and 2009). For Option A of the Proposed Action (see Chapter 2, Table 2-3), where ground-based yarding is proposed on 138 acres, as many as 12 acres of soil disturbance would occur. Effects would include soil compaction deeper than four inches and/or soil displacement deeper than the organic enriched surface soil layer. The result of these effects would be a local reduction in productivity that could persist for as long as 30 years. The effects of ground-based yarding varies by the type of equipment used, number of equipment passes over the trails, terrain, access routes, climatic conditions, and operator skill. Option B of the proposed action does not include ground-based yarding, so no disturbance from this activity would occur.

The PDFs (Chapter 2, Section 2.3.4, #2), which restrict ground-based yarding to designated trails and slopes less than 35 percent, would limit soil displacement and the extent of affected area. The extent of disturbance would also be limited by maintaining an average skid trail spacing of at least 150 feet and limiting equipment track width to 12 feet. Soil compaction would be minimized by suspending the use of ground-based equipment during periods of wet weather and when soil moisture levels are high.

Additionally, some landings and heavily compacted skid trails would be subsoiled to reduce compaction. Areas of shallow, skeletal soils with high cobble and gravel content, or rocky soils would not be subsoiled. Subsoiling would reduce soil bulk density and provide some soil aeration, allowing for natural reseeding of trees, and contributing to the survival and growth of both natural and planted seedlings. Subsoiling would also help prevent runoff and erosion by increasing infiltration capacity.

Part of the subsoiling process would also include placing slash and other organic debris, and some topsoil over the tilled areas to reduce surface soil erosion, and replace organic material, nutrients, and soil microbes to help maintain soil productivity. Logging slash, where available, or other organic debris and topsoil would cover at least 50 percent of the subsoiled areas (Chapter 2, Section 2.3.4, #2).

Cable Yarding

Monitoring of timber sales on the Roseburg District has shown that the amount of ground affected by cable yarding systems ranged from two to three percent of the harvest unit when the proposed PDFs were applied (USDI BLM 2007, 2008c, 2008a, 2009). For the Back in Black project, this represents as many as 12 acres for Option A of the Proposed Action and 16 acres for Option B. This includes areas disturbed within yarding corridors, landings and equipment use areas. The result would be a local reduction in productivity that could persist for as long as 30 years. Soil disturbance from cable yarding would vary by topography (e.g. convex vs. concave slope, slope steepness, and the presence or absence of pronounced slope breaks) and by the volume of logs yarded. Cable yarding (either uphill or downhill) would produce localized areas of soil disturbance, such as duff removal or displacement of the top one to six inches of soil, along the yarding corridors. The most soil disturbance would be within 100 to150 feet of landings. Low to moderate soil compaction would be concentrated in the center of the corridors at depths of three to four inches. High soil compaction up to six inches deep would occur in small pockets.

Approximately 10 percent or less of the cable yarding area would require downhill cable yarding. Downhill cable yarding generally would produce more soil disturbance than uphill yarding on equivalent slopes because there would be less control of the logs. Disturbed soil, gravel, and slash material would be moved downslope by gravity with the downward movement of the logs. Increased soil disturbance increases the potential for surface soil erosion on the steeper slopes. However, for the Back in Black project, downhill yarding would occur on slopes with favorable deflection and would eliminate the additional road construction needed for uphill yarding, thus reducing overall soil disturbance.

The PDFs listed in Chapter 2 (Section 2.3.4, #2) would limit detrimental soil disturbance from cable yarding. The PDF to obtain a minimum of one-end suspension would reduce the degree of soil displacement and compaction in cable yarding corridors.

Portions of cable yarded units would be whole-tree yarded, yarding logs with tops and branches attached, which may reduce the depth of concentrated displacement and compaction in the corridors because the tree weight would be dispersed over a wider area when compared to logs that are limbed and bucked prior to yarding. In those units with whole tree yarding, soil displacement would be limited primarily to the duff and topsoil layer.

Whole-tree yarding removes nutrients contained in tree branches and tree tops from the units. However, needles, twigs and small branches generally fall off during felling and yarding, so some nutrients from these sources would remain in the units. Whole-tree yarding also helps to avoid the need to broadcast burn prior to planting. By avoiding broadcast burning, the existing duff and litter in the units would be maintained, and the potential for surface soil erosion would be greatly reduced.

Road Construction, Maintenance/Renovation, and Decommissioning

The construction of roads would displace and compact soil, thereby decreasing soil productivity. The proposed road construction for the project would occur on approximately two miles or seven acres where new soil displacement and compaction would occur. The maintenance or renovation of 31 miles of existing roads would be confined to areas that are currently non-productive and therefore would not have an impact on soil productivity. Option A for road surfacing (see Chapter 2, Table 2-2) proposes 7 miles of native surface roads, whereas Option B proposes rocked roads only. Native surface roads may be subsoiled as part of decommissioning (Chapter 2, Section 2.3.4, # 2 and 3), which would ameliorate some of the soil compaction and allow for vegetation to occupy the area sooner than decommissioned rocked roads. Rocking roads would eliminate the opportunity to ameliorate soil compaction. Decommissioning rocked roads may include waterbarring and blocking of roads.

New road cut and fill slopes would be mulched with weed-free straw (or its equivalent) or seeded to prevent surface soil erosion from road construction. With the PDFs described in Chapter 2 (Section 2.3.4, #2), resulting soil erosion would be limited to localized areas, and any reduction of soil productivity due to erosion would be minor. Road decommissioning would have positive effects on soil productivity by reducing soil erosion by constructing waterbars or mulching.

Fuels Management – Landing and Fuel Accumulation Pile Construction and Burning

The impacts of pile burning on soil productivity can vary considerably depending on fuel characteristics and loading, soil climatic conditions at the time of burning, and soil burn severity. Large landing piles, roadside piles, and fuel accumulation piles create enough heat to alter soil structure, volatilize soil nutrients, and alter soil microbial communities. Soil heating during the burn would result in a short-term loss of microbial biomass or a shift in community structure. These impacts would not affect the long term productivity of the project area because the roadside and fuels accumulation piles within units would occupy a minor component of each stand. While the total acreage where roadside and fuel accumulation piles could be built is 168 acres for Option A and 179 acres for Option B, the actual footprint of the piles would be less. It is estimated that 8.9 acres for Option A and 9.4 acres for Option B would account for the pile footprint within units where impacts to soils from high severity fire would occur (Chapter 2, Section 2.3.3, Table 2-3). Implementing the fuels management PDFs would reduce impacts to soil productivity by burning in the late-fall to mid-spring season when the soil, duff layer and large down log moisture levels are high (Chapter 2, Section 2.3.4, #4).

The method for treating activity fuels would be machine piling on landings and in areas identified for ground-based yarding and hand or machine piling for roadside treatment areas and along select property boundaries. Machine piling at the landings would occur on ground that is already disturbed from logging activities, therefore no additional acres would be impacted from this action. Machine piling within units would meet soil management guidelines in the RMP regarding mechanical site prep, which limit disturbance to ten percent of the ground-based harvest area and five percent of the cable harvest area in units. In order to meet these guidelines, fuels management PDFs restrict machine use to the driest part of the season and limit equipment to small or medium sized excavators or other low ground-pressure equipment to minimize soil compaction (Chapter 2, Section 2.3.4, #4). Soil displacement would be minimized by restricting machine piling equipment to traveling straight up and down on slopes between 35 percent and 50 percent.

Slope Stability

A risk rating for shallow, rapid landslides was determined for each harvest unit according to the risk matrix described in the methods section (Tables 3-17 and 3-18). A low probability of landslides exists on the majority of the proposed harvest area because most of the slopes are less than 35 percent. A moderate probability exists on a lesser extent of the harvest area on slopes between 30-70 percent, especially on topographic features such as headwalls and inner-gorges. Three acres, or less than one percent of the harvest area, are at high probability for shallow rapid landslides. Tree retention and PDFs would be implemented to help minimize soil disturbance and maintain slope stability on areas of high probability for landslides.

The consequence rating for all units was determined to be minor to moderate (Table 3-20). Riparian Reserves reduce the likelihood that landslides would impact stream channels. Potential landslides would not pose safety concerns nor would they result in major property damage. The combined impacts from harvest and potential landslides would be less than the 10 percent disturbance threshold in the RMP and therefore soil productivity would be maintained across harvested units.

The resulting landslide risk ratings for all units are low to moderate. This represents an increase in risk from Alternative One. This increase in risk would be confined to areas of steep slopes, which are present on a small (<1) percentage of the total unit acres. The highest risk for shallow, rapid slope failures would occur on slopes over 70 percent, depending on landform and geology (USDI BLM 2008a). The increase in landslide risk is expected to be greatest for 10 years after regeneration harvest. If an extreme storm would occur during the early-successional period, the susceptibility of land sliding would be increased compared to forest where harvest did not occur.

In the project area, the most likely slope failure would be shallow (three feet or less in depth), rapid slope failures. If a slope failure were to occur on the steep to very steep slopes, the travel distance of the material would depend on a variety of factors, including the initial failure size (amount of material), the initial and down slope steepness, proximity to stream channels, the downstream channel junction angles, stream channel gradients, and the riparian condition along the resulting debris flow path (Robison *et al.* 1999; Benda and Cundy 1990).

High risk, landslide-prone portions of the landscape most commonly occur within the steep inner-gorge of streams; however, under Alternative Two, these areas would be included in the Riparian Reserves. High landslide probability areas in Units 24-4-13E and 25-4-17A would include areas of retention trees which would help moderate the impacts to slope stability. Additionally, proposed harvest units were field reviewed by the project soil scientist and areas of existing instability would be excluded from timber harvesting.

In the proposed regeneration harvest, the strength of live roots that bind the soil would drop to a low point in seven to ten years post-harvest, and then improve rapidly. After 10 years, the landslide susceptibility would drop substantially (USDI BLM 2008a, Robinson *et al.* 1999). The regeneration harvest would accelerate the growth of residual trees left in the stand and along the borders. Understory vegetation, such as shrubs, forbs and grasses, would respond to the increased light in openings taking up increased soil moisture and stabilizing the soil. Additionally, the proposed reforestation and stand maintenance treatments would promote the recovery of root strength, which would reduce the probability of landslides in the future.

Best Management Practices (BMPs) were designed to reduce the likelihood of harvest and road activities contributing to landslides. These include practices that direct road runoff away from unstable fill slopes, avoid road building on unstable areas, stabilize bare soil as a result of road construction, and control runoff on skid trails and yarding corridors with waterbars (ROD/RMP pp.130-132).

Table 3-20. Results of Risk Assessment for shallow rapid landslides following regeneration harvest activities proposed in Alternative Two.

Unit	Probability	Consequence	Risk
24-3-5C	Low-Moderate	Minor-Moderate	Low-Moderate
24-3-5D	Low-Moderate	Minor-Moderate	Low-Moderate
24-3-5E	Low	Minor-Moderate	Low
24-3-7D	Low-Moderate	Minor-Moderate	Low-Moderate
24-3-17D	Low-Moderate	Minor-Moderate	Low-Moderate
24-4-1D	Low	Minor-Moderate	Low
24-4-1E	Low	Minor-Moderate	Low
24-4-13E	Low-Moderate, 1 acre High*	Minor-Moderate	Low-Moderate
25-4-17A	Low-Moderate, 2 acres High*	Minor-Moderate	Low-Moderate

* High probability of landslides would occur on concave slopes and swales steeper than 70 percent. These areas would have dispersed retention trees, which would lower the probability to moderate.

Cumulative Effects

The spatial scope of cumulative effects for soil productivity is confined to Back in Black harvest units and roads where disturbing activities would occur; there is no casual mechanism for soil productivity impacts to combine with impacts from outside of these areas. The past effects of forest management on soil productivity and slope stability are documented in the Affected Environment section (Chapter 3, Section 3.7.1). There are no ongoing actions occurring in the project area that impact soil productivity and there are no projects proposed in the foreseeable future that would overlap Back in Black harvest units, therefore no cumulative effects to soil productivity would occur.

The spatial scope for cumulative effects to slope stability are Back in Black regeneration harvest units and new roads, as well as regeneration harvest and road construction adjacent to Back in Black units. Regeneration harvest and roads immediately adjacent and upslope of Back in Black units have the potential to increase the probability of landslides within Back in Black units. Landslides that start on roads and hillsides higher up on the hillslope have the potential to activate landslides within Back in Black units. On BLM lands, the Calapooya Creek Harvest Plan EA project proposes thinning in stands adjacent to four regeneration harvest units in the Back in Black project (USDI BLM 2015). However, the Calapooya Creek Harvest Plan EA project does not propose regeneration harvest above Back in Black units and BMPs would be implemented to reduce the likelihood that road activities would contribute to landslides. On private lands adjacent to Back in Black units, one recent clear-cut is upslope of Unit 24-3-5D. However, the area flattens out above Unit 24-3-5D, so a slide that originates on the private lands would not be likely to trigger a landslide in the Back in Black unit. Therefore, there are no actions on BLM or private lands that would combine with those of the Proposed Action to produce cumulative impacts under NEPA in regard to slope stability.

3.8. Fire and Fuels Management and Air Quality

3.8.1. Methodology

Spatial Scale

Fire and Fuels Management

The spatial context of fire and fuels management includes activities within the proposed harvest units and roads because this is the limit where disturbing activities would occur.

Photo Series were used to estimate fuel loading. Photo Series were developed by the U.S. Forest Service, Fire and Environmental Research Applications Team, to help land managers appraise fuel and vegetation conditions. Each group of photos in a series includes inventory information summarizing: vegetation composition, structure, and loading; woody material loading and density by size class; forest floor fuel bed depth and loading; and various site characteristics.

Fuel loading estimates were assigned an appropriate fire behavior fuel model based upon comparison to representative photos and fine fuel loading (Scott and Burgan 2005). Fuel models were used to predict expected flame lengths under low and high fire danger weather conditions using the BehavePlus Fire Modeling System (Andrews *et al.* 2008). Flame length is used as a proxy for fire risk because it corresponds to fire line intensity and therefore, fire suppression response (Table 3-21; Andrews and Rothermel 1982). Large fuels, those greater than three inches in diameter, are not considered in fuel models, or the prediction of fire behavior, because their low surface area to volume ratio, influence fire severity and duration rather than flame length or rate of spread (Rothermel 1972).

Table 3-21. Correlation of predicted flame lengths and the interpreted appropriate firefighting response (Andrews and Rothermel 1982).

Flame Length (ft)	Interpretation for Fire Suppression Response	Risk Rating
1-4	Fire can generally be attacked at the head or flanks by persons using hand tools. Handline should hold the fire.	Low
4.1-8	Fires are too intense for direct attack by persons using hand tools. Equipment like bulldozers, engines, and retardant aircraft may be effective.	Moderate
8.1-11	Fires may present serious control problems – torching, crowning, and spotting. Control efforts at the head will probably be ineffective.	High
>11.1	Crowning, spotting, and major fire runs are probable. Control efforts at the head of the fire are ineffective.	Extreme

Cumulative Effects

The cumulative effects analysis area for fire and fuels management is comprised of three sub-watersheds. The total area analyzed is 72,486 acres, of which 13,590 acres (19 percent) are administered by the BLM. For the purpose of this analysis, fire risk is considered at a sub-watershed level because sub-watershed boundaries can provide appropriate locations for fire control breaks.

Air Quality

Direct, indirect, and cumulative effects of air quality are considered at the airshed scale as determined by the Oregon Department of Environmental Quality. Generally, these airsheds align with large watersheds because major rivers channel smoke and other particulate matter.

Temporal Scale

Short-term effects are considered ≤ 10 years post-harvest based on the time it would take for activity generated fine fuels (less than 3 inches diameter) to degrade. Long-term effects would last up to 20 years and are based on the historic fire return interval of the analysis area (Agee 1993). It is assumed conditions at 35+ years post-harvest would resemble pre-harvest conditions. For past, current and reasonably foreseeable management actions, cumulative effects are considered to be 10 years in the past through 10 years in the future.

3.8.2. Affected Environment

3.8.2.1. Fire and Fuels Management

The Back in Black project area is entirely within the Wildland Urban Interface (WUI) as identified in the Douglas County Community Wildfire Protection Plans (2013). This area has moderate public use, even though access to most of the project area is restricted by locked gates.

The BLM determined current fuel loading conditions in the proposed harvest units at 11-20 tons per acre as interpreted from Photo Series (photo 1-MC-3 and 2-MC-3, Maxwell and Ward 1980; Figure 3-5). The corresponding fuel models for the stands would be low load, compact conifer litter (TL1) or moderate load conifer litter (TL3). Based upon the fuel loading estimates for thinned stands, current fire risk, even in high fire danger weather conditions, is low with predicted flame lengths of 1-2 feet (Table 3-22).

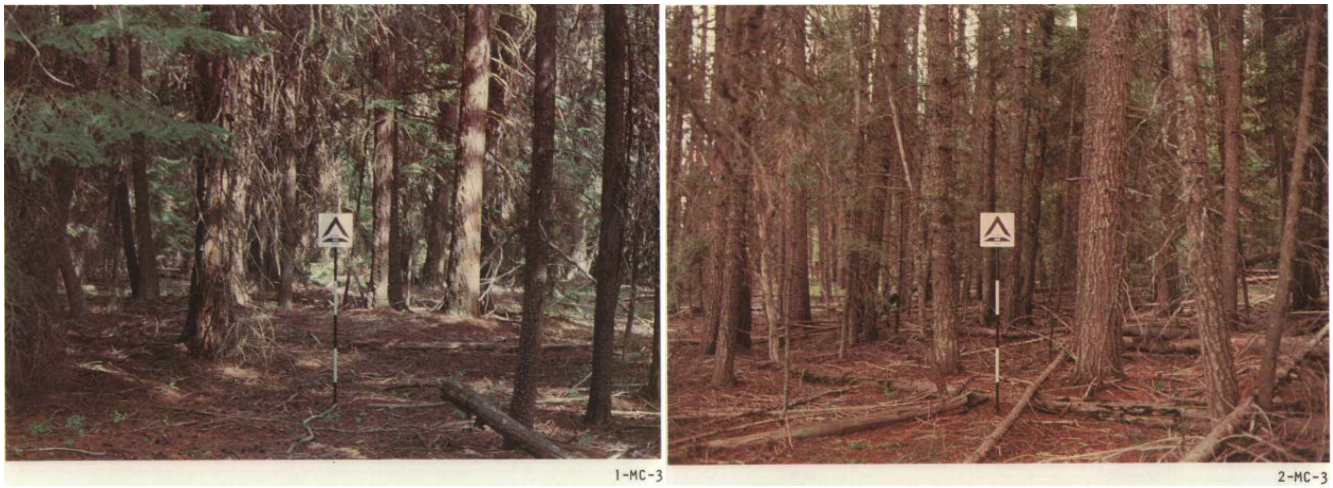


Figure 3-5. Photo series representation of the current fuel loading conditions for the proposed Back in Black harvest units (Maxwell and Ward 1980).

Figure 3-6. Photo series representation of the current fuel loading conditions for the 5 acres of un-thinned forest in Unit 25-4-17A (Gillette *et al.* 1980).

One portion (5 acres) of Unit 25-4-17A was not previously thinned and therefore has a higher fuel loading than the commercially thinned stands, estimated at 29 tons per acre (photo 8-DF-4-PRE, Gillette *et al.* 1980; Figure 3-6). The corresponding fuel model for the unthinned stands would be small downed logs (TL4).

Based upon the fuel loading estimates for unthinned stands, current fire risk, even in high fire behavior weather conditions, is low with predicted flame lengths of 1-3 feet (Table 3-22).

Table 3-22. Fire behavior prediction system fuel model and corresponding potential fire behavior and risk rating under low and high fire danger weather conditions for the current conditions.

Photo Series #	Fuel Model	Fuel Model Name/Descriptor	Flame Length (feet)		Risk Rating *(see Table 3-21)*	
			Low Fire Danger Weather	High Fire Danger Weather	Low Fire Danger Weather	High Fire Danger Weather
1-MC-3	TL1	Low load, compact conifer litter	<1	1	Low	Low
2-MC-3	TL3	Moderate load conifer litter	1	2	Low	Low
DF-4-PRE	TL4	Small downed logs	1	3	Low	Low

3.8.2.2. Air Quality

The Oregon Department of Forestry – Smoke Management Plan (Oregon SMP 2008) identifies areas sensitive to smoke where impacts should be avoided. The Smoke Sensitive Receptor Areas (SSRA) in proximity to the analysis area are the cities of Roseburg, Cottage Grove, Oakridge, and Eugene. The primary concern regarding these SSRA would be smoke produced from burning harvest activity fuels.

3.8.3. Environmental Consequences

3.8.3.1. Alternative One – No Action

Fire and Fuels Management

Under Alternative One, downed fuels would gradually accumulate, adding to the existing fuel conditions of 11-20 tons per acre. As the stands mature, suppression mortality would occur, resulting in passive snag and woody debris recruitment (Chapter 3, Section 3.3.2.2.) and increased fuel loading. The estimated increase in fuel loading over the next 20 years would be represented by photo 1-MC-4, with larger trees and 21 tons per acre of down woody material (Maxwell and Ward 1980, Figure 3-7). The corresponding fuel model would be large down logs (TL7) (Table 3-23).

Figure 3-7. Photo series representation of the fuel loading conditions for the proposed Back in Black harvest units under Alternative One in 20 years (Maxwell and Ward 1980).

Since the majority of these stands have been previously thinned, which reduced competition between remaining trees, mortality would likely occur in trees between 3 and 20 inches diameter (Chapter 3, Section 3.3.2.2). The risk of wildfire would gradually increase as fuels accumulate over time. Estimated flame lengths would be 2-4 feet, which is still within the capability of hand crews to suppress the fire (Table 3-23; Andrews and Rothermel 1982).

Air Quality

Absent implementation of management activities, there would be no potential effects to air quality from BLM forest management actions. As fuel loading increases, however, the potential for a wildfire occurring would increase. Under drought conditions or during severe weather events, fires would be expected to burn with high intensity and long duration, producing large amounts of smoke with heavy particulate loading. This increase, depending on a multitude of variables, would lead to health concerns for surrounding public, particularly individuals sensitive to smoke.

3.8.3.2. Alternative Two - Proposed Action

Fire and Fuels Management

Under Alternative Two, the downed fuels would increase as a result of harvest operations to approximately 37 tons per acre ≤ 10 years post-harvest (photo 4-DF-4-CC, Maxwell and Ward 1976; Figure 3-8). Option B for yarding would have slightly less accumulation of activity fuels (2-4 ton per acre less) because cable yarding would bring more intact trees to the landing rather than being limbed and bucked in the unit. Of this 37 tons per acre predicted, 36 percent would be small fuels while the remainder would consist of larger fuels.

The additional large fuels, if ignited, would change the effects of a fire by increasing the duration of heat exposure to soils, increasing the severity (Neary *et al.* 2005). These fuels would also increase the difficulty of fighting an initial attack fire. Creating fire line in fuels greater than 3 inches in diameter would require the use of chainsaws, which slows the rate of line construction by fire fighters (Fischer 1981; Sandberg and Ward 1981).

Based on the fuel model moderate activity fuel (SB2), the additional amount of downed fuels created by the proposed action (i.e. 17-26 tons per acre) would increase the predicted flame length from 1-3 feet to 5-14 feet in the short-term (≤10 years post-harvest) (Table 3-23).

4-DF-4-CC

Figure 3-8. Photo series representation of the fuel loading conditions for the proposed Back in Black units under Alternative Two immediately post-harvest (Maxwell and Ward 1976).

To reduce concentrated fuel loads, 42 acres of activity fuels would be machine-piled and burned at landings under Yarding Option A (392 acres of cable yarding and 138 of ground-based yarding), while 55 acres would be machine-piled and burned at landings under Yarding Option B (530 acres cable yarding and no ground-based yarding; Tables 2-1 and 2-3).

In addition, small fuels would be piled along roadways, in all areas identified as ground-based harvest, and some property boundaries (168 acres for Yarding Option A or 179 acres for Option B).

Treatment of activity fuels in this manner would have multiple benefits. Treatment along roadways would reduce risk of roadside ignition and increase the viability of those roadways as fuel breaks in the event of a wildfire. Treatment of areas identified for possible ground-based harvest, regardless of actual yarding method, in the interior of units would reduce the amount of and create gaps in the slash, altering it from moderate load activity fuel (SB2) to low load activity fuel (SB1). Predicted flame lengths would correspondingly reduce from 5-14 feet to 3-7 feet, and fire risk would decrease from moderate/extreme to low/moderate. Breaking up the continuity of the fuels would make fires less likely to carry through units and increase the number of possible fire line locations.

At approximately 20 years of age, small harvest activity fuels in the stands would be mostly degraded. However, the stands would be densely stocked with trees and appropriate for a pre-commercial thinning treatment. Prior to and after pre-commercial thinning, a fire in these stands would result in flame lengths predicted at 6-13 feet (Table 3-23). The closest photo series photograph (4-DF-1-TH, Maxwell and Ward 1976), describing the estimated conditions 20 years post-harvest under Alternative Two has a total fuel loading of 122 tons per acre. This over estimates the expected post-harvest conditions in the Back in Black project because the photo predicts 81 tons per acre in fuels greater than 20 inches diameter. The Back in Black project would have less loading in this large size class; therefore, a modified estimate of fuel loading for the Back in Black project after pre-commercial thinning would be 30-40 tons per acre. Once the stands mature and fuels degrade, 35-40 years post-harvest, the predicted fire behavior would have the same or lower than pre-harvest flame lengths (Table 3-23).

Table 3-23. Fire behavior prediction system fuel model and corresponding potential fire behavior and risk rating under low and high fire danger weather conditions for the expected fuel conditions.

Temporal Scale	Photo Series #	Fuel Model	Fuel Model Name/Descriptor	Flame Length (feet)		Risk Scale *(see Table 3-21)*	
				Low Fire Danger Weather	High Fire Danger Weather	Low Fire Danger Weather	High Fire Danger Weather
No Action Alternative post-20 years	1-MC-4	TL7	Large downed logs	2	4	Low	Low
≤10 years post-harvest, pre-treatment	4-DF-4-CC	SB2	Moderate load activity	5	14	Moderate	Extreme
≤10 years post-harvest, pile burned	1-DF-4-CC	SB1	Low load activity fuels	3	7	Low	Moderate
20 years post-harvest	4-DF-1-TH (modified)	TU5	Very high load, dry climate timber-shrub	6	13	Moderate	Extreme
35-40 years post-harvest	1-MC-2	TL3	Moderate load conifer litter	1	2	Low	Low

All spurs would be decommissioned under both road surfacing options, blocking access for fire suppression. Decommissioning of the roads may include covering the surface with slash from the harvest units, which would decrease the amount of activity fuels burned in landing piles.

Air Quality

Pile burning of would be conducted under the requirements of the Oregon SMP (2008), which includes timing of pile burns, registration with the State for permits, and day of burn approval based upon weather and other county-wide prescribed burning activity. Working within the constraints of this plan would minimize the risk of smoke settling into a drainage or along roadways and persisting for an extended period of time (Chapter 2, Section 2.3.4, #4). Potential impacts to air quality within 0.25 to 1.0 mile of units would persist for one to three days and would be characterized by some haziness.

Piles would likely burn for 4 to 24 hours, depending on pile size. In the event a pile burn generates nuisance smoke, additional ignition or suppression tactics would be used to speed or stop the burn.

With the application of Oregon smoke management restrictions, prescribed burning would have no long-term effects to local air quality.

Cumulative Effects

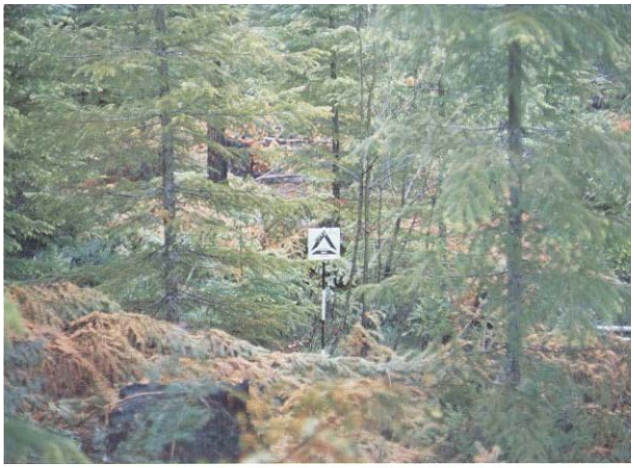
Table 3-24 summarizes cumulative activities in the analysis area including 2,115 acres of BLM harvest activity, within the past 10 years, which generated activity fuel loads slightly less than those described for the Back in Black project. The generated loading is lower due to harvest type; the previous treatments were commercial thinning as opposed to regeneration harvest. Planned future BLM harvest actions within the analysis area, the Calapooya Creek Harvest Plan (USDI BLM 2015), would create an additional 1,090 acres of activity fuels.

Table 3-24. Fire behavior prediction system fuel model and corresponding potential fire behavior and risk rating under low and high fire danger weather conditions for the cumulative fuel conditions.

Project	Photo Series #	Fuel Model	Flame Length (feet)		Risk Scale *(see Table 3-21)*		Acres	BLM-administered Lands within Analysis Area (%)
			Low Fire Danger Weather	High Fire Danger Weather	Low Fire Danger Weather	High Fire Danger Weather		
Back in Black	1-DF-4-CC	SB1	3	7	Low	Moderate	530	4
Calapooya	2-DF-4-PC	SB1	3	7	Low	Moderate	1,048	8
	4-DF-4-CC	SB2	5	14	Moderate	Extreme	42	
Recent Past Harvest Activity	2-DF-4-PC	SB1	3	7	Low	Moderate	2,115	16
Recent Past PCT Treatments	4_DF-1-TH (modified)	TU5	6	13	Moderate	Extreme	1,090	8
Total treated area							4,836	36

Future pre-commercial thinning and stand maintenance activities on BLM lands would increase fuel loading in the analysis area. For the past decade, pre-commercial thinning has averaged approximately 100 acres per year in the analysis area, totaling 1,090 acres since 2005.

Two pre-commercially thinned stands treated in 2014 are adjacent to Unit 25-4-17A. Fuel loading in the pre-commercially thinned stands increased from 13 tons per acre to 21 tons per acre post-treatment (photo 3-DF-1-TH, Maxwell and Ward 1976; Figure 3-9). As shown in Table 3-23, this corresponds to fuel model timber understory, very high load, dry climate timber/shrub (TU5) with estimated flame lengths of 6-13 feet (Table 3-24). Activity fuels from pre-commercial thinning are mostly small (less than 3 inches diameter) and would persist for ≤ 10 years. Cumulative effects of management activities in the three subwatersheds would result in 28 percent of BLM-administered lands falling under a low to moderate fire risk and 8 percent of BLM-administered lands falling under a moderate to extreme fire risk. The fire risk, under high fire danger weather, for stands that were pre-commercially thinned within the past 10 years would range from moderate to extreme, depending on time since treatment. One year post-treatment, stands that were pre-commercially thinned may be at an extreme fire risk, whereas ten years post-treatment, stands may be at a moderate fire risk. These treatments would result in 36 percent of the BLM-administered lands with activity fuels on them (Table 3-24).



3-DF-1-TH

Figure 3-9. Photo series representation of the fuel loading conditions in pre-commercially thinned stands adjacent to Back in Black Unit 25-4-17A under Alternative Two

Timber harvesting on nearby private lands would generate activity fuels increasing fire risk. The extent of the risk is difficult to gauge, however, because it is not possible to forecast the type, scale, manner of harvest, level of utilization, or activity fuel treatments that may be applied.

3.9. Carbon Storage and Release

Climate change and greenhouse gas emissions have been identified as a resource concern by the Secretary of the Interior (Secretarial Order No. 3226; January 16, 2009), and the OR/WA BLM State Director (Instruction Memorandum OR-2010-012, January 13, 2010).

Forster *et al.* 2007 (pp. 129-234), incorporated here by reference, reviewed scientific information on greenhouse gas emissions and climate change. Their conclusion was that human-caused increases in greenhouse gas emissions have likely exerted a substantial warming effect on global climate. Literature, however, has not yet defined any specifics on the nature or magnitude of any cause and effect relationship between greenhouse gases and climate change.

The U.S. Geological Survey, in a May 14, 2008 memorandum (USDI/USGS 2008) to the U.S. Fish and Wildlife Service, summarized the latest science on greenhouse gas emissions concluding that it is currently beyond the scope of existing science to identify a specific source of greenhouse gas emissions or sequestration and designate it as the cause of specific climate impacts at a specific location. Given this uncertainty, this analysis is focused on calculating carbon emissions and storage, in the context of release and sequestration.

The 2016 FEIS (pp. 165-211), incorporated by reference, describes current information on predicted changes in carbon storage, greenhouse gas emissions, regional climate, forest vegetation and wildlife habitat. Under the current state of the science, the BLM cannot identify the impacts of greenhouse gas emissions from any one project or program, or from its activities in western Oregon on global, national, or even local climate (USDI BLM FEIS 2016). However, the amount of carbon released or stored under the alternatives analyzed can be estimated. Values in this analysis, of carbon stored and released, are expressed as tonnes, the most common unit of measure used in scientific literature on the subject. One tonne of carbon is equivalent to 3.67 tons of CO_2 (U.S. EPA 2005).

3.9.1. Affected Environment

BLM is a relatively small emitter of greenhouse gases from timber harvest and prescribed fire within Oregon, about 0.2 percent of Oregon's emissions. Oregon's emissions were about 1 percent of all U.S. emissions. Total annual global emissions of CO_2 are estimated at 48 billion tonnes, with estimated U.S. emissions of 6.7 billion tonnes of CO_2 (USDI BLM FEIS 2016, p. 175).

Land use, land use change and forestry nationally resulted in a net sequestration of 940 million tonnes of CO_2 in 2008 (EPA 2010, Table 2-3, p. 2-8). Forest management in the U.S., alone, resulted in net CO_2 sequestration of 792 million tonnes (EPA 2010, Table 2-9, p. 2-16), an offset of 11 percent of total U.S. CO_2 emissions.

On lands managed by the BLM in western Oregon and on the Klamath Falls Resource Area of the Lakeview District, there are an estimated 360 million tonnes of carbon stored in vegetation and soil (USDI BLM FEIS 2016, p.169).

For this analysis, the Back in Black project area includes 766 acres of forested stands. Modeling indicates the stands currently hold 139 tonnes of carbon per acre, totaling 106,000 tonnes, or 0.03 percent of the estimated 360 million tonnes of carbon stored on BLM-administered lands in western Oregon.

3.9.2. Environmental Effects

3.9.2.1. Methodology

Data from stand exams specific to the proposed units was input into the ORGANON Growth Model (Hann 2011). Outputs were then used to calculate amounts of carbon release and sequestration, and the net carbon balance that would result under each of the alternatives. Modeling effects of each alternative was conducted for three intervals extending out 50 years, a period deemed sufficient to illustrate long-term trends across the alternatives.

The net carbon balance was derived from: the amount of carbon held in live trees and other components of the forest stands (snags, down wood, soil carbon, etc.); the amount of carbon directly released at the time of harvest; the amount of carbon held in wood products and logging slash that gradually release carbon over time; and the amount of carbon released by the burning of fossil fuels and slash.

Cumulative effects, described below, were analyzed by combining the Back in Black Regeneration Harvest Plan and Calapooya Harvest Plan carbon effects.

The methodology used is described in detail in *Appendix H - Calculation Assumptions for Carbon Sequestration and Release.*

3.9.2.2. Alternative One - No Action

There would be no direct release of carbon because fossil fuels would not be consumed in conjunction with road construction and renovation, timber harvest operations, or timber hauling. Direct release of carbon from the cutting of live trees would not occur. No wood products would be produced to release carbon over time. Absent the creation of any logging slash, no carbon would be released by the burning and/or decomposition of activity fuels.

Forest stands in the project area would continue to grow and develop. Carbon would be released through the decay of snags, woody debris and dead vegetation, and through the process of respiration. At the same time, carbon would be sequestered as live, growing trees and other vegetation fix atmospheric CO_2 through the process of photosynthesis.

Over the course of the next 50 years, the total carbon stored on-site would increase from current levels to 308 tonnes per acre, over double the existing condition (Table 3-25).

Over the next 50 years, an average annual sequestration of 2,600 tonnes of carbon equivalent to 9,500 tonnes of CO_2 would be expected, representing an offset of 0.0002 percent of current annual United States emissions and 0.00004 percent of projected annual global carbon emissions whether expressed as tonnes of carbon or tonnes of CO_2.

Table 3-25. Effects of Alternative One on carbon release and storage per acre.

Timestep	Standing, Live Carbon (tonnes)	Wood Products (tonnes)	Logging Slash (tonnes)	Other Than Live Trees (tonnes)	Fossil Fuels (tonnes)	Slash Burning (tonnes)	Carbon Balance (tonnes)	Net Change (+/-) (tonnes)
Current Condition	69	0	0	70	0	0	139	0
10 years	99	0	0	70	0	0	169	30
20 years	130	0	0	70	0	0	200	31
50 years	220	0	0	88	0	0	308	108

3.9.2.3. Alternative Two – Proposed Action

Alternative Two includes 530 acres of proposed regeneration harvest, out of the 766 acre project area. The direct release of carbon associated with harvesting and logging slash treatments would release approximately 8 tonnes per acre, totaling 4,300 tonnes. Direct release of carbon under Alternative Two would represent 0.0003 percent of annual emissions in the United States, and 0.00004 percent of annual global emissions.

Carbon would be stored in wood products and untreated logging slash. Both of these carbon pools would gradually release carbon over time through processes of decay, sublimation and disposal of wood products by burning.

While there would be a direct release of carbon, and an annual indirect release of carbon from wood products and unburned slash, growth of remaining trees would sequester atmospheric carbon and store it on site in the form of woody biomass. Taking into account the continued sequestration of carbon by retained trees, along with the growth of tree regeneration established in the harvested areas, re-sequestration of carbon directly released by the regeneration harvest would occur in less than ten years. Differences in assumption between Options A and B were not large enough to substantially affect the overall carbon balance among options (Tables 3-26 and 3-27).

Over the course of the next 50 years, the total carbon stored on-site would increase from current levels to about 257 tonnes per acre, an increase of about 85 percent over the current condition (Tables 3-26 and 3-27). The total carbon balance 50 years following harvest would be 197,000 tonnes, approximately 39,000 tonnes less than Alternative One.

Table 3-26. Effects of Alternative Two[1] – Option A on carbon release and storage per acre.

Timestep	Standing, Live Carbon	Wood Products	Logging Slash	Other Than Live Trees	Fossil Fuels	Slash Burning	Carbon Balance	Net Change (+/-)
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Current Condition	69	0	0	70	0	0	139	0
Post- Harvest	35	16	14	70	(1)	(4)	131	(8)
10 years	51	15	9	70	0	0	145	14
20 years	67	14	7	70	0	0	159	14
50 years	153	13	5	86	0	0	257	98

[1] Modeling of carbon release and storage considers the entire area of the forest stand under consideration, i.e. all harvested and unharvested areas.

Table 3-27. Effects of Alternative Two[1] – Option B on carbon release and storage per acre.

Timestep	Standing, Live Carbon	Wood Products	Logging Slash	Other Than Live Trees	Fossil Fuels	Slash Burning	Carbon Balance	Net Change (+/-)
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Current Condition	69	0	0	70	0	0	139	0
Post- Harvest	35	16	14	70	(1)	(4)	131	(8)
10 years	51	15	9	70	0	0	145	14
20 years	67	14	7	70	0	0	159	14
50 years	153	13	5	86	0	0	257	97

[1] Modeling of carbon release and storage considers the entire area of the forest stand under consideration, i.e. all harvested and unharvested areas.

Cumulative Effects

The proposed Calapooya Creek Harvest Plan EA project is considered as a reasonably foreseeable future action, and proposes treatment of 1,245 acres of mid-seral stands with variable density thinning and variable retention harvest (USDI BLM 2015). Back in Black and Calapooya combined, currently include approximately 304,000 tonnes, or 0.08 percent of the estimated 360 million tonnes of carbon stored on BLM-administered lands in western Oregon. Combining both of these projects shows the cumulative effects for carbon for this project.

The direct release of carbon associated with the Back in Black and Calapooya timber management activities is estimated to be approximately 11,300 tonnes. Direct release of carbon under both projects combined would represent only 0.0003 percent of annual emissions in the United States, and 0.00004 percent of annual global emissions.

The cumulative effect of the direct release of carbon is negligible at all spatial scales considered in this analysis, because the direct release of carbon is less than 0.1 percent of the estimated carbon stored at the scale of BLM-administered lands in western Oregon, and less than 0.001 percent of the scales of annual emissions in the United States and globally.

The total carbon balance 50 years following harvest would be approximately 574,000 tonnes, an amount 121,400 tonnes less than the no action alternative for both projects, but 285,000 tonnes more than at present.

3.10. Monitoring

Monitoring will be conducted in accordance with provisions contained in the ROD/RMP, Appendix I (pp. 84-86, 189, 193-199, 201, 202, 206-209). Monitoring efforts will focus on consideration of the following resources: Matrix land use allocation, air quality, water and soils, wildlife habitat, special status species, cultural resources, timber resources, noxious weeds, and fire/fuels management.

Chapter 4. Agencies and Individuals Contacted; Preparers; and Literature Cited

Initiation of the project was published in the Spring 2014 Quarterly Planning Update. Upon completion of the EA, an electronic Notice of Availability for public review and comment will be posted to individuals and organizations having expressed interest in these types of projects.

4.1. Agencies & Persons Contacted

Adjacent landowners and downstream water users
Cow Creek Band of Umpqua Tribe of Indians
Confederated Tribes of Grand Ronde
Confederated Tribes of Siletz Indians
NOAA Fisheries
U.S. Fish and Wildlife Service

4.2. Agencies, Organizations and Individuals to be Notified of the Completion of the EA

American Forest Resources Council
Cascadia Wildlands
Douglas Timber Operators
Klamath Siskiyou Wildlands Center
National Marine Fisheries Service
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Wild
Pacific Northwest 4-Wheel Drive Association
Ronald S. Yockim, Attorney-at-Law
Umpqua Valley Audubon Society
Umpqua Watersheds, Inc.
U.S. Fish and Wildlife Service

Consultation under Section 7 of the Endangered Species Act (1973 as amended) with the U.S. Fish and Wildlife Service (Service) is complete. Consultation on the Back in Black Regeneration Harvest project was completed on February 9, 2016. The Biological Opinion found that the proposed treatments included in the 2016 document are not likely to jeopardize the northern spotted owl (Tails #01EOFW00-2016-F-0065).

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4.3. List of Preparers

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Chapter 3

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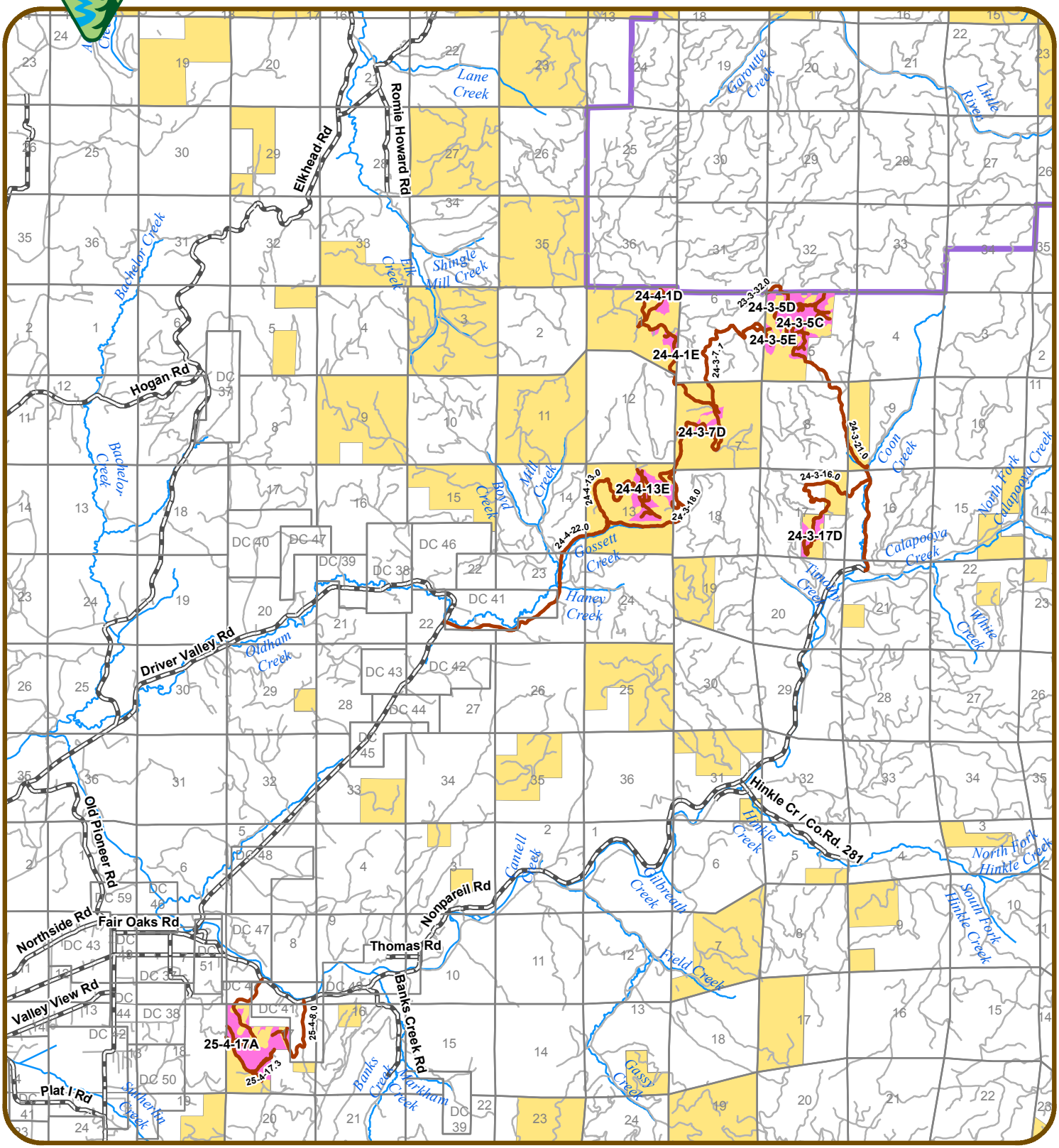
Appendix A. Maps for the Back in Black Regeneration Harvest Plan project

Back in Black Regeneration Harvest Plan

Figure A-1. Vicinity Map



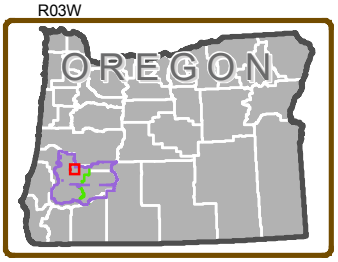
Legend

- Proposed Unit
- District Area Boundary
- Bureau of Land Management
- Private/Unknown
- Major Stream
- Haul Route
- County Road
- Other Road

0 0.5 1 2
Miles

N W E S

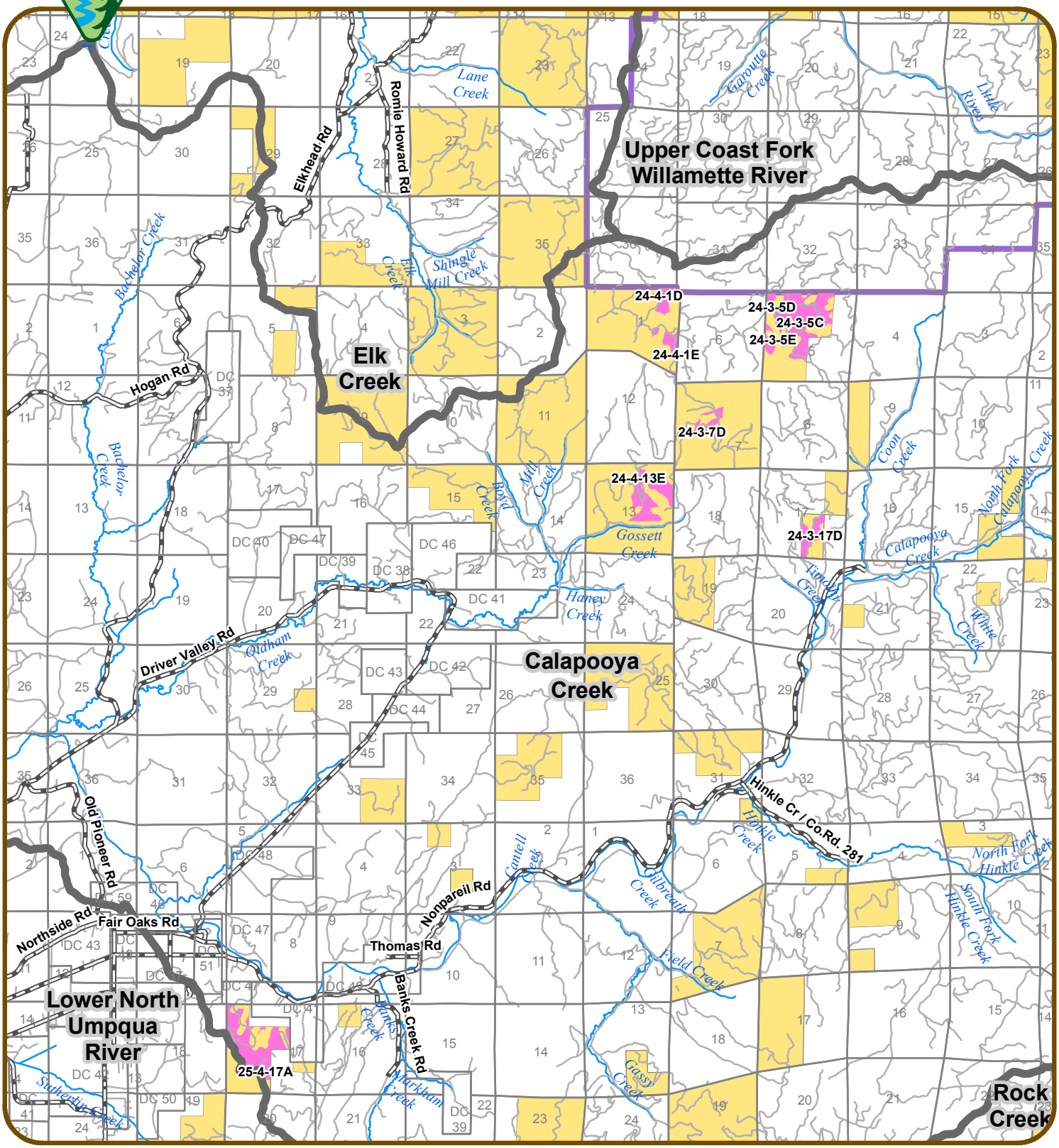
Date: 5/4/2016



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 and may be updated without notification.

Back in Black Regeneration Harvest Plan

Figure A-2. Hydrologic Unit Code 10 - Watershed



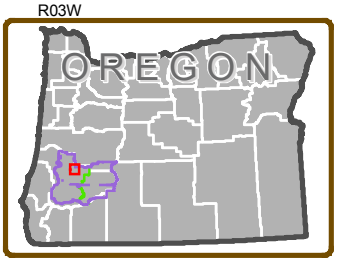
Legend

- Proposed Unit
- HUC10 -Watershed
- District Area Boundary
- Bureau of Land Management
- Private/Unknown
- Major Stream
- County Road
- Other Road

0 0.5 1 2
Miles

N W E S

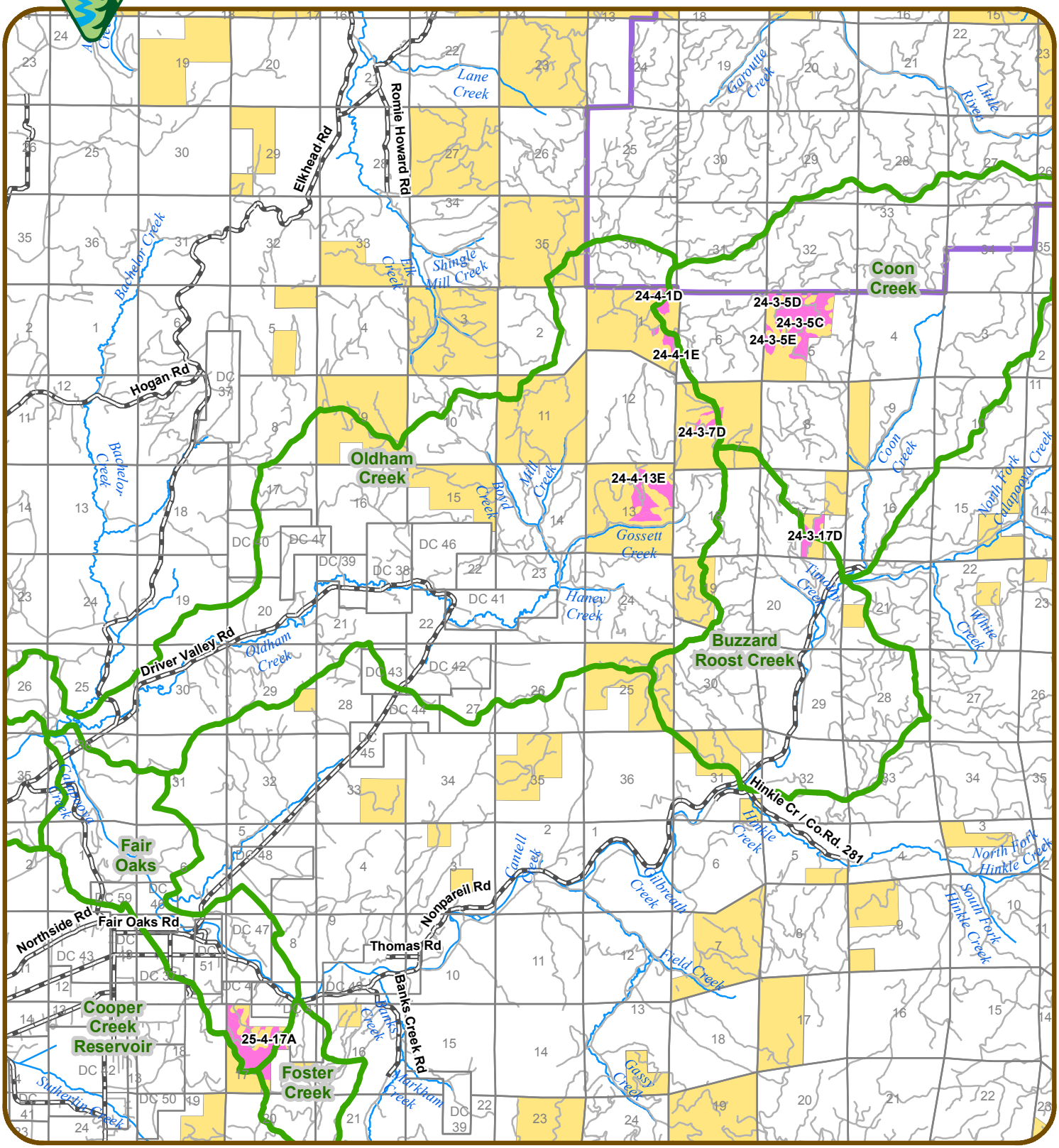
Date: 5/4/2016



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 and may be updated without notification.

Back in Black Regeneration Harvest Plan

Figure A-3. Hydrologic Unit Code 14 - Drainage



Date: 5/4/2016

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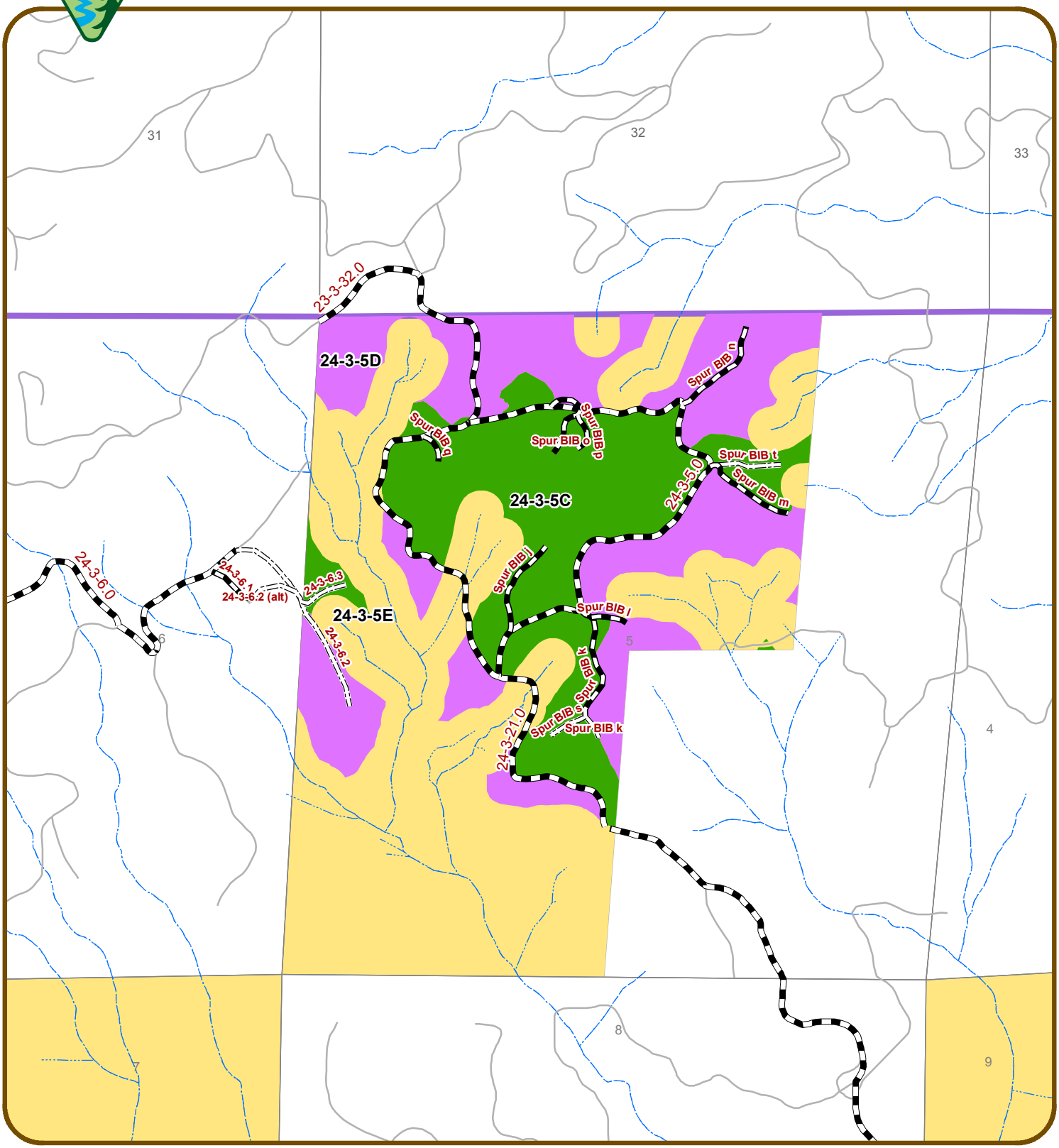
Back in Black Regeneration Harvest Plan

Figure A-4. Alternative Two - Proposed Action - Option A

Units 24-3-5C, 24-3-5D, 24-3-5E



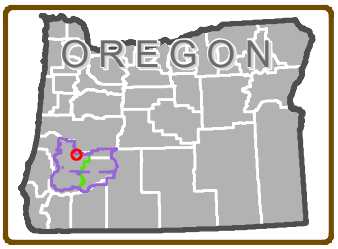
Legend

- Proposed Unit - Cable Yarding
- Proposed Unit - Ground-based Yarding
- Proposed Spur Construction
- Proposed Road Maintenance/Renovation
- District Area Boundary
- Bureau of Land Management
- Private/Unknown
- Road
- Minor Stream

0 430 860 1,720
Feet

N W E S

Date: 3/23/2016



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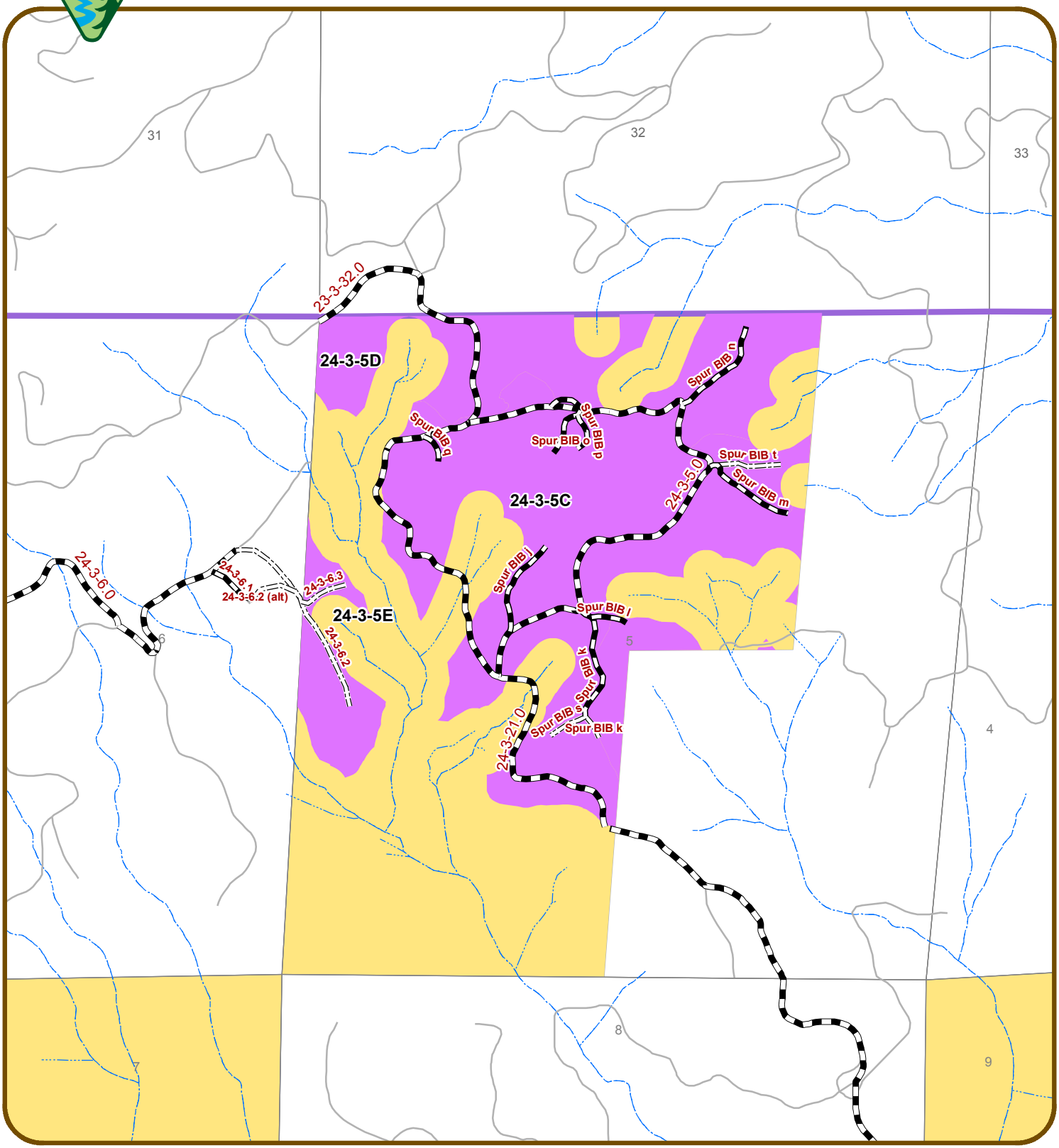
Back in Black Regeneration Harvest Plan

Figure A-5. Alternative Two - Proposed Action - Option B
Units 24-3-5C, 24-3-5D. 24-3-5E



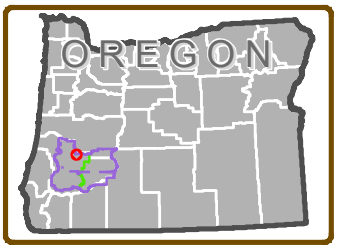
Legend

- Proposed Unit - Cable Yarding
- Proposed Spur Construction
- Proposed Road Maintenance/Renovation
- District Area Boundary
- Bureau of Land Management
- Private/Unknown
- Road
- Minor Stream

0 430 860 1,720
Feet

N W E S

Date: 3/23/2016



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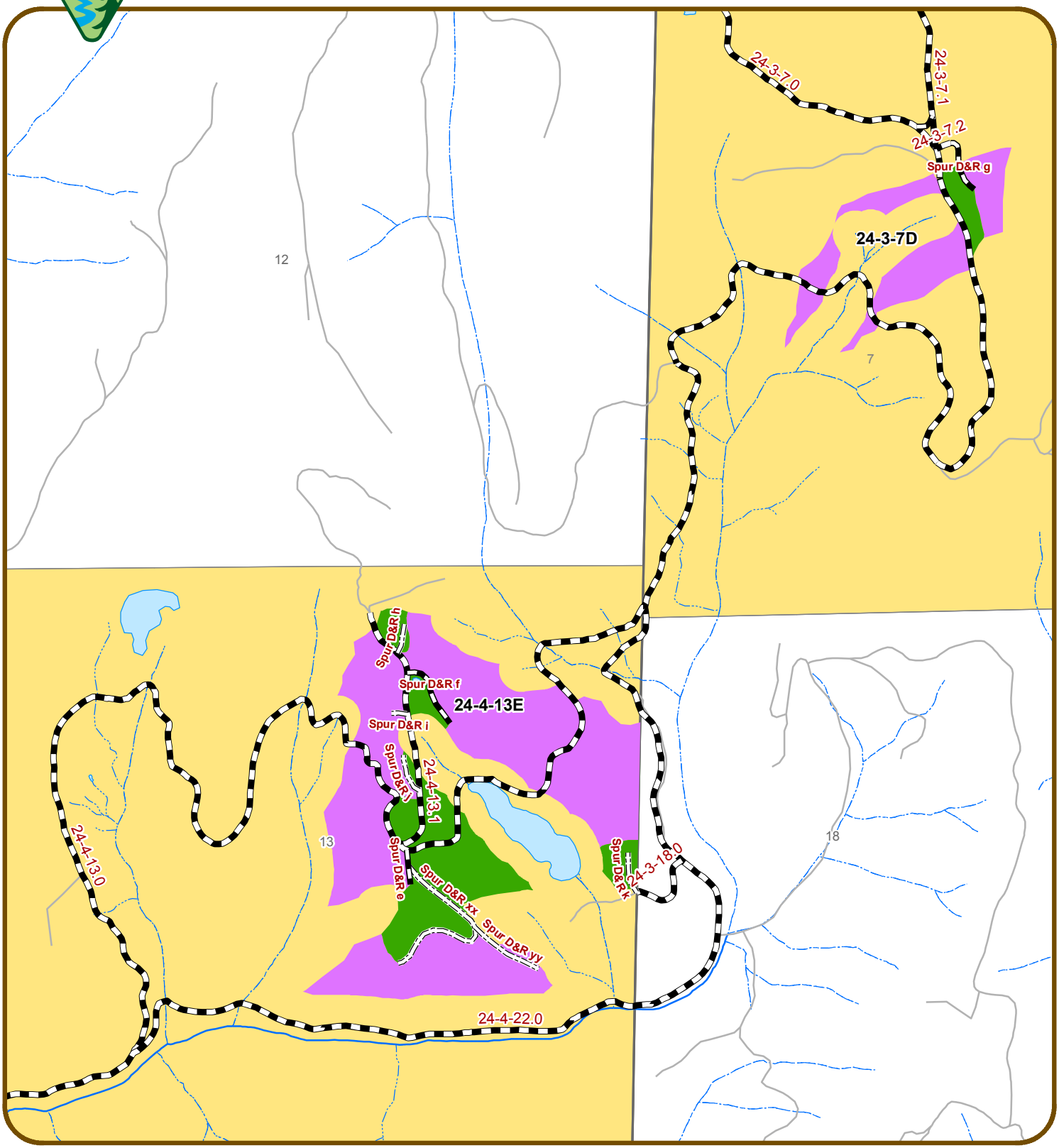
Back in Black Regeneration Harvest Plan

Figure A-6. Alternative Two - Proposed Action - Option A
Units 24-3-7D, 24-4-13E



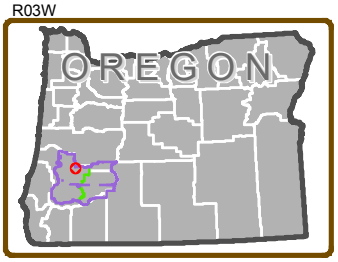
Legend

- Proposed Unit - Cable Yarding
- Proposed Unit - Ground-based Yarding
- Proposed Spur Construction
- Proposed Road Maintenance/Renovation
- Bureau of Land Management
- Private/Unknown
- Road
- Minor Stream
- Major Stream
- Waterbody

0 430 860 1,720
Feet

N W E S

Date: 3/23/2016



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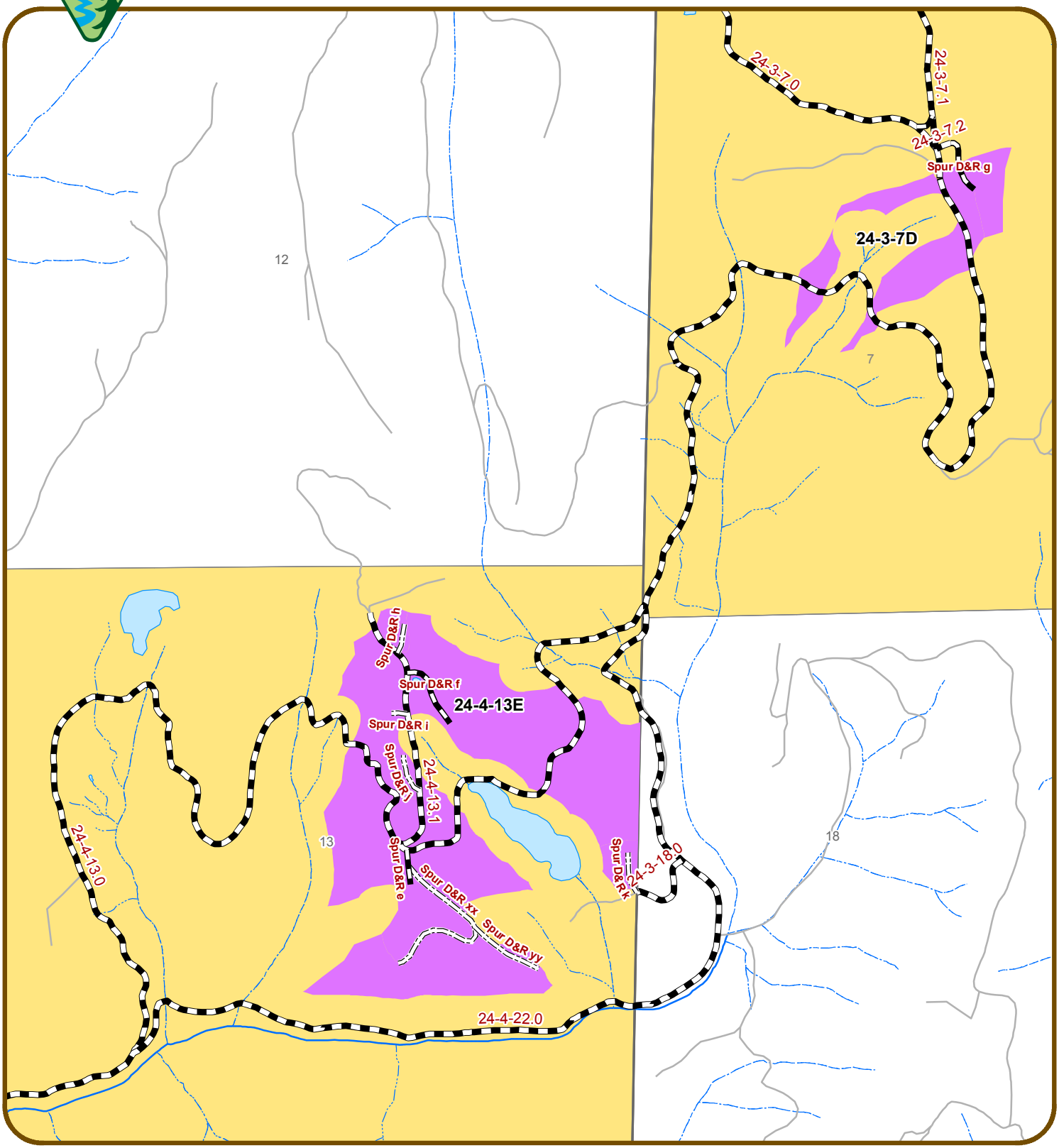
Back in Black Regeneration Harvest Plan

Figure A-7. Alternative Two - Proposed Action - Option B
Units 24-3-7D, 24-4-13E



Legend

- Proposed Unit - Cable Yarding
- Proposed Spur Construction
- Proposed Road Maintenance/Renovation
- Bureau of Land Management
- Private/Unknown
- Road
- Minor Stream
- Major Stream
- Waterbody

0 430 860 1,720
Feet

N W E S

Date: 3/23/2016

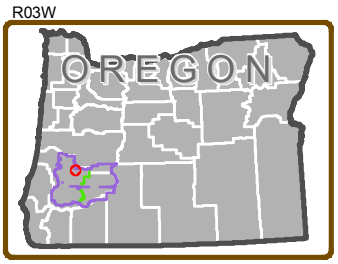


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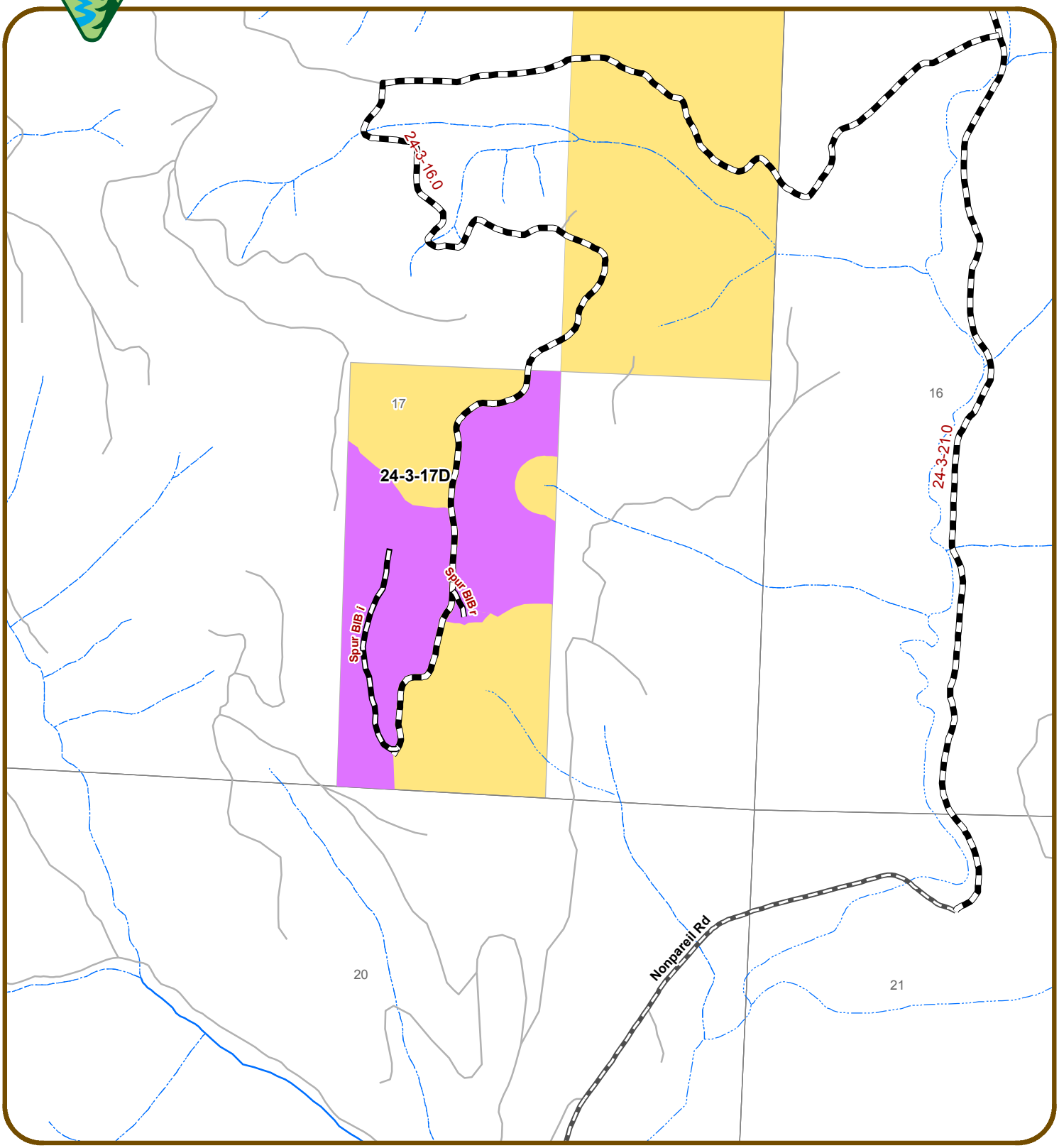
Figure A-8. Alternative Two - Proposed Action - Options A and B
Unit 24-3-17D

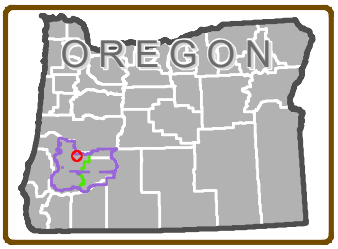


Legend

- Proposed Unit - Cable Yarding
- Proposed Road Maintenance/Renovation
- Bureau of Land Management
- Private/Unknown
- Road
- County Road
- Minor Stream
- Major Stream

0 330 660 1,320
Feet

N W E S



Date: 3/23/2016

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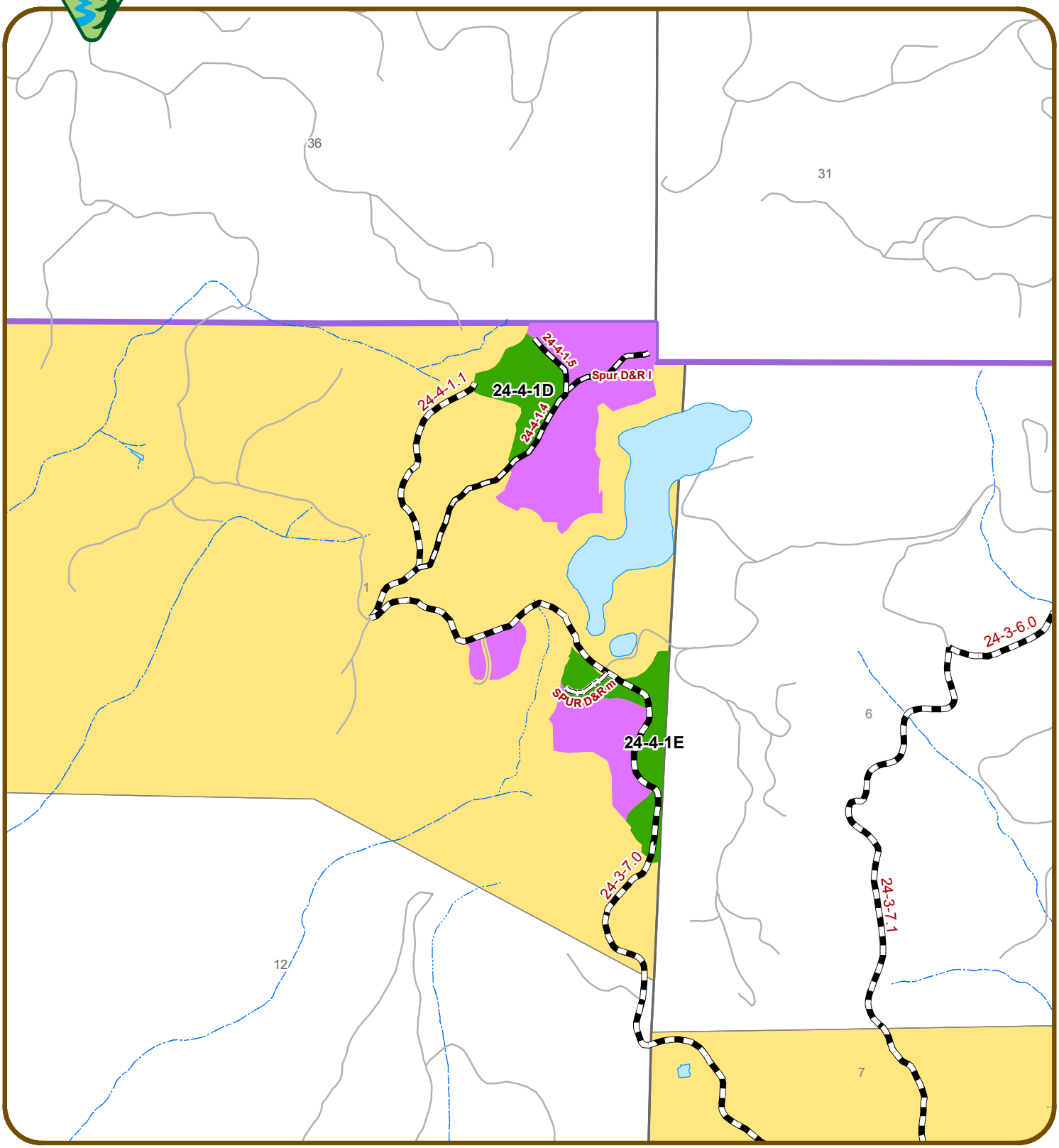
Figure A-9. Alternative Two - Proposed Action - Option A
Units 24-4-1D, 24-4-1E



Legend

- Proposed Unit - Cable Yarding
- Proposed Unit - Ground-based Yarding
- Proposed Spur Construction
- Proposed Road Maintenance/Renovation
- District Area Boundary
- Bureau of Land Management
- Private/Unknown
- Road
- Minor Stream
- Waterbody

0 430 860 1,720
Feet

N W E S

Date: 3/23/2016

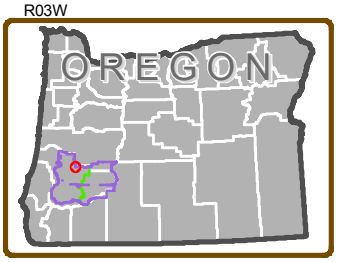


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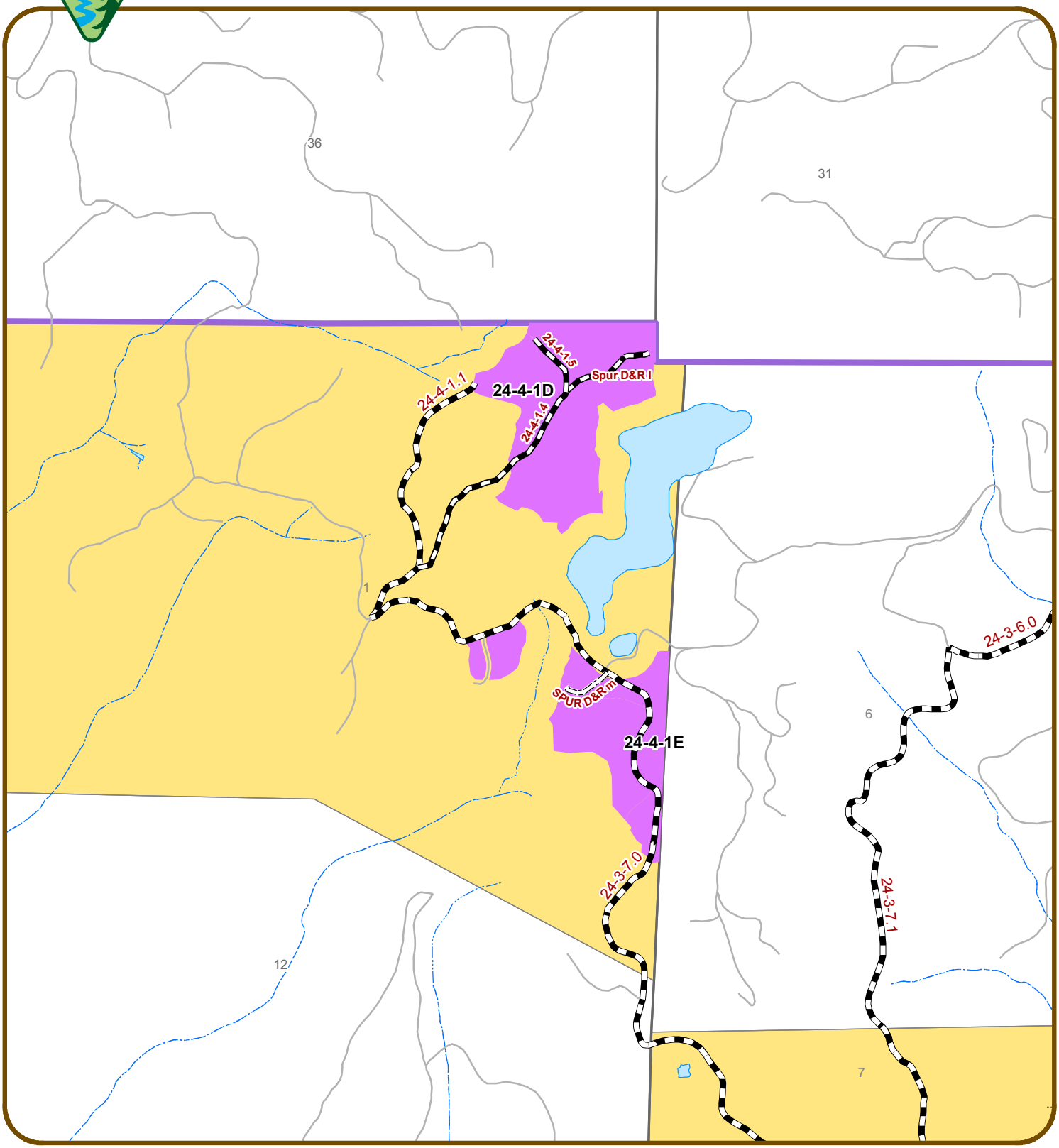
Figure A-10. Alternative Two - Proposed Action - Option B
Units 24-4-1D, 24-4-1E



Legend

- Proposed Unit - Cable Yarding
- Proposed Spur Construction
- Proposed Road Maintenance/Renovation
- District Area Boundary
- Bureau of Land Management
- Private/Unknown
- Road
- Minor Stream
- Waterbody

0 430 860 1,720
Feet

N W E S

Date: 3/23/2016

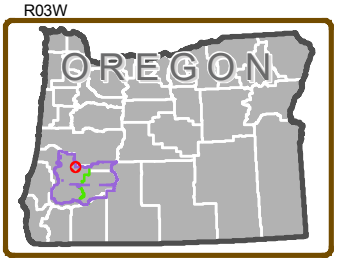


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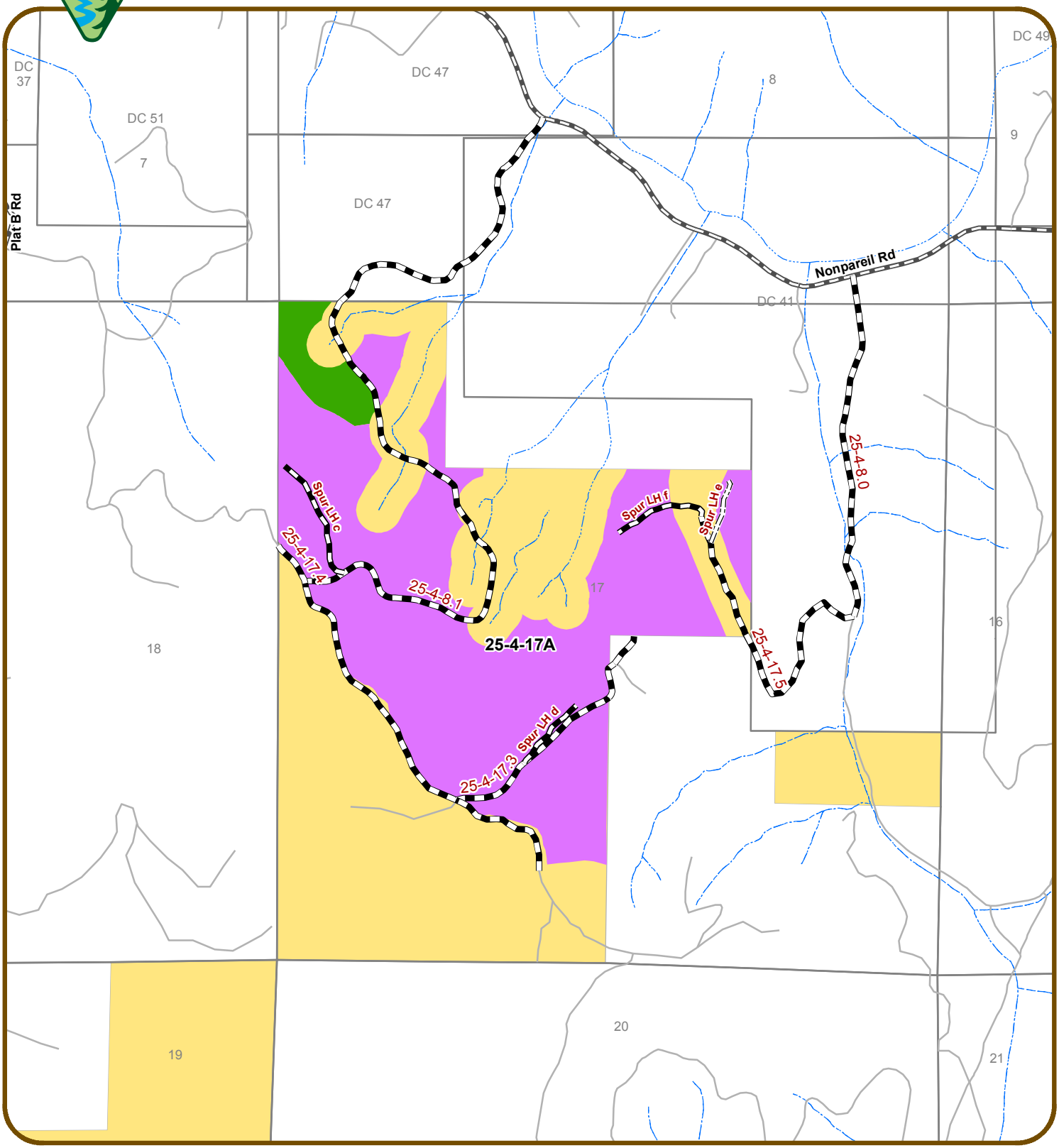
Figure A-11. Alternative Two - Proposed Action - Option A
Unit 25-4-17A



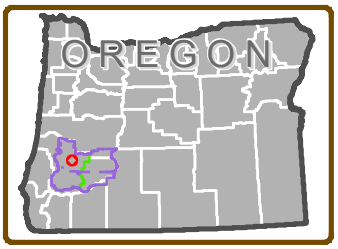
Legend

- Proposed Unit - Cable Yarding
- Proposed Unit - Ground-based Yarding
- Proposed Spur Construction
- Proposed Road Maintenance/Renovation
- District Area Boundary
- Bureau of Land Management
- Private/Unknown
- Road
- County Road
- Minor Stream

0 430 860 1,720
Feet

N W E S

Date: 5/4/2016



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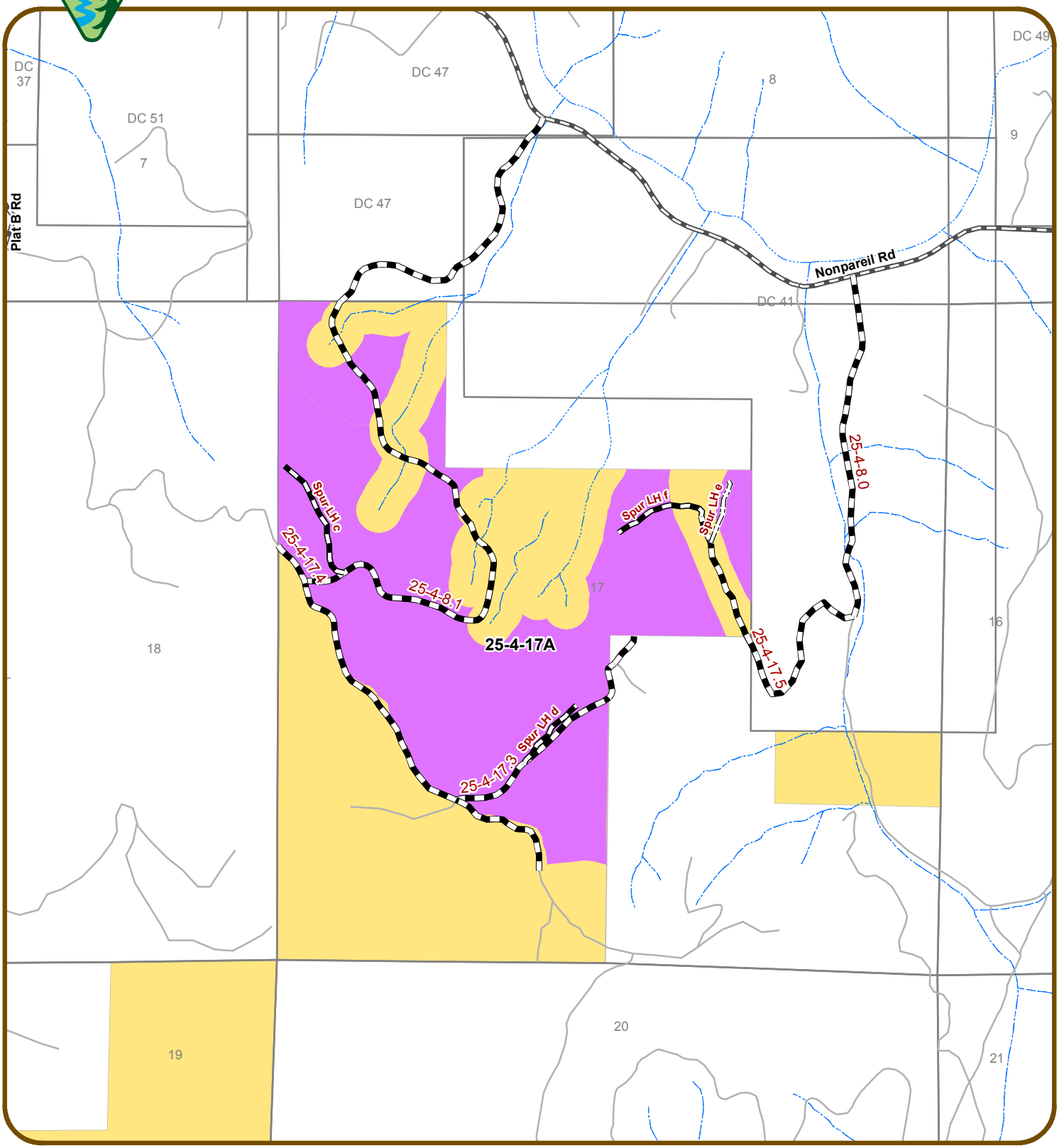
Back in Black Regeneration Harvest Plan

Figure A-12. Alternative Two - Proposed Action - Option B
Unit 25-4-17A



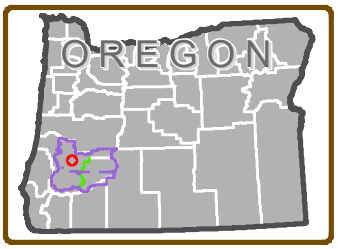
Legend

- Proposed Unit - Cable Yarding
- Proposed Spur Construction
- Proposed Road Maintenance/Renovation
- District Area Boundary
- Bureau of Land Management
- Private/Unknown
- Road
- County Road
- Minor Stream

0 430 860 1,720
Feet

N W E S

Date: 5/4/2016



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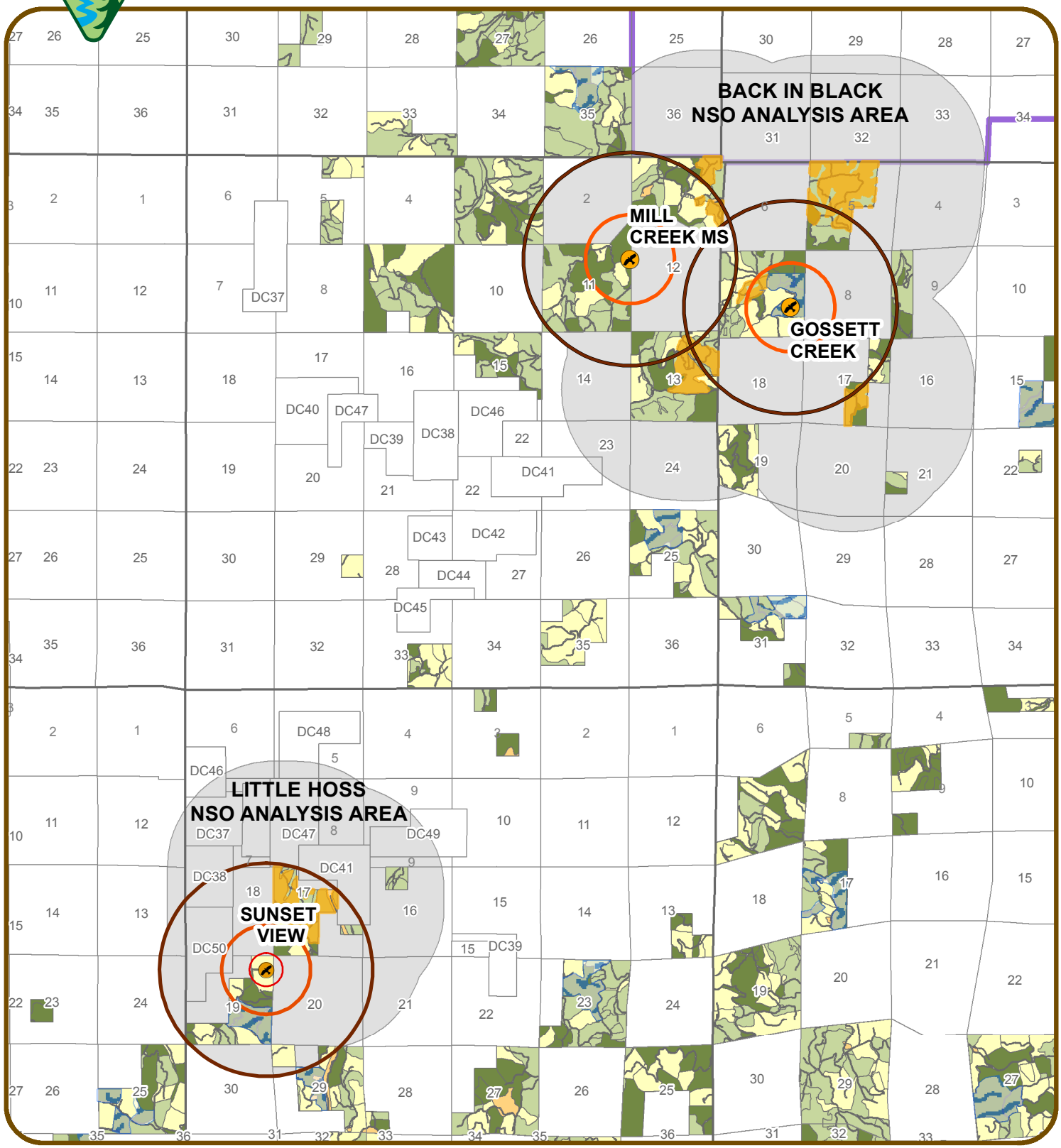
Back in Black Regeneration Harvest Plan

Figure A-13. NORTHERN SPOTTED OWL

Activity Centers, Analytical Spatial Scales, and Habitat

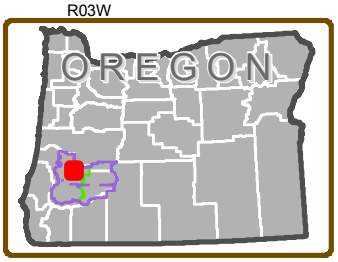


Legend

- NSO Activity Center
- NSO Nest Patch (300 meters)
- NSO Core Area (0.5 miles)
- NSO Home Range (1.2 miles)
- NSO KOAC Reserve
- NSO Analysis Area
- Non-capable Habitat- Road
- Non-capable Habitat
- Capable Habitat
- Dispersal Habitat
- NRF/ Suitable Habitat
- District Area Boundary
- Bureau of Land Management
- Private/Unknown

0 2,750 5,500 11,000
Feet

N W E S



Date: 8/20/2015

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 and may be updated without notification.

Appendix B. Live Vegetation Development Analytical Methodology

Analytical Question:

How would treatments alter stand dynamics and what effects would they have on the stand structure and composition of selected live vegetation components (i.e. trees and shrubs)?

Analytical Assumptions:

The BLM made some analytical assumptions to complete its analysis. Key assumptions made are:

- Stand exam data adequately represents the current unit conditions or can be updated by simulation to current conditions.
- Computer simulations beyond the range of the base data on which the Organon model was built are considered adequate for characterizing differences between alternatives.
- Simulations for 20 and 50 years into the future are adequate to distinguish between alternative outcomes.
- Stand development outcomes of the proposed action are based on a single harvest (regeneration) entry.

Live Tree Analytical Methodology:

The BLM analyzes impacts to live vegetation by examining site-specific data, scientific literature, and the outputs from computer simulations.

The methodology used data from site-specific stand inventories and the Organon growth simulator model to depict current stand conditions (e.g. trees per acre, diameters, volumes, species, and canopy cover).

Stand Age:

Stand boundaries were determined from the Forest Operation Inventory (FOI). Stand ages for this project were derived from the Microstorms database. The FOI stand ages were verified with past harvest histories in the district's timber atlases.

The exception to this is a portion of Unit 25-4-17A(c) in which there was no record of a past harvest. Area specific stand exam data was used. Tree ages were sampled at breast height (4.5 feet above ground line) on dominant trees. One tree per two and a half acres was sampled. Total age was calculated using the breast height age and adding a site productivity specific adjustment to calculate the total tree age. A simple average of the sample trees determined the stand age. Small numbers of predominant trees[1] exist in some stands, but are not included in stand age determination.

Organon Model Description:

Organon is an individual-tree, distance-independent model developed by Oregon State University from data collected in western Oregon forest stands (Hann 2011). The architecture of the model makes it applicable for simulations of traditional and non-traditional silviculture (Hann 1998).

[1] Predominant trees - trees with crowns extending well above the canopy level of the majority of the stand and substantially different [≥ 30 years] in age from the main stand. Synonyms for predominants are remnant, residual, legacy, or emergent trees.

The southwest Oregon variant (SWO-Organon) was selected as the most appropriate for modeling the Back in Black stand types, based on the stands' geographic locations, species composition, and site productivity.

Simulations of stand growth extend beyond the Organon model's range of data for units 25-4-1(c) only, but are within the range considered reasonable for evaluation of stand development trajectories (Tappeiner *et al.* 2007, Andrews *et al.* 2005). The timing of harvest and other silvicultural treatments occur well within the range of the model's validated growth projection capabilities.

Organon can adequately simulate *regular* tree mortality caused by inter-tree competition. However, it underestimates tree mortality from causes other than inter-tree competition, such as insects, disease, windthrow, and stem breakage (Tappeiner *et al.* 2007). This type of mortality is *irregular*, or episodic in nature, and it is inherently difficult to predict the exact time period it will occur (Franklin *et al.* 1987). The Organon mortality equations predict that the risk of dying is very low for trees larger than 20 inches in diameter or with crown ratios greater than 70 percent (Hann and Wang 1990). For mature stands, mortality from inter-tree competition becomes less significant as stands age and mortality from other factors becomes more substantial (Franklin *et al.* 2002).

Organon calculates a stand-level measure of canopy cover that is calculated by summation of individual tree crown widths. Estimates of current (no growth simulated) canopy cover may be considered reasonably accurate. Future canopy cover predictions after growth simulation should be considered conservative, i.e. somewhat underestimated. Validation and limitations of the Organon generated canopy cover attribute for Roseburg District conditions has been documented for previous projects.

Canopy cover alone should not be considered a surrogate for assessing the potential for light penetration to the forest floor or conversely the amount of shade produced by overstory trees. Canopy cover does not account for other relevant attributes (e.g. crown length and volume) affecting light penetration to the forest floor and consequently potential vigor and growth of understory vegetation. Reduction in available understory light can be more rapid than may be inferred from the canopy cover attribute only.

Snags and Down Wood Analytical Methodology

Analytical Question:
How would treatments alter stand dynamics and what effects would that have on the production of dead wood (i.e. snags and down wood)?

Analytical Assumptions:
The BLM made some analytical assumptions to complete its analysis. Key assumptions made are:

- Stand exam data adequately represents the current unit conditions or can be updated by simulation to current conditions.
- Computer growth model simulations beyond the range of the base data on which the model was built are considered adequate for characterizing differences between alternatives.
- Simulations for 20 and 50 years into the future are adequate to distinguish between alternative outcomes.

- Cumulative dead wood outputs from the Organon growth simulations are summarized for the 20 and 50 years of simulation for each proposed sale by alternative. Dead wood components include the trees killed by both regular and irregular mortality processes described previously.

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Appendix C. Bureau Sensitive & Bureau Strategic Wildlife Species

ISSSP List Date: July 29, 2015 (IM-OR-2015-028)

The following table includes those species which are documented or suspected to occur within the Roseburg District BLM. Those *Bureau Sensitive* or *Bureau Strategic terrestrial wildlife species* which are suspected or documented to occur within the project area are detailed below. Species names indicated in **bold** within Table C-1 identifies the two species that are discussed in detail within the *Back in Black Environmental Assessment.*

Bureau Sensitive Species

BLM districts are responsible to assess and review the effects of a proposed action on *Bureau Sensitive* species. To comply with Bureau policy, Districts may use one or more of the following techniques:

a. Evaluation of species-habitat associations and presence of potential habitat.
b. Application of conservation strategies, plans, and other formalized conservation mechanisms.
c. Review of existing survey records, inventories, and spatial data.
d. Utilization of professional research and literature and other technology transfer methods.
e. Use of expertise, both internal and external, that is based on documented, substantiated professional rationale.
f. Complete pre-project survey, monitoring, and inventory for species that are based on technically sound and logistically feasible methods while considering staffing and funding constraints.

When Districts determine that additional conservation measures are necessary, options for conservation include, but are not limited to: modifying a project (e.g. timing, placement, and intensity), using buffers to protect sites, or implementing habitat restoration activities (IM-OR-2003-054).

Bureau Strategic Species

If sites are located, collect occurrence data and record in corporate database.

Occurrence data or sites have not been located for any of the District's seven Bureau Strategic Species. The project area is located outside of the distribution range of six invertebrate species including: A Caddisfly (*Namamyia plutonis*), (Broadwhorl Tightcoil *(Pristiloma johnsoni),* Chase Sideband *(Monadenia chaceana),* Klamath Tail-Dropper (*Prophysaon sp. nov.),* and Odessa Pebblesnail (*Fluminicola sp. nov.).* No habitat is present in the project area for the Merlin (*Falco columbarius).*

Table C-1. Effects of the Back in Black Timber Sale Project on Bureau Sensitive & Strategic Terrestrial Wildlife Species.

SPECIES	GENERAL HABITAT REQUIREMENTS	PRESENT IN PROJECT AREA?	IMPACTS TO SPECIES	
			ALTERNATIVE ONE NO ACTION	ALTERNATIVE TWO PROPOSED ACTION
BUREAU SENSITIVE				
American Peregrine Falcon *Falco peregrines anatum*	Cliffs, rock outcrops; open habitats for hunting birds. No seasonal restrictions would be required because the unit lies outside of the disturbance protection buffer and topographical features present (i.e. a ridge) would provide an adequate buffer to noise during the breeding season. Although peregrine falcons are likely to forage within the proposed project area, the proposed action is not expected to cause measurable effects to foraging habitat. The closest known site is 7.0 miles southeast of Unit 24-3-17D (Roseburg BLM PEFA Database 2015). *Although this species has been documented, there is no nesting habitat or known nest sites within the project area and therefore, is eliminated from detailed analysis within the EA.*	Documented	No Effect	No effects to nesting habitat. Regeneration harvest would create more diverse habitat and micro habitat conditions for avian species in early seral forest habitat, thus increasing foraging opportunities and prey species diversity.
Bald Eagle *Haleaeetus leucocephalus*	Late-successional forests with multi-canopies, generally within two miles of a major water source. Based on field review, bald eagles are not expected to be nesting within the units. The closest known nest site is 4.0 miles southeast of Unit 25-4-17A. Closest observations are 0.7 miles northeast of Unit 24-3-17D and 0.8 miles northwest of Unit 25-4-17A (GeoBOB data query; Feb. 2015). However, based on numerous observations through the summer of 2014 of bald eagles and the presence of suitable habitat adjacent to units, it is suspected (but not confirmed) there may be nest sites located within the vicinity (within 1.0 mile) of the project area along the major streams (i.e. Coon Creek, Calapooya Creek and Gassey Creek).	Documented	Stands would remain unsuitable for nesting until late successional characteristics develop, including open, multi-layered canopy with the presence of large trees with structural characteristics to support a nest.	Disturbance: If a nest location is identified within the vicinity of the project area, seasonal restrictions would be required from January 1 to August 31 within 0.5 miles of the active nest site based on line of sight to avoid disturbance of breeding bald eagles and their offspring. Habitat: No suitable habitat would be removed within two miles of a major water source. For stands within two miles of a major water source, regeneration harvest would delay the development of nesting habitat by 80 or more years post-harvest. In 80-100 years, nesting and roosting structure for the bald eagle would increase in stands after they develop a multi-canopy containing large trees with large limbs and deep crowns.
Columbian White Tailed Deer *Odocoileus virginianus leucurus*	Oak woodland habitats near and north of Roseburg, OR Bottomlands, oak/hardwood forests; cover for fawning. (USDI FWS 1983)	Out of Range	No Effects	
Crater Lake Tightcoil ***Pristiloma arcticum crateris***	**Also a *Survey & Manage Species*; refer to Table D-1 in Appendix D for habitat requirements and impacts.**			
Fisher *Martes pennanti*	Large contiguous blocks of mature forest with structural complexity (Verts and Carraway 1998). Denning, resting and	Suspected	Stands would remain unsuitable for denning until late	Loss of potential foraging habitat due to regeneration harvest, by reducing canopy

Species	General Habitat Requirements	Present in Project Area?	Impacts to Species	
			Alternative One No Action	Alternative Two Proposed Action
	foraging habitat consists of structurally complex forests; mature open forests with large live trees, snags, and down wood. Forest stands in the project are not suitable habitat and currently known species range is outside of the West Coast DPS. On October 7, 2014, the FWS issued a proposal to list the West Coast Distinct Population Segment (DPS) of the fisher as federally threatened under the ESA. However, on April 18, 2016, the FWS determined that the fisher does not risk extinction now or in the foreseeable future and is therefore withdrawn from ESA listing (81 FR 22710). . In Washington and Oregon, outside of the existing known populations, fishers are considered likely extirpated – although on occasion individual fishers may be detected (79 FR 60427). Thus, based on available information, it appears that occasional individual fisher move through BLM-administered lands on the Roseburg District but it is unknown if there is a current, breeding-population on BLM-administered lands. Eight incidental observations of fisher within the documented 34-mile estimated dispersal (maximum) distance recorded for fisher in SW Oregon, with the closest observation 10 miles northeast of the proposed project area (ORBIC database query, Feb. 2015). Although an occasional individual fisher may move through BLM-administered lands on the Roseburg District, fisher is not expected to be denning within the watershed, including the proposed project area		successional characteristics develop, including open, multi-layered canopy and the presence of large, hollow snags.	cover below 30 percent. Some large down wood and snags in units would be maintained in aggregates to maintain cover and security from predators. In the long term (60-100 years), harvest treatments is expected to foster the development of structural elements important for fisher, including large trees and snags, and eventually large down wood.
Foothill Yellow-legged Frog *Rana boylii*	Low gradient streams/ponds; gravel/cobble, bedrock pools (Corkran and Thoms 1996). No habitat is present within the proposed units.	No Habitat	No Effects	
Franklin's Bumblebee *Bombus franklini*	Project within the historical range of the species, however, undocumented in the Roseburg District. Currently known only from southern Oregon and northern California between the Coast and Sierra-Cascade Ranges. Requires habitat in proximity to water with a sufficient supply of floral resources to provide continuous blooming throughout the colony season. Additionally, probably requires abandoned rodent borrows or clumps of grass for nesting, population sites may be limited by the abundance of rodents and the presence of undisturbed grassland. Closest known documentation of species is in Roseburg and just west of Sutherlin at Ford's Pond (The Xerces Society 2008). Not reasonably expected to occur in the analysis area due to lack of suitable habitat.	No Habitat	No Effects	
Fringed Myotis *Myotis thysanodes*	Fringed myotis are rare in the Pacific Northwest and their distribution in relation to forest age is unknown (Weller and Zabel 2001). Hibernacula and roost sites includes caves, mines, bridges,	Suspected	Stands will continue to function as foraging and roosting habitat. Suitability of habitat will	Regeneration harvest would result in the direct loss of snags or reduce canopy cover around reserved snags that may be present

SPECIES	GENERAL HABITAT REQUIREMENTS	PRESENT IN PROJECT AREA?	IMPACTS TO SPECIES	
			ALTERNATIVE ONE NO ACTION	ALTERNATIVE TWO PROPOSED ACTION
	buildings, rock crevices, and large snags (Weller and Zabel 2001). The fringed myotis is not considered a tree-roosting bat in the Pacific Northwest (Weller and Zabel 2001). Snags are present in the analysis area and all units are considered foraging habitat. The species has been documented within the fifth-field watershed, but not within unit boundaries (GeoBOB database query, Feb. 2015). There are no known communal roosts, nurseries, or hibernacula in the proposed harvest units and these species are generally uncommon in the project vicinity.		increase as late successional characteristics develop, including open, multi-layered canopy (for foraging) and the presence of large, hollow snags (for roosting).	outside of retention areas or Riparian Reserves. Snags retained in units to the extent possible *(PDF would retain existing snags ≥ 10 inches dbh and ≥ 16 feet tall; some pockets of snags are retained in "skips")* would continue to provide some roosting habitat post-harvest. Regeneration harvest would create an overall increase in quality and diversity of foraging habitat as grasses, forbs, and shrubs develop which is expected to increase flying insect populations (prey species).
Green Sideband *Monadenia fidelis beryllica*	Coast Range, riparian forests at low elevations; deciduous trees & shrubs in wet, undisturbed forest - low elevation; strong riparian associate (USDA FS and USDI BLM 2010; Frest and Johannes 2000).	Out of Range	No Effects	
Harlequin Duck *Histrionicus histrionicus*	Mountain Streams in forested areas on west slope of the Cascade Mountains in swift, rocky, large streams or rivers. Nest under rock overhangs, vegetation or streamside debris. Late spring migrant or summer visitor. The North Umpqua River contains suitable nesting and brooding habitat. Nesting has not been documented in the Umpqua River Basin (Dowlan 2003, p. 116). In the western Cascades, breeding pairs are observed on low to moderate gradient (1-7 percent) third to fifth-order streams in the western hemlock zone (Dowlan 2003, p. 116). Although suspected, nesting has not been documented on the District. Closest observation is 10.5 miles southeast along the N. Umpqua River (GeoBOB database query, Feb. 2015).	No Habitat	No Effects	

SPECIES	GENERAL HABITAT REQUIREMENTS	PRESENT IN PROJECT AREA?	IMPACTS TO SPECIES	
			ALTERNATIVE ONE NO ACTION	ALTERNATIVE TWO PROPOSED ACTION
Johnson's Hairstreak *Callophrys johnsoni*	A butterfly known to occur within coniferous forests which contain dwarf mistletoe (*Arceuthobium spp*.). Associated with old-growth or late successional second growth forests but can be present in younger forests if dwarf mistletoe is present (Andrews et.al. 2010). Elevation ranges from sea level to 6000 feet. Many sightings in Oregon have been documented at higher elevations and all are associated with coniferous forests (The Xerces Society 2016). No dwarf mistletoe was observed within the units.	No Habitat	No Effects	
Lewis' Woodpecker *Melanerpes lewis*	Open woodland habitat near water; open woodland canopy and large diameter dead/dying trees, snag cavities (Tobalske 1997).	No Habitat	No Effects	
Oregon Giant Earthworm *Driloleirus macelfreshi*	Deep, moist, undisturbed soils of riparian forests.	Out of Range	No Effects	
Oregon Shoulderband *Helminthoglypta hertleini*	Suitable habitat for the Oregon Shoulderband is rocky areas, including talus deposits and outcrops, which contain stable interstitial spaces large enough for snails to enter. Within rocky habitat, the species is associated with herbaceous vegetation and deciduous leaf litter, generally within 30 meters (98 feet) of stable talus deposits or other rocky areas. With the exception of one habitat area, suitable habitat areas will be protected within the designated skips. Areas of suitable Oregon Shoulderband habitat were identified in Units 24-4-1D, 24-3-7D, and 25-4-17A. Suitable habitat areas will be included and protected within the designated skips within units 24-4-1D and 24-3-7D. Pre-project surveys were completed spring 2015 and the species was not detected in either of the two suitable habitat areas identified in unit 25-4-17A.	Suspected	No Effect	Inclusion of rocky outcrops and small rocky areas within "skips" would protect and maintain suitable habitat within the harvest units.
Oregon Vesper Sparrow *Pooecetes gramineus affinis*	Grassland, farmland, and sage habitats. Dry, open habitat with moderate herb and shrub cover (Jones and Cornely 2002).	No Habitat	No Effects	
Pacific Marten *Martes caurina* (coastal population only)	The marten is associated strongly with mature conifer forests characterized by closed canopies, large trees, and abundant stand and down woody material (Zielinski *et al*. 2001 p. 478) with a dense shrub component (Zielinski *et al*. 2001 p. 485). The proposed project area is located within the Western Cascades – outside of the distribution range of the coastal population.	Out of Range	No Effects	
Pallid Bat *Antrozous pallidus*	Hibernacula and roost sites in caves, mines, rock crevices, bridges, hollow trees and snags (Lewis 1994). Usually rocky outcroppings near dry open areas; occasionally near evergreen forests. All units are considered foraging habitat. Snags and rocky outcrops present within the project area, but not within the units specifically. The pallid bat has not been documented within the watershed, but has	Suspected	Roosting opportunities would remain at current levels where suitable snags exist. Stands would continue to provide foraging opportunities at current levels.	Regeneration harvest would result in the direct loss of snags or reduce canopy cover around reserved snags that may be present outside of retention areas or Riparian Reserves. Snags retained in units to the extent possible *(PDF would retain existing*

SPECIES	GENERAL HABITAT REQUIREMENTS	PRESENT IN PROJECT AREA?	IMPACTS TO SPECIES	
			ALTERNATIVE ONE NO ACTION	ALTERNATIVE TWO PROPOSED ACTION
	been documented within adjacent field-field watersheds to the north, south, and east (GeoBOB data query; Feb. 2015). There are no known communal roosts, nurseries, or hibernacula in the proposed harvest units and these species are generally uncommon in the project vicinity.			*snags ≥ 10 inches dbh and ≥ 16 feet tall; some pockets of snags are retained in "skips")* would continue to provide some roosting habitat post-harvest. Regeneration harvest would create an overall increase in quality and diversity of foraging habitat as grasses, forbs, and shrubs develop which is expected to increase flying insect populations (prey species).
Purple Martin *Progne subis*	Snags with woodpecker cavities in open habitats (e.g. grasslands, brushlands, open woodlands); typically found in open areas near water (Brown 1997, Horvath 2003). Foraging expected within the project area. Closest purple martin observation was 3.6 miles north of the project area and the closest known colony is located on the North Bank Habitat Management Area, approximately 4.7 miles south of Unit 17A (GeoBOB data query; Feb 2015). Although this species is suspected to forage within the project area, this species was eliminated from detailed analysis in the EA because there would be no effects to known purple martin colonies or potential habitat and no measurable effects to foraging habitat for the species,	Suspected	No Effect	No measurable effect to foraging habitat due to regeneration harvest. Overall increase in quality of foraging habitat as grasses, forbs, and shrubs develop which increase flying insect populations (prey species). Nesting and foraging habitat could potentially be created by regeneration harvest; particularly if large snags with suitable nesting cavities develop in open areas which would increase natural nesting habitat within the project area.
Rotund Lanx *Lanx subrotundata*	Major rivers and large tributaries with cold, well-aerated water and rocky substrate (USDA FS and USDI BLM 1998).	Out of Range	No Effects	
Siskiyou Hesperian *Vespericola sierranus*	Primarily a freshwater riparian associate, moist habitat, including springs, seeps and deep leaf litter along stream banks and under debris and rocks. Preferably, moist valleys, ravines, gorges or talus sites near the lower portion of slopes. It may occur in areas with running water or alongside streams and spring pools (Stone 2009). No habitat is present within the timber harvest units.	No Habitat	No Effects	
Traveling Sideband *Moadenia fidelis celeuthia*	This subspecies is known to be at lower elevations in unaltered, somewhat dry and open forested terrain. It can be found in basal talus and rock outcrops with oak and maple overstory and along creeks with a variety of hardwoods and conifers (Fallon 2015) (*The Xerces Society*). The extent of the range for each subspecies has not been determined due to the uneven survey effort and to identification and recording difficulties (Fallon 2015). Known locations occur outside and south of Douglas county, primarily in Jackson County, Oregon (Fallon 2015).	Out of Range	No Effects	

Species	General Habitat Requirements	Present in Project Area?	Impacts to Species	
			Alternative One No Action	Alternative Two Proposed Action
Townsend's Big-eared Bat *Corynorhinus townsendii*	Townsend's big-eared bat is a colonial species and is generally viewed as a cave dwelling species, and are also found in human-made structures (e.g. old mine workings and buildings); only roosts in the open, hanging from walls and ceilings (Pierson and Rainey 1998). Expected to forage in or above units. This species has not been documented specifically within units, but has been documented within one mile of the proposed project area within the fifth-field watershed (GeoBOB database query, Feb. 2015). There are no known communal roosts, nurseries, or hibernacula in the proposed harvest units and these species are generally uncommon in the project vicinity.	Suspected	Stands would continue to provide foraging opportunities at current levels.	Regeneration harvest would create an overall increase in quality and diversity of foraging habitat as grasses, forbs, and shrubs develop which is expected to increase flying insect populations (prey species).
Western Bumblebee *Bombus occidentalis*	Western bumble bees forage on flowering shrubs and forbs usually found in open spaces including lupines and California poppy (The Xerces Society 2011). Limited data but project within the historical range of the species. Undocumented in the Roseburg District. Not reasonably expected to occur in the analysis area due to lack of suitable habitat.	Unknown	Stands would continue to be unsuitable because of the lack of understory development until suppression mortality created gaps and edge habitat allowing for the development of forage habitat – flowering plants and shrubs.	Regeneration harvest would create openings where flowering vegetation important for foraging would persist until the canopy cover increases and closes in 20+ years.
Western Pond Turtle *Actinemys marmorata*	Marshes, ponds, lakes, streams, and rivers with emergent structure (Csuti *et al.* 1997). Nesting habitat is in areas of high solar exposure and sparse vegetation consisting of grass, forbs, compact soil composed of clay, silt or sandy loam and sometimes a mix of soil and gravel/cobble (Rosenberg *et. al*. 2009). No suitable habitat is present within or adjacent to unit boundaries.	No Habitat	No Effects .	
Western Ridged Mussel *Gonidea angulata*	Streams of all sizes in low to mid-elevation watersheds inhabiting mud, sand, gravel, and cobble substrates (Duncan 2008); Umpqua R., major tributaries, and possibly smaller creeks.	Unknown	No Effect	No measurable effects to habitat due to 35, 60, and 120-foot buffers along perennial streams within Riparian Reserves.
White-Tailed Kite *Elanus leucurus*	Open grasslands, meadows, emergent wetlands, farmlands, lightly, wooded areas; wooded riparian habitats close to open hunting; tall trees and shrubs. (Dunk 1995). Project at unsuitable elevations and lacks suitable habitat.	No Habitat	No Effects	

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Appendix D. Survey & Manage Wildlife Species

S&M List Date: December 2003 of Survey and Manage Species List *(except change made to red tree vole)* (*IM- OR-2014-037); 2001 Record of Decision and Standards and Guidelines for Amendments of the Survey and Manage, Protection Buffer, and other Mitigation Measures Stands and Guidelines (USDA/FS and USDI/BLM 2001).*

The project is consistent with the 2001 ROD and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, as incorporated into the District Resource Management Plan (USDI BLM 1995).

This project utilizes the December 2003 species list. This list incorporates species changes and removals made as a result of the 2001, 2002, and 2003 Annual Species Reviews (ASR) with the exception of the red tree vole. For the red tree vole, the Ninth Circuit Court of Appeals in KSWC *et al.* v. Boody *et al.*, 468 F3d 549 (9th Cir. 2006) vacated the category change and removal of the red tree vole in the mesic zone, and returned the red tree vole to its status as existed in the 2001 ROD Standards and Guidelines, which makes the species Category C throughout its range. Details of the project surveys are described below.

The Roseburg District compiled the species listed and includes those vertebrate and invertebrate species with pre-disturbance survey requirements (Category A, B, or C species), whose known or suspected range includes the Roseburg District according to:

- *Survey Protocol for the Great Gray Owl within the range of the Northwest Forest Plan v3.0*, January 12, 2004; (refer to IM-OR-2011-063, Attachment 1-26, July 21, 2011).
- *Survey Protocol for the Red Tree Vole: Arborimus longicaudus (= Phenacomys longicaudus) in the Record of Decision of the Northwest Forest Plan)*, Version 3.0, Revision November 2012 (Huff *et al.* 2012) (refer to IM-OR-2003-003, October 23, 2002 and Memorandum from the Regional Interagency Executive Committee, November 21, 2012).
- *Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan*, Version 3.0, 2003 (refer to IM-OR-2003-044, February 21, 2003).

This list also includes any Category D, E, or F species with known sites located within the Back in Black Project (regeneration harvest). Applicable management recommendations include:

- Conservation Assessment for Great Gray Owl (*Strix nebulosa*), USDA Forest Service Region 6 and USDI Bureau of Land Management, Oregon and Washington, Williams, Elizabeth; Klamath Bird Observatory; April 2012
- Interim management recommendations for the Great Gray Owl were put forth in the 2011 Survey and Manage Settlement Agreement Species List (refer to IM-OR-2011-063, Attachment 1-26, July 21, 2011).
- *Management Recommendations for the Oregon Red Tree Vole: Arborimus longicaudus, Version 3.0* (refer to IM-OR-2000-086, September 27, 2000).
- Conservation Assessment for *Monadenia (Shastelix) chaceana*, Chace Sideband, Service Region 6 and USDI Bureau of Land Management, Oregon and Washington, Ted R. Weasma, November 1998; reconfigured by Nancy Duncan, August 2005.
- Conservation Assessment for *Pristiloma arcticum crateris*, Crater Lake Tightcoil, USDA Forest Service Region 6 and USDI Bureau of Land Management, Oregon and Washington, Darryl Gowan and Thomas E. Burke, October 1999; reconfigured by Nancy Duncan, September 2004.

- Management Recommendations for Terrestrial Mollusk Species, *Megomphix hemphilli*, the Oregon Megomphix, Version 2.0. John S. Applegarth; (refer to Attachment 2 of IM-OR-2000-015, November 23, 1999)

Pechman Exemption (a) does not apply to the nine units proposed for regeneration harvest in the Back in Black project area. Therefore, if habitat conditions are met per species protocol, pre-disturbance surveys for Survey & Manage species would be required as indicated in Table D-1.

Table D-1. Survey & Manage Wildlife Species – Back in Black Project

SPECIES	S&M CATEGORY	SURVEY TRIGGERS			SURVEY RESULTS			SITE MANAGEMENT
		Within Range of the Species?	Contains Suitable habitat?	Habitat Disturbing*?	Surveys Required?	Survey Date	Sites Known or Found?	
VERTEBRATES								
Great Gray Owl *Strix nebulosa*	C	Yes	No[1]	No	No[2]	Completed 2014 & 2015	0[2]	N/A[2a]
Red Tree Vole *Arborimus longicaudus*	C	Yes	Yes[3]	Yes[3]	Yes[3]	Completed Fall 2015/ Winter 2016	10[3a]	4 sites = High Priority; 4 sites = High and Non-High Priority; 2 sites = Non-High Priority[3b]
MOLLUSKS								
Siskiyou Sideband *Monadenia chaceana*	B	No[4a]	No[4]	No[4a]	No[4a]	N/A	0	N/A
Crater Lake Tightcoil *Pristiloma arcticum crateris*	A	Yes[5]	Yes[5a]	Yes[5a]	No[5a]	N/A[5a]	0	Protection of unsurveyed suitable habitat[5a]
Oregon Megomphix *Megomphix hemphilli*	F[6]	Yes[6a]	Yes[6a]	No[6a]	N/A[6a]	N/A	13[6a]	Protection not required [6a]

**"Habitat disturbing" and thereby a trigger for surveys as defined in the 2001 ROD S&Gs (p. 22).*

N/A = Not Applicable

[1] The stands in the Back in Black project area do not contain the habitat characteristics, including large diameter nest trees and/or suitable nesting structures or have proximity to natural-openings $\geq$ 10 acres (A.Worthing, staff review, 2013). Pre-disturbance surveys are <u>not</u> suggested in suitable nesting habitat adjacent to man-made openings at this time (pg. 14, *Survey Protocol for the Great Gray Owl within the range of the Northwest Forest Plan v3.0*, January 12, 2004).

[2] During field review of Unit 24-3-17D in February 2014, a large owl species was observed and originally believed to be a great gray owl. It is required to protect known great gray owl sites *(Survey Protocol for the Great Gray Owl within the range of the Northwest Forest Plan v3.0*; January 12, 2004). Therefore, pre-disturbance surveys were completed to confirm the owl species previously observed. Great gray owls were not detected during either year of surveys in 2014 and 2015.

[2a] Conservation Assessment for Great Gray Owl (*Strix nebulosa*), USDA Forest Service Region 6 and USDI Bureau of Land Management, Oregon and Washington, Williams, Elizabeth; Klamath Bird Observatory; April 2012, pg. 32 and USDI Bureau of Land Management, Record of Decision and Resource Management Plan; June 1995, p. 44.

[3] In accordance with the *Survey Protocol for the Red Tree Vole: Arborimus longicaudus (= Phenacomys longicaudus in the Record of Decision of the Northwest Forest Plan)*, Version 3.0, Revision November 2012 (refer to IM-OR-2003-003, October 23, 2002) and <u>based on stand metrics</u>, all nine units do not meet the minimum mean diameter (criteria 2) or the general habitat descriptions (criteria 3) and therefore, do not require pre-disturbance surveys because they do not contain suitable habitat that may potentially contribute to a reasonable assurance of persistence for the red tree vole (Version 3, 2012, p. 9).

However, based on field review it was determined that surveys were warranted in two of the nine units (as originally proposed), because Units 24-3-5E and 111 year-old portion of Unit 25-4-17A did meet the general habitat criteria. In addition, active red tree vole nest trees were located in Unit 25-4-17A. Therefore, the Field Office elected to complete pre-project clearance surveys in these areas. Refer to Appendix I for further details on rationale and stand descriptions.

[3a] Pre-disturbance surveys were completed previously in May 2000 which identified six active red tree vole trees. However, no site(s) was delineated because the red tree vole was removed from the Survey and Manage standards and guides in 2003 (IM-OR-2003-034). As a result, five (5) of the six (6) nest trees were not protected during the thinning treatment in the previous timber harvest unit. The sixth nest tree was protected in the Riparian Reserve. To determine current status of historic sites within the unit, pre-project surveys were conducted within the previously treated portion of Unit 25-4-17A. Refer to Appendix I for further details survey results and non-high priority designation.

[3b] Refer to Appendix I for details on non-high priority designation of sites and management of high priority sites. Summary of survey results and site designation for Units 24-3-5E and 25-4-17A are as follows: a) Unit 24-4-5E – three red tree vole sites identified: 1) one within harvest unit designated as non-high priority, 2) one site adjacent to the unit is partially designated as non-high priority (2 trees will be retained and managed within adjacent protocol-quality habitat, but would not receive a full site-tree buffer), and, 3) one site located in adjacent protocol-quality habitat would be managed as a high priority site; b) Unit 25-4-17A – seven red tree vole sites identified: 1) three red tree vole sites would be fully retained in protocol-quality habitat outside of the timber harvest boundary, including two sites (one active red tree vole tree each) located within protocol quality habitat and one site (six active red tree vole trees) located in the Riparian Reserve; 2) Three red tree vole sites would be partially retained including red tree vole nests located within the three stands of protocol-quality habitat adjacent to proposed harvest unit and 15 active red tree vole nest trees within young habitat in the southeast corner of unit 25-04-17A would be protected in the 3.6 acre skip; this area is contiguous with adjacent habitat and would be managed as a high priority site. The young habitat within the harvest boundary for the remaining two red tree vole sites (west and southwest sites) would be harvested; 3) One entire red tree vole site, containing nine active red tree vole nest trees, would be harvested. This site is not within protocol-quality habitat.

[4] Suitable habitat for the Siskiyou Sideband may be found within 30 meters (98 feet) of rocky areas, talus deposits and in associated riparian areas in the Klamath physiographic province and adjacent portions of the south-western Oregon Cascades. Areas of herbaceous vegetation in these rocky landscapes adjacent to forested habitats are preferred. Areas that contain moist, shaded rock surfaces are preferred for daily refuges. In more mesic, forested habitats, especially in the Oregon Cascades, the species is associated with large woody debris and the typical rocky habitat is not required. Forest habitats without either rock features or large woody debris are not currently considered to be suitable habitat for this species (*Survey*

Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan, Version 3.0, 2003, p. 42)

[4a] Pre-disturbance surveys are not required within the variable retention harvests for Siskiyou Sideband because it falls outside its distribution range of Roseburg BLM (South River Resource Area) (*Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan, Version 3.0, 2003*, pg. 38).

[5] Suitable habitat for the Crater Lake Tightcoil is "perennially wet situations in mature conifer forests, among rushes, mosses and other surface vegetation or under rocks and woody debris within 10 meters of open water in wetlands, springs, seeps and riparian areas…above 2000 feet elevation and east of Interstate 5" (*Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan, Version 3.0, 2003,* pp. 39 and 43).

[5a] With the exception of unit 25-4-17A, all or a portion of the remaining eight units are above 2000 feet in elevation. Areas of suitable mollusk habitat were identified in Units 24-3-7D, 24-3-5C and 24-3-5D. In lieu of pre-project disturbance surveys, these suitable habitat areas will be avoided and protected within the designated skips.

[6] Management of known sites is NOT required for Category F because species are uncommon, not rare, and species within this category would be assigned to other categories or removed from Survey & Manage as soon as new information indicates the correct placement. Until that time, inadvertent loss of some sites is not likely to change the level of rarity. In addition, pre-disturbance surveys are not required for Category F species (2001 ROD, Standards and Guidelines, pp. 7, 13-14).

[6a] Suitable habitat for the Oregon Megomphix is mature or late-seral, moist conifer/hardwood forests, usually in hardwood leaf litter and decaying non-coniferous plant matter under bigleaf maple trees. The species may also be present in the absence of bigleaf maple, especially at moist sites where deciduous shrubs, coarse woody debris, rotten logs or stumps and large sword ferns provide abundant cover (p. 42, *Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan, Version 3.0, 2003*). Protection of this species is not required because sites known as of September 30, 1999 are protected and are projected to achieve stable populations (2001 ROD, Standards and Guidelines, p. 14). One Oregon Megomhpix site was located within Unit 24-3-17D and 12 sites within Unit 25-4-17A in 2000 (GeoBOB database 2015), and would not require protected because they were discovered after 1999. However, 4 of the 12 sites within Unit 25-4-17A will be protected within a Riparian Reserve or a skip.

In addition, areas of suitable Oregon Megomphix habitat were identified in Units 24-4-1D, 24-3-7D, and 25-4-17A. The suitable habitat areas would be avoided and protected within designated skips in units 24-4-1D and 24-3-7D. One of the two habitat areas identified in Unit 25-4-17A would also be protected within a designated skip.

Table D-2. Effects of Proposed Action on Survey & Manage Wildlife Species. Species names indicated in **bold** within Table D-2 identifies the five (5) species that are discussed in detail within the *Back in Black Environmental Assessment*.

SPECIES	GENERAL HABITAT REQUIREMENTS	PRESENT IN PROJECT AREA?	IMPACTS TO SPECIES	
			NO ACTION	PROPOSED ACTION ALTERNATIVE
VERTEBRATES				
Great Gray Owl *Strix nebulosa*	Habitat characteristics of suitable habitat include: (1) large diameter nest trees, (2) forest for roosting cover, and (3) proximity [within 600 feet] to openings that could be used as foraging areas (*Survey Protocol for the Great Gray Owl within the range of the Northwest Forest Plan v3.0*). No natural meadows are present within proximity to the proposed units. However, clear cuts are present in proximity to suitable forest habitat adjacent to units and, therefore great gray owls could be present within the project area.	No Habitat	Thinning stands would remain unsuitable until late successional characteristics develop, including open, multi-layered canopy and the presence of large trees and eventually large hollow snags. Regeneration harvest units have a limited amount of large trees and large hollow snags but would continue to develop into suitable habitat in 20 years.	Regeneration harvest would create foraging habitat until canopy closure recovers to approximately 60 percent. The retention of the largest trees and dispersed aggregates would provide for roosting and foraging during the early successional stages after harvest. Portions of harvest stands over 30 meters from an edge or perch are of little value to foraging great gray owls. However, the retention and aggregates would provide for perch sites throughout the harvest units (Hayward 1994). In the long term (80-100 years), the development of a multi-canopy forest with large trees and subsequently large snags will provide future nesting habitat for the great gray owl.
Red Tree Vole ***Arborimus longicaudus***	Suitable habitat is almost exclusively in forests having Douglas-fir in the canopy, and associated primarily with late-successional (older, structurally complex) forests (Huff *et al.* 2012).	**Documented**	Regeneration harvest units that have high density of trees would limit the stand's ability to create diverse, multi-storied stands, including large trees with deep crowns. The species would continue to persist where it is currently present (refer to Appendix I for current active nest locations).	Regeneration harvest would remove 12 acres of high-quality habitat and 145 acres of young habitat. Of the 10 red tree vole sites, 4 sites would be managed as high priority, 2 sites would be considered non-high priority and harvested, and a portion of 4 sites would partially be managed as high priority and partially impacted by regeneration harvest (refer to Appendix I for details on non-high priority designation of sites and management of high priority sites). Where regeneration harvest is applied, forest stands would not be considered high-quality habitat for approximately 100 years or until QMD exceeds 18 inches. Active nest trees may be retained in aggregates ("skips") and as dispersed retention trees where practicable. However, RTVs would be vulnerable to predation in the concentrated harvest area. Retained aggregates and dispersed retention trees would provide important nesting habitat structures in future habitat. Habitat connectivity would be expected to develop in approximately 40-50 years or when canopy cover reaches 60 percent (Swingle 2005, p. 39).

SPECIES	GENERAL HABITAT REQUIREMENTS	PRESENT IN PROJECT AREA?	IMPACTS TO SPECIES	
			NO ACTION	PROPOSED ACTION ALTERNATIVE
MOLLUSKS				
Siskiyou Sideband *Monadenia chaceana*	Rocky, talus habitats in the Klamath Province and southwards and large down wood debris habitat in Western Cascade Province. In Oregon, known sites occur in southern Douglas County, within the South River Resource Area on the Roseburg BLM District. Therefore, the Back in Black project area is outside the range of distribution of the species. *Also listed as a Bureau Sensitive Species on the SSS list (Appendix C).*	Out of Range	No effect	
Crater Lake Tightcoil ***Pristiloma arcticum crateris***	Perennially wet areas in late-seral forests above 2,000 feet elevation and east of Interstate-5; seeps, springs, riparian areas. *Also listed as a Bureau Sensitive Species on the SSS list (Appendix C).*	**Suspected**	No Effect	No measurable effects to habitat due to 60-foot no-harvest buffer along perennial streams within Riparian Reserve and suitable habitat areas protected within the designated skips (Table D-1).
Oregon Megomphix ***Megomphix hemphilli***	Late-seral or mature conifer/ hardwood forests usually in hardwood leaf litter (i.e. big leafed maple trees) and/or under decaying non-coniferous plant matter. Pre-disturbance surveys are not required for Category F species (*2001 ROD, Standards and Guidelines, Table 1-1, p.49*). Pre-project clearance surveys were completed spring 2015 in one habitat area; no target species were observed (Table D-1).	**Documented**	No effect	Species would benefit from the Alternative Two by creating suitable habitat conditions in the future by promoting the growth of hardwoods and shrubs. Persistence of species will be maintained within unsurveyed suitable habitat areas located in designated skips (Table D-1) and Riparian Reserve buffers by maintaining micro site features such as pockets of hardwoods, including big leaf maple.

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Appendix E. Landbirds

Table E-1. Summary of Back in Black Project Effects on Identified Landbird Species of "Conservation Concern" (USDI FWS 2008).

SPECIES	GENERAL HABITAT REQUIREMENTS	IMPACTS TO SPECIES	
		NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
• **Bold = indicates those species (9 of 31) typically associated with late-seral forest habitat (generally 66 years of age in this project area; as defined on p. 14) and known habitat components present within the proposed units. These species, where present, would potentially have direct impacts due to habitat loss or modification.** • Non-bold = indicates those species not expected to be present within the proposed harvest units in their current condition. These species are typically associated other habitat types, including late-successional (mature/old growth) that would potentially have indirect impacts or would have no effect.			
EAGLE PROTECTION ACT			
Bald Eagle *Haliaeetus leucocephalus*	Also a *Bureau Sensitive Species*; refer to Table A-1 *in Appendix A* for habitat requirements and impacts.		
Golden Eagle *Aquila chrysaetos*	Usually associated with open grassland, pasture, and shrub land conditions. In southwestern Oregon, golden eagles nest in a variety of trees including ponderosa pine, Douglas-fir, oak species, and madrone (Csuti *et al.* 1997; Kochert *et al.* 2002). Nest on cliffs, in the upper one-third of deciduous and coniferous trees, or on artificial structures (e.g. artificial nesting platforms, electricity transmission towers, windmills). On the Roseburg District, primarily documented to nest in large conifer trees within late-seral forests near open habitats (e.g. meadows, valleys, and clearcuts). The closest known site (Jeffers Butte) is 1.6 miles south of Units 13C and 13E.	Within the harvest units, high density of trees would limit the stand's ability to create diverse, multi-storied stands. Large trees or snags containing large limbs or structural characteristics to support a nest would be slow to develop.	The regeneration harvest stands, post-harvest, would be slow to develop the structural characteristics to support nesting. However, regeneration harvest would create open foraging habitat for the golden eagle.
BIRDS OF CONSERVATION CONCERN			
Bald Eagle *Haliaeetus leucocephalus*	Also a *Bureau Sensitive Species*; refer to Table A-1 *in Appendix A* for habitat requirements and impacts.		
Marbled Murrelet *Brachyramphus marmoratus*	Also a *Bureau Sensitive Species*; refer to Table A-1 *in Appendix A* for habitat requirements and impacts.		
Northern Goshawk *Accipiter gentilis gentilis*	Mature and older mixed conifer forests with high canopies for nesting (Squires and Reynolds 1997). The closest known goshawk nest site is located 15 miles east (Ringtail) of the proposed project area. Goshawks have been documented nesting in mid-seral habitat at two sites in the Swiftwater Resource Area on the Roseburg District. However, these stands	Harvest units would continue to provide for forage and nesting habitat for avian species that goshawks may prey upon.	Regeneration harvest would remove stand overstory, reducing foraging and nesting opportunities for another 80 years.

SPECIES	GENERAL HABITAT REQUIREMENTS	IMPACTS TO SPECIES	
		NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
	were walked and reviewed for nesting structure; none were located that provided evidence that northern goshawk were nesting within any of the units.		
Olive-sided Flycatcher *Contopus cooperi*	Forages in early-seral areas associated with natural or man-made openings with tall trees or snags available for perching and singing (Altman and Alexander 2012, p. 41-42). In the Oregon Coast Range, it is closely associated with edges of older stands with tall trees and snags greater than 21 inches diameter breast height and broken canopy (Carey *et al.* 1991, p. 137). Habitat is generally absent within the proposed units, except on edges where older stands are adjacent to private clear cuts.	Suitable habitat condition would continue to be absent until suppression mortality created gaps and edge habitat adjacent to older stands.	Regeneration harvest would create more man-made openings with dispersed trees that could be used for perching and provide for increased foraging opportunities.
Oregon Vesper Sparrow *Pooecetes framineus affinis*	Also a *Bureau Sensitive Species*; refer to Table A-1 *in Appendix A* for habitat requirements and impacts.		
Peregrine Falcon *Falco peregrinus anatum*	Also a *Bureau Sensitive Species*; refer to Table A-1 *in Appendix A* for habitat requirements and impacts.		
Purple Finch *Carpodacus purpureus*	Primarily nest in Douglas-fir, pine or spruce but may use oak, maple, and fruit trees. Prefer open areas or edges of low to mid-elevation mixed coniferous-deciduous forests, frequently breeding in mixed conifer-deciduous forest, on edges of bogs, in riparian corridors, deciduous forests, orchards, and other areas with scattered conifers and shrubs (Csuti *et al.* 1997).	A continuous overstory and lack of deciduous tree and plant species would preclude the species from using the habitat within the proposed units.	Regeneration harvest would create additional nesting and foraging habitat as canopy layers and hardwoods develop in the areas with lower residual tree densities.
Rufous Hummingbird ***Selasphorus rufus***	Also listed as a *Focal Avian Species*. Primarily associated with forest edges and openings with a diversity of flowering plants for feeding and open space. Frequently occurs in open habitats that are shrub-dominated, and late-successional forest with a highly developed and diverse understory of herbaceous plants and shrubs, particularly within large openings. Need flowering plants and shrubs.	Suitable habitat conditions would until shrubs and forbs are shaded out due to an increased canopy cover. Foraging plants would continue to be absent until suppression mortality created gaps where flowering plants and shrubs developed.	Regeneration harvest would create additional nesting and foraging habitat as flowering plants and shrubs important would develop. These conditions would persist until canopy cover increased, shading out flowering plants and shrubs.
Willow Flycatcher *(Empidonax traillii)*	This flycatcher is found in willows at the edges of streams flowing through meadows and marshes, but also breeds in thickets along the edges of forest clearings and, generally, in tall, brushy vegetation in the vicinity of water (Csuti *et al.* 1997).	A continuous overstory and lack of deciduous tree and plant species would preclude the species from using the habitat within the proposed units.	Regeneration harvest would create additional nesting and foraging habitat, where occurring in the vicinity of water, as the development of early-successional plant communities that support greater insect populations which would increase insect populations to prey upon. These conditions would persist until canopy cover increased, shading out flowering plants and shrubs.
FOCAL AVIAN SPECIES			

SPECIES	GENERAL HABITAT REQUIREMENTS	IMPACTS TO SPECIES	
		NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
Band-tailed Pigeon ***Columba fasciata***	Generally associated with high canopy cover and hardwood stands (Bottorff 2007). In Oregon, they nest primarily in closed Douglas-fir stands with canopy cover above 70 percent (Leonard 1998). Used mineral sites appear to be scarce in western Oregon, and are seemingly essential resources for this species (Sanders and Jarvis 2000). Sanders and Jarvis (2003) indicate availability of food sources may be directly related to the declining band-tailed pigeon population in Oregon. There are no mineral springs associated with the proposed units; however, the stands may provide foraging opportunities where an understory of shrubs and forbs exists. The band-tailed pigeon is not expected to use the proposed units for nesting because canopy cover is currently below 70 percent in these units (Forest Vegetation, Section 3.1.2.3, and Table 3-7). However, the band-tailed pigeon is expected to forage within the units where desired plant species exist. The band-tailed pigeon is also identified on the "Game Birds Below Desired Condition" list.	Stands would continue to provide foraging habitat of shrubs such as red elderberry (*Sambucus racemosa*), cascara (*Rhamnus purshiana*), and other forage species (i.e. berries from Pacific madrone (*Arbutus menziesii*), salal (*Gaultheria shallon*), salmonberry (*Rubus spectabilis)*) for at least 30 years while the tree canopy in these areas remains open.	Regeneration harvest would create potential foraging habitat in the short-term by creating growing conditions to foster the establishment of shrubs such as red elderberry (*Sambucus racemosa*), cascara (*Rhamnus purshiana*), and other forage species (i.e. berries from Pacific madrone (*Arbutus menziesii*), salal (*Gaultheria shallon*), salmonberry (*Rubus spectabilis)*) for at least 30 years while the tree canopy in these areas remains open. Regeneration harvest would preclude nesting habitat until canopy cover reaches at least 70 percent within 50 or more years (*Forest Vegetation* section, Table 3-5).
Brown Creeper *Certhia americana*	Optimal habitat appears to be mature and old-growth unmanaged forests where large trees and snags for foraging and nesting are relatively abundant due to natural processes (Altman and Alexander 2012).	Stands would remain unsuitable. May forage away from adjacent suitable habitat in managed stands where large remnant Douglas-fir trees and snags are present.	With the exception of aggregate tree patches, regeneration harvest units would be unsuitable habitat post-treatment, precluding nesting or foraging for another 70-100 years. Benefits most from long-term effects of regeneration harvest resulting in lower tree densities, which would best create conditions fostering the development of suitable habitat, including large conifers with deep furrowed bark. Also would benefit from retention of large remnant trees and snags.
Black-throated Gray Warbler *(Setophaga nigrescens)*	This neo-tropical migrant warbler uses a wide range of forests, woodlands, and brushy areas at forest edges, including the brushy regeneration in recent clearcuts. Can be found in deciduous and mixed deciduous – coniferous forests, but dense moist coniferous forests are avoided (Csuti et al. 1997). Altman and Alexander 2012 states the black-throated gray warbler is strongly associated in low to moderate elevation (1,070-4,192 feet) unmanaged forest through the Oregon Cascades, and is most abundant in young (40-80 years) stands with broadleaf trees. This species are active in both canopy and woody understory.	Expected to continue use of the forested stands for nesting and foraging within the harvest units.	Abundance within the regeneration harvest units would be expected to decline due to removal of suitable habitat. Regeneration harvest would remove stand overstory, reducing foraging and nesting habitat for this warbler species. After the development of a shrub layer, the black-throated gray warbler would be expected to use the stands for nesting and foraging within 5-10 years.
Hammond's Flycatcher *Empidonax hammondii*	An aerial insectivore that uses open space beneath the overstory canopy and between trees. Strongly associated with late-successional stands in low to moderate elevation (1,050-3,182 feet) managed forest through the Central Oregon Cascades (Altman and Alexander 2012). It occupies all forest types on	Stands would remain unsuitable until stand differentiation and late-successional characteristics developed.	Regeneration harvest would modify canopy overstory to preclude nesting or foraging for another 40 or more years before canopy closure returns to suitable conditions.

SPECIES	GENERAL HABITAT REQUIREMENTS	IMPACTS TO SPECIES	
		NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
	the west slope of the Cascade Mountains (Csuti *et al.* 1997)		
Hermit Warbler ***Dendroica occidentalis***	This neo-tropical migrant warbler species is a canopy dwelling neo-tropical migrant associated with young (35-79 years old) and mature (80-200 years old) conifer forests and is common in Douglas-fir dominated stands, where dense canopy provides foraging and nesting habitat (Pearson 1997, Altman and Alexander 2012). Territories in southern Washington range between 0.4 acres and 1.8 acres (Pearson 1997). All of the proposed units are characterized by closed canopy, and hermit warblers are known to be present in many of them.	Expected to continue use of the forested stands for nesting and foraging within the harvest units.	Abundance within the regeneration harvest units would be expected to decline due to removal of suitable habitat. Dispersed retention harvest would modify canopy overstory precluding nesting or foraging within these areas for approximately 20 years before canopy closure recovers.
Hutton's Vireo ***Vireo huttoni***	Strongly associated (i.e., preferentially selected) with pole forest conditions among younger and older forested stands in all elevations of managed forests of the west of the Western Cascades in Oregon.	Where present, would continue to persist in stands with an existing deciduous component in harvest units.	Abundance within the regeneration harvest units would be expected to decline due to removal of suitable habitat. Dispersed retention harvest would modify canopy overstory precluding nesting or foraging within these areas for approximately 20 years before canopy closure recovers.
Olive-sided Flycatcher *Contopus cooperi*	*Also listed as a **BIRD OF CONSERVATION CONCERN**; refer to relevant section.*		
Orange-crowned Warbler ***Oreothlypis celata***	A foliage-gleaning insectivore associated with dense deciduous shrubs. Reaches peak abundance in early-seral forests once a shrub layer has developed (5-10 years) and before overstory canopy closure sets in (15-20 years). Also occurs in older multi-layered forest conditions where canopy openings have allowed development of a deciduous shrub understory (Altman and Alexander 2012). Expected in stands with a lower canopy cover and high shrub understory (units 24-4-13E and 25-4-17A).	Where present, would continue to persist in stands where a deciduous shrub component is present in harvest units.	Would benefit from regeneration harvest treatment which would foster understory development of deciduous shrubs and trees. Species is expected to reach peak abundance in early-seral forests once a shrub layer has developed (5-10 years) and before overstory canopy closure sets in (15-20 years) (Altman and Alexander 2012).
Pacific-sloped Flycatcher ***Empidonax difficilis***	A neo-tropical migrant found in young, mature, and old-growth forests that contain deciduous canopy trees. Optimal habitat appears to be low elevation (<3,000 feet) riparian forest in late-successional coniferous forest with a deciduous component and/or wet site coniferous trees such as western hemlock and western red cedar (Altman and Alexander 2012). However, can also be found throughout coniferous forests with some open space beneath or in the canopy and deciduous trees for aerial foraging and nesting.	Where present, would continue to persist in portions of units where open space with a deciduous component is available.	Abundance within the regeneration harvest units would be expected to decline due to removal of suitable habitat. Regeneration harvest would remove nesting and foraging habitat where dispersed retention is applied, thereby reducing the abundance of the Pacific-slope flycatcher within the area. Removal of canopy overstory due to dispersed retention harvest would preclude nesting or foraging for approximately 80- 100 years until canopy closure recovers. Nesting and foraging habitat would continue to function where it is retained within aggregates.

SPECIES	GENERAL HABITAT REQUIREMENTS	IMPACTS TO SPECIES	
		NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
Pacific Wren ***Troglodytes troglodytes***	Name changed from "Winter Wren" and is most commonly found in older and more in structurally complex areas in the forest. Requires forest floor complexity -shrubs, rootwads, down logs, ferns, and herbaceous vegetation. May persist in units with newly recruited or remnant down woody material and shrub habitat. This species has been observed in many of the proposed units.	Where present in harvest units, would continue to persist in portions of stands where newly recruited or remnant down woody material and shrub habitat is present. Where stands are lacking large down wood and an understory component, habitat would continue to be unsuitable for wrens until such components develop within the stand.	Regeneration harvest would remove or damage the existing forest floor complexity. Skips within regeneration harvest units would maintain some complexity and continue to provide some habitat conditions for Pacific wrens to persist within the area.
Pileated Woodpecker *Dryocopus pileatus*	Strongly associated with mature and old-growth stands (stands ≥ 80 years) with a multi-layered canopy. Nests in large snags and decadent live trees in mature and old-growth forests. Younger forests can be used for foraging if snags and/or down logs are present. Dependent on snags and down wood.	Thinning stands would remain unsuitable for nesting and most foraging activities. May forage away from adjacent suitable habitat where large snags and down wood are present in managed stands.	Regeneration harvest units would be unsuitable habitat post-treatment, precluding nesting or foraging for another 100 years. Benefits most from long-term effects of treatments resulting in lower tree densities which would best create conditions fostering the development of suitable habitat, including large trees, and eventually large snags and down wood. Also would benefit from retention of remnant trees and snags.
Red Crossbill *Loxia curvirostra*	Optimal habitat is late-successional forest with high productivity of conifer cone-producing trees.	Stands would remain unsuitable until stand differentiation and late-successional characteristics developed (large conifers).	Regeneration harvest units would be unsuitable habitat post-treatment, precluding nesting 80-100 years. Benefits most from long-term effects of thinning treatments resulting in lower tree densities (e.g. Riparian Reserve) which would best create conditions fostering the development of suitable habitat, including large trees with deep crowns.
Rufous Hummingbird *Selasphorus rufus*	*Also listed as a* ***BIRD OF CONSERVATION CONCERN****; refer to relevant section.*		
Varied Thrush *Ixoreus naevius*	Mature forests with high canopy closure, high-stem density, multiple tree layers, a deciduous tree component, and a relatively open low understory and forest floor with much debris in patches. Fruit bearing shrub and tree species, and wet sites with deciduous vegetation.	Proposed harvest units would remain unsuitable until multiple tree layers and deciduous tree component develop.	Regeneration harvest units would reduce stem density and tree layering, precluding nesting or foraging for another 80-100 years.
Vaux's Swift *Chaetura vauxi*	Associated with late-successional forests and large, hollow snags used as nest and roost trees. Availability of suitable large hollow snags and trees is a major limiting factor.	Proposed harvest units would remain unsuitable until late successional characteristics develop, including open, multi-layered canopy and the presence of large, hollow snags.	Benefits most from long-term effects from regeneration harvest resulting in lower tree densities (e.g. Riparian Reserves) which would best create conditions fostering the development of suitable habitat, including large trees, and eventually large snags, as well as a multi-layered canopy.
Western Bluebird *(Sialia mexicana)*	Strongly associated and dependent on snags for nesting (Altman and Alexander 2012). In western Oregon, the western bluebird breeds in forest clear-cuts with standing snags, around farms in agricultural lands, in riparian woodlands, and in open oak-ponderosa pine woodlands (Csuti *et al.* 1997). In western	Stands would remain unsuitable until stand differentiation occurs which may develop suitable nesting habitat if large gaps with snags with cavities are present, particularly near open areas/adjacent to recent clearcuts.	Benefits most from regeneration harvest where snags and live trees with cavities are retained or develop in the short-term within the recently harvested areas.

SPECIES	GENERAL HABITAT REQUIREMENTS	IMPACTS TO SPECIES	
		NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
	Oregon, Hansen *et al.* (1995) (*in* Csuti et al. 1997) reported highest densities of western bluebirds at low densities of live overstory trees less than 8 trees per acre. Habitat suitability in early-seral forests is time-limited; after about five years vegetation development may make habitat unsuitable. Bluebirds would be expected within in adjacent new clearcuts where there is a density of snags and live trees with cavities are currently present.		
Wilson's Warbler ***Wilsonia pusilla***	Nest in low deciduous vegetation in mature conifer forests, and forages in stands with a diverse deciduous shrub and/or mid-canopy layer. Expected in stands with a lower canopy cover and high shrub understory (units 24-4-13E and 25-4-17A).	As canopy cover increases, would not likely occupy the stands with high canopy cover which would preclude growth of herbs and forbs, shrubs, and trees in the understory.	Foraging opportunities would increase after the development of diverse deciduous shrubs and/or a mid-canopy layer within the Regeneration harvest units.
GAME BIRDS			
Band-tailed Pigeon *Columba fasciata*	*Also listed as a* ***Partner's In Flight FOCAL SPECIES****; refer to relevant section.*		
Mourning Dove *Zeneida macroura*	Forests, woodland edges, savannas, grasslands, deserts, suburban and urban areas, and agricultural lands. Frequently seen on the Roseburg District along roadsides and forest openings. Nesting may occur on the ground, on ledges, in bushes and in trees (Otis *et al.* 2008), in edge-habitats between woodlands/shrubs and open areas (Csuti et al. 1997). Generally avoid extensive forests and wetlands.	Continuous canopy would preclude nesting except along habitat edges (e.g. roads and private clear cuts).	Creation of gaps due to roads and landings may create edge habitat suitable for nesting. In addition, regeneration harvest would provide for additional nesting and foraging habitat in areas where regeneration harvest would occur.
Wood Duck *Aix sponsa*	Nest in tree cavities (Lewis and Kraege 1999) in the vicinity of wooded swamps, flooded forest, streams, marshes, sloughs, lakes, or ponds (Marshall et al. 2003, p. 93). At least 10 acres of wetland or other aquatic habitat in a contiguous unit or in isolated parcels separated by no more than 100 feet of upland is needed in close proximity to nesting habitat is needed. Open water makes up 25 percent of brood-rearing area with the remainder a mixture of shrubs and herbaceous emergent plants and trees (Hepp and Bellrose 2013). Nearest presence of Wood Ducks is expected to occur along Gassey Creek. Suitable habitat is not present in the harvest units.	No Effect	

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Appendix F. Noxious Weeds

Table F-1. Noxious weeds in the Back in Black Regeneration Harvest Plan project area

Name	Status	Area Populated by Noxious Weed	Ecology and Habitat[1]	Swiftwater Resource Area Management Strategy
Himalayan blackberry *Rubus armeniacus*	State Listed "B" Douglas County "B, T"	450 ac	Perennial shrub. Reproduces both by seed and vegetatively. Canes can grow more than 20 feet per season with rootstocks more than 30 feet long. Seeds dispersed by birds and animals.	Treat known populations.
Scotch broom *Cytisus scoparius*	State Listed "B" County list "B"	200 ac	Perennial evergreen shrub that grows up to 10 feet tall. Reproduces by seed and vegetatively. Seeds can remain viable in soil for more than 80 years. Grows in open areas along roads, in pastures, waterways, and recently logged lands.	Treat known populations.
English holly *Ilex aquifolium*	Douglas County "B"	72 m^2	Slow-growing, dense, evergreen tree or shrub. Can grow 15-50ft tall and up to 15ft wide. Seeds carried by birds into forests where it can form dense thickets in the understory.	Treat known populations.
English hawthorn *Crataegus monogyna*	Douglas County "B"	45 m^2	Small tree that spreads rapidly into woodlands and open fields, creating a dense thorny thicket. Abundant red berries are attractive to wildlife which spreads seed far.	Treat known populations.
Stinky Bob *Geranium robertianum*	State Listed "B"	5 m^2	Annual herbaceous plant inhabiting forests on the wetter side of the Cascades. Found along roadsides and under canopy cover, tolerating a wide range of light intensities. Highly competitive with native spring herbaceous plants.	Treat known populations.
Slender false brome *Brachypodium sylvaticum*	State Listed "B"	2 m^2	Perennial grass that grows along roadsides and in the roadbed. Reproduces rapidly from seed and can re-sprout from small stem or root fragments when cut. Seeds typically do not last in seed bank for more than 1 year.	Treat known populations.
Bull thistle *Cirsium vulgare*	State Listed "B" County list "B"	Infrequent and scattered along roadsides	Biennial herbaceous plant. Reproduces from seeds. Common along roadsides, where soil is disturbed and canopy cover removed.	Treat specific populations in high risk areas (Special Status plant sites, special areas)

Name	Status	Area Populated by Noxious Weed	Ecology and Habitat[1]	Swiftwater Resource Area Management Strategy
Canada thistle *Cirsium arvense*	State Listed "B" County list "B"	Scattered, patchy, occasional to frequent along roadsides, in forest gaps, near private clear cut boundaries, often among RUAR9	Perennial herbaceous plant with extensive rhizomatous roots that create large clonal patches. Reproduces via seeds and vegetatively. Can produce new plant with small root section; root system can grow up to 20 feet per season and to soil depths of 30 feet. Grows along roads and where soil has been disturbed and canopy cover removed.	Treat known sites.
St. Johnswort *Hypericum perforatum*	State Listed "B" County list "B"	Scattered along roadsides, rare to occasional throughout units in forest openings	Perennial herbaceous plant. Reproduces vegetatively via rhizomes. Invades roadsides and other disturbed open areas. More prevalent in eastern Douglas County than western Douglas County.	Treat populations in quarries or near Special Status plant sites or other special areas. A beetle introduced as a biocontrol has been effective at reducing St. Johnswort populations at lower to middle elevations.
Meadow knapweed *Centaurea debeauxii*	State Listed "B" County list "B"	Occasional on roadsides in small patches	Perennial herbaceous plant that grows from a woody crown. Seeds are spread by wildlife, wind, water, and humans. Grows in disturbed areas, along roadsides, and forest edges and openings.	Treat known populations.
Tansy ragwort *Senecio jacobaea*	State Listed "B," "T" County list "B"	Patchily scattered along roadsides, past landings, and occasionally in units	Biennial or short-lived perennial. Stems can grow up to 6 feet tall supported by a large taproot. Grows in pastures, clearcuts, and along disturbed roadside areas.	Treat known populations.

[1]Oregon Department of Agriculture, 2015.

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Appendix G. Botanical Species Considered but Dropped from Detailed Study

Kincaid's lupine (*Lupinus sulphureus* var. *kincaidii*) is the only federally listed plant species that has the potential to be found in the analysis area. Surveys were conducted in May and June of 2014 and no individuals were identified.

Seventy-two special status plant and fungi species are known or suspected to occur on the Roseburg District: 12 species of fungi, six species of lichens, four species of liverworts, 11 species of moss, and 37 vascular plant species. Potential habitat for 21 of the species is not present in the analysis area (Table G-2).

There are 188 species of fungi identified by the Survey and Manage standards and guidelines. Most Special Status, and Survey and Manage fungi species are highly isolated in occurrence, producing short-lived, ephemeral sporocarps or fruiting structures that are seasonal and annually variable in occurrence (USDA/FS and USDI/BLM 2000, S&M SEIS, p. 191). Richardson (1970) estimated that sampling every two weeks would fail to detect about 50 percent of macrofungal species fruiting in any given season. In another study (ODell et al., 1999), less than ten percent of species were detected in each of two consecutive years at any one of eight sites. Given this, it has been determined that surveys for these species are impractical.

A single species, *Bridgeoporus nobilissimus*, is identified in Survey and Manage Category A. It is dependent upon noble (*Abies procera*) and Pacific silver fir (*Abies amabilis*) which are not present in the project area. There are 13 fungi species that fall within Survey and Manage Category D for which surveys are considered impractical or unnecessary. There are five Survey and Manage Category E species considered to be of rare and undetermined status for which no management recommendations exist, and three Survey and Manage Category F species considered to be uncommon or concern for persistence unknown and status undetermined (USDA/FS and USDI/BLM, 2001 S&M ROD, Standards and Guidelines pp. 7-13).

The remaining 167 fungi species (one species is within two categories, based on differences in abundance in different geographic areas) are in Survey and Manage Category B, considered rare, and pre-disturbance surveys are not considered practical. To avoid inadvertent loss, the 2001 S&M ROD (Standards and Guidelines, pp. 9 and 25) states that for projects on which decisions are issued after fiscal year 2011, equivalent-effort surveys for Category B species will be conducted in old-growth forest if strategic surveys were not completed. The proposed harvest units and road locations avoid all forest stands that are characterized as old-growth forest based upon the definition with the Northwest Forest Plan SEIS and FEMAT. Therefore equivalent surveys are not required for this project.

There are 40 species of lichens, 15 bryophyte species, and 12 vascular plant species identified by the Survey and Manage standards and guidelines. Pin lichens were identified in two (2) surveyed units (Table G-1). They would be protected as described in Chapter 2 (Section 2.3.4, #9).

There are 11 lichen, 3 bryophytes, and 8 vascular plant species in Survey and Manage Category A, which require pre-disturbance surveys in suitable habitat and management of all known sites. There are 2 lichens and 3 vascular plant species in Survey and Manage Category C, which require pre-disturbance surveys in suitable habitat and high-priority sites are to be managed (all sites are to be managed until high-priority sites are identified). There are 6 lichens and 8 bryophytes in Survey and Manage Category B, for which surveys have been determined to not be practical but which require the management of all

known locations. Survey and Manage Category E includes 21 lichens and 4 bryophytes, which are considered rare, having undetermined status and for which no management recommendations exist but in the interim all known sites are to be managed. There are 2 Survey and Manage Category F lichen species considered to be uncommon or concern for persistence unknown and status undetermined (Standards and Guidelines, pp. 7-13).

Table G-1: Presence/absence results for *Chaenotheca chrysocephala* (CHCH14) within surveyed units.

Unit ID	CHCH14
24-3-5C	absent
24-3-5D	absent
24-3-5E	present
24-3-7D	absent
24-3-17D	absent
24-4-1D	absent
24-4-1E	absent
24-4-13E	absent
25-4-17A	present

Table G-2: Special Status Plant Species Survey Requirements, Survey Results and Rational for Exclusion from Detailed Analysis

Status[1]	Scientific Name	Common Name or Taxon	Habitat	Elevation (feet)	Identified on Roseburg District	Survey Results
Bureau Sensitive S&M B	*Boletus pulcherrimus*	Fungi	Associated with the roots of conifers and hardwoods, mostly white fir, mountain hemlock, Douglas fir, and western hemlock.	42-5620	Different Watershed	Surveys Not required
Bureau Sensitive S&M A	*Bridgeoporus nobilissimus*	Fungi	Large, dying and dead noble fir and Pacific silver fir in late-successional old-growth forests.	1000-4300	No	Habitat Not Present
Bureau Sensitive S&M B	*Dermocybe humboldtensis*	Fungi	Associated with various members of the pine family.	1337-1781	Different Watershed	Surveys Not required
Bureau Sensitive S&M B	*Helvella crassitunicata*	Fungi	Montane old-growth forests containing true firs.	1533-9673	No	Surveys Not Required
Bureau Sensitive S&M B	*Phaeocollybia californica*	Fungi	Roots of Pacific silver fir, Sitka spruce, Douglas fir and western hemlock.	206-3855	Different Watershed	Surveys Not required
Bureau Sensitive S&M B	*Phaeocollybia gregaria*	Fungi	Associated with Sitka spruce and Douglas fir.	486-3628	No	Surveys Not required
Bureau Sensitive S&M B	*Phaeocollybia oregonensis*	Fungi	Associated with Pacific silver fir, Douglas fir, and western hemlock.	721-3916	No	Surveys Not required
Bureau Sensitive S&M B	*Pseudorhizina californica*	Fungi	Rotted stumps or logs of coniferous trees or on soil rich in rotted wood.	668-6515	No	Surveys Not required
Bureau Sensitive S&M B	*Ramaria amyloidea*	Fungi	Associated with true fir, Douglas fir, and western hemlock.	1592-5729	No	Surveys Not required
Bureau Sensitive S&M B	*Ramaria rubella* var. *blanda*	Fungi	Growing on rotting wood from spruce and alder in hemlock/conifer forests.	442-1813	Different Watershed	Surveys Not required
Bureau Sensitive S&M B	*Ramaria spinulosa* var. *diminutiva*	Fungi	Associated with hosts from the pine family.	1470	No	Surveys Not required

Status[1]	Scientific Name	Common Name or Taxon	Habitat	Elevation (feet)	Identified on Roseburg District	Survey Results
Bureau Sensitive S&M B	*Rhizopogon chamaleontinus*	Fungi	Growing on roots of Douglas fir and sugar pine.	1000	No	Surveys Not required
Bureau Sensitive S&M B	*Rhizopogon exiguous*	Fungi	Associated with Douglas fir and western hemlock.	54-3844	No	Surveys Not required
Bureau Sensitive S&M B	*Bryoria subcana*	Lichen	Sitka spruce, western hemlock, wet Douglas fir, wet noble fir and mixed hardwood-coniferous forests. In coastal bays, streams, dune forests, and high precipitation ridges and summits within 30 miles of the ocean.	<2000	Different Watershed	Not Present
Bureau Sensitive S&M E	*Calicium adspersum*	Lichen	The bark of living grand fir, Douglas fir, oak, California redwood and western redcedar. Generally in relatively open stands in drier microhabitats where sheltered from precipitation. On trees greater than 200 years.	<2000	No	Not Present
Bureau Sensitive	*Lobaria linita*	Lichen	Cool and humid, mesic to moist, old-growth Pacific silver fir, mountain hemlock, or western hemlock forests (possibly oak forest and late mature tanoak and madrone).	700-4500	Different Watershed	Not Present
Bureau Sensitive	*Pilophorus nigricaulis*	Lichen	Cool, moist, rocky slopes in the open but where sheltered by surrounding topography. Substrate is noncalcareous rocks, primarily volcanic.	130-4700	No	Not Present
Bureau Sensitive	*Stereocaulon spathuliferum*	Lichen	Sheltered microsites in cool moist habitats, especially talus slopes and cliffs on noncalcareous rock.	3000-5000	No	Not Present
Bureau Sensitive	*Cephaloziella spinigera*	Liverwort	Growing in bogs and fens.	>5000	No	Not Present
Bureau Sensitive	*Gymnomitrion concinnatum*	Liverwort	Growing on peaty soil of cliffs and rock outcrops.	subalpine parklands	No	Not Present
Bureau Sensitive	*Phymatoceros phymatodes*	Liverwort	Bare, mineral soils which remains moist until late spring or summer.	<2100	No	Not Present
Bureau Sensitive	*Porella bolanderi*	Liverwort	Forming shaded to partly exposed mats on a variety of rock types (siliceous, calcareous, and metamorphic) and trunks of oaks, Oregon myrtle, and big leaf maple. Primarily within Oregon white oak, ponderosa pine, and Douglas fir forests.	500-3000	No	Not Present
Bureau Sensitive	*Bryum calobryoides*	Moss	Forming sods or occurring as individuals among other mosses on rocks and soil.	3000-7000	No	Not Present
Bureau Sensitive	*Campylopus schmidii*	Moss	Nutrient-poor sandy substrates near the coast. Forms sods in open stands of shore pine and Mendocino cypress.		Different Watershed	Not Present

Status[1]	Scientific Name	Common Name or Taxon	Habitat	Elevation (feet)	Identified on Roseburg District	Survey Results
Bureau Sensitive	*Codriophorus depressus*	Moss	Forming mats on rocks in perennial or intermittent streams, and in the spray zone of waterfalls.	400-11000	No	Not Present
Bureau Sensitive	*Entosthodon fascicularis*	Moss	Individuals or small sods on seasonally wet exposed soil in seeps or along intermittent streams. Including grasslands, oak savanna, grassy balds, and rock outcrops.	<3000	No	Not Present
Bureau Sensitive	*Helodium blandowii*	Moss	Forming mats and small hummocks in montane fens, usually with calcareous groundwater.	5000-6000	No	Not Present
Bureau Sensitive	*Meesia uliginosa*	Moss	Turfs in medium to rich montane fens growing on saturated ground, usually in full sunlight	5000-6000	No	Not Present
Bureau Sensitive S&M A	*Schistostega pennata*	Moss	Growing on damp rock, soil, and decaying wood in dark places.		No	Not Present
Bureau Sensitive S&M A	*Tetraphis geniculate*	Moss	Forming small turfs on well-rotted stumps and logs rarely on rocks in shaded, humid locations.	sea level to subalpine	No	Not Present
Bureau Sensitive	*Tomentypnum nitens*	Moss	Forming loose or dense sods or intermixed with other bryophytes in medium to rich montane fens.	5000-6000	No	Not Present
Bureau Sensitive	*Tortula mucronifolia*	Moss	Forming small cushions on soil, tree roots, and sheltered ledges and crevices of rock outcrops and cliffs. Primarily in true fir and riparian forests.	5000-7000	No	Not Present
Bureau Sensitive	*Trematodon asanoi*	Moss	Forming loose mats on moist bare soil along the edges of trails, streams, and ponds in the subalpine zone.	subalpine zone	No	Not Present
Bureau Sensitive	*Adiantum Jordanii*	California maiden-Hair	Growing on seasonally moist, shaded, rocky banks, canyons, and ravines.	<3600	Different Watershed	Not Present
Bureau Sensitive	*Arabis koehleri* var. *koehleri*	Koehler's rockcress	Growing on serpentine and limestone outcrops.	300-3000	Different Watershed	Not Present
Bureau Sensitive	*Arctostaphylos hispidula*	Hairy manzanita	Growing on rocky serpentine soils or sandstone. Generally associated with interior chaparral and open woodland.	300-3750	No	Not Present
Bureau Sensitive	*Asplenium septentrionale*	Grass-fern	Growing in the crevices of granite.	750-10050	Different Watershed	Not Present
Bureau Sensitive	*Bensoniella oregano*	Bensonia	Periphery of meadows in the true fir zone.	1800-4500	Different Watershed	Not Present
Bureau Sensitive	*Calochortus coxii*	Crinite mariposa-lily	Serpentine soils on north facing open grassy or wooded slopes.	450-3200	Different Watershed	Not Present
Bureau Sensitive	*Calochortus umpquaensis*	Umpqua mariposa-lily	Transitional zone between forest and grasslands, on serpentine soils.	300-2500	Different Watershed	Not Present

Status[1]	Scientific Name	Common Name or Taxon	Habitat	Elevation (feet)	Identified on Roseburg District	Survey Results
Bureau Sensitive	*Camassia howellii*	Howell's camas	Grassy wet meadows, swampy ground and transitional areas between wet meadows and coniferous woodlands on serpentine soils.	720-4050	No	Not Present
Bureau Sensitive	*Carex brevicaulis*	Short stemmed sedge	On coastal dunes or headlands.	<1200	No	Not Present
Bureau Sensitive	*Carex comosa*	Bristly sedge	Growing in relatively wet locations.	<1200	No	Not present
Bureau Sensitive	*Cicendia quadrangularis*	Timwort	Growing in open, wet locations.	360-1170	Same Watershed	Not Present
Bureau Sensitive S&M C	*Cypripedium fasciculatum*	Clustered lady's-slipper	Growing in a variety of habitats with 60-100% cover.	990-5235	Different Watershed	Not Present
Bureau Sensitive	*Delphinium nudicaule*	Red larkspur	Found on moist talus, wooded, rocky slopes.	<7800	No	Not Present
Bureau Sensitive	*Epilobium oreganum*	Oregon willow-herb	Found in bogs and small streams on serpentine soils.	1650-5400	Different Watershed	Not Present
Bureau Sensitive	*Eschscholzia caespitosa*	Gold poppy	Growing in open chaparral sites.	<5400	No	Not Present
Bureau Sensitive S&M A	*Eucephalus vialis*	Wayside aster	Found in gaps and edges of dry, open Douglas fir forests. Generally on shallow, rocky soils.	250-2200	Different Watershed	Not Present
Bureau Sensitive	*Frasera umpquaensis*	Umpqua swertia	Found in coniferous forests dominated by true firs, in damp, shaded sites under forest canopy, forest edges.	3000-6100	Different Watershed	Not Present
Bureau Sensitive	*Horkelia congesta* ssp. *congesta*	Shaggy horkelia	Growing in grasslands, oak savannas and grassy balds.	275-1700	Different Watershed	Not Present
Bureau Sensitive	*Horkelia tridentata* ssp. *tridentata*	Three-toothed horkelia	Found in meadows and open woodlands.	150-2100	No	Not Present
Bureau Sensitive	*Iliamna latibracteata*	California globe-mallow	Growing within conifer forests.	1500-6000	Different Watershed	Not Present
Bureau Sensitive	*Kalmiopsis Fragrans*	Fragrant kalmiopsis	Growing on rock outcrops and crevices, in sun or shady coniferous forests.	1400-3900	Different Watershed	Not Present
Bureau Sensitive	*Lathyrus Holochlorus*	Thin-leaved peavine	Found along low elevation roadsides, fencerows, creek banks, forest edges, oak savannas, shrublands, and grasslands.	100-2000	No	Not Present

Status[1]	Scientific Name	Common Name or Taxon	Habitat	Elevation (feet)	Identified on Roseburg District	Survey Results
Bureau Sensitive	*Lewisia leeana*	Lee's lewisia	Growing on granite, serpentine cliffs, rocky slopes, and under conifer forest.	3900-10050	No	Not Present
Bureau Sensitive	*Limnanthes gracilis* ssp. *Gracilis*	Slender meadowfoam	Growing in seasonally wet meadows, rocky slopes and basins, on serpentine soils.	450- 5100	Different Watershed	Not Present
Bureau Sensitive	*Lotus stipularis*	Stipuled trefoil	Found in thickets and chaparral sites, often within previously logged locations.	600-3600	No	Not Present
Federally Threatened	*Lupinus oreganus* var. *kincaidii*	Kincaid's lupine	Found in upland prairie grasslands, oak savanna, and woodland edges.	600-6000	Different Watershed	Not Present
Bureau Sensitive	*Meconella oregana*	White fairypoppy	Growing in shaded canyons.	<3000	No	Not Present
Bureau Sensitive	*Pellaea andromedifolia*	Coffee fern	Growing on rocky or dry sites.	90-5400	Different Watershed	Not Present
Bureau Sensitive	*Perideridia erythrorhiza*	Red-rooted yampah	Meadows and swales which are vernally moist and dry out in the summer. Found within oak woodlands.	400-900	Same Watershed	Not Present
Federally Endangered	*Plagiobothrys hirtus*	Rough popcorn flower	Growing in wet meadows and vernal pools,	270-450	Same Watershed	Not Present
Bureau Sensitive	*Polystichum californicum*	California sword-fern	Growing in woodlands, stream banks, and rocky open slopes.	<3300	Different Watershed	Not Present
Bureau Sensitive	*Romanzoffia thompsonii*	Thompson's mistmaiden	Found in seasonally wet, open, sunny cliffs and gravelly slopes.	700-6100	Different Watershed	Not Present
Bureau Sensitive	*Schoenoplectus subterminalis*	Water clubrush	Growing in fresh water lakes and streams that are low in nutrients.	<6900	No	Not Present
Bureau Sensitive	*Scirpus pendulus*	Drooping bulrush	Growing in marshes, moist meadows, and ditches, on calcereous soils.	0-2000	No	Not Present
Bureau Sensitive	*Sisyrinchium hitchcockii*	Hitchcock's blue-eyed grass	Found in prairies and oak savannas.	200-650	Different Watershed	Not Present
Bureau Sensitive	*Utricularia gibba*	Humped bladderwort	Growing in shallow water or mud.	20-6900	No	Not Present
Bureau Sensitive	*Utricularia minor*	Lesser bladderwort	Growing in shallow (generally <30 cm) acidic waters.	0-50, 2100-5500	Different Watershed	Not Present
Bureau Sensitive	*Wolffia borealis*	Dotted water-meal	Found in freshwater ponds and slow flowing ditches with high levels of organic material, natural ponds as well as log and sewage treatment ponds.	350-1500	Different Watershed	Not Present

Status[1]	Scientific Name	Common Name or Taxon	Habitat	Elevation (feet)	Identified on Roseburg District	Survey Results
Bureau Sensitive	*Wolffia columbiana*	Columbia water-meal	Found in freshwater ponds and slow flowing ditches with high levels of organic material, natural ponds as well as log and sewage treatment ponds.	20-1500	Different Watershed	Not Present

Survey and Manage Standards and Guidelines (2001 S&M ROD, pp. 7-13)
Category A – Require pre-disturbance surveys in suitable habitat and management of all known sites.
Category B – Considered rare, and pre-disturbance surveys are not considered practical.
Category C – Require pre-disturbance surveys in suitable habitat and high-priority sites are to be managed. Manage all sites until identification of high-priority sites.
Category E – Considered rare and of undetermined status. No management recommendations exist but in the interim all known sites are to be managed.

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Appendix H. Calculation Assumptions for Carbon Sequestration and Release

This appendix describes the analytical methodology used for calculating carbon storage and release associated with timber management, provides the assumptions used, and describes how calculations were made as displayed in Table C-1. The area used to calculate the carbon sequestration and release was based on the unit configurations and the associated riparian reserves that are in the same forested operations inventory (FOI) unit.

Analysis of Carbon Storage

A variety of scientific literature is available describing quantitative measures (e.g. decay rates of slash, fire consumption of slash, fuel use and efficiency, haul distances, etc.) and other factors that may be used in calculating carbon storage with the potential to influence the outcome of an analysis. The methodology[2] described here provides a consistent means for comparison of the relative effects of alternatives considered. It is not intended to express the absolute amount of carbon that would be stored or released. The analysis models carbon stored in the forest and wood products, and carbon released into the atmosphere in association with timber harvest. The analysis divides carbon storage/release into six pools:

- Standing, Live Trees
- Other Than Live Trees
- Wood Products
- Slash Burning
- Logging Slash
- Fossil Fuels

The total estimated carbon in each of the six pools was summed for analytical interval to derive the Net Carbon Balance by alternative over time.

Carbon Storage in Standing, Live Trees

1. Current and future standing, live tree carbon was derived using the outputs from the ORGANON model (Hann 2011) for standing tree volume for each alternative. Analysis includes the growth of trees established by artificial regeneration.

2. Standing tree volumes measured in board feet per acre were converted to cubic feet using a conversion factor of 6.00 board feet/cubic foot (2008 FEIS Appendices-28).

3. Cubic foot tree volumes per acre were converted to pounds of biomass, assumed to be Douglas-fir in this analysis, using a factor of 35 pounds of biomass/cubic foot (2008 FEIS Appendices-28, Table C-1).

[2] Numerous factors used for carbon analysis found in BLM's 2008 FEIS for management of western Oregon lands were used and are cited in this project level analysis. Recently (April 2016), a new FEIS that includes an analysis of carbon storage and emissions at a larger scale was released. The Roseburg BLM examined that document and found that the factors from the 2008 FEIS used in the Back in Black analysis and the 2016 FEIS factors are identical or nearly so. The Roseburg BLM therefore continues to use the factors cited in the 2008 FEIS for consistency and comparison to previous project level analyses.

4. Pounds of biomass per acre for entire trees (including branches, bark, and roots) were derived from tree volumes using an expansion factor of 1.85 (2008 FEIS Appendices-28).

5. The expanded biomass value was converted to pounds of carbon per acre by multiplying by 0.50 (USDI/BLM 2008A, Appendices-28).

6. Pounds of carbon per acre in whole trees were converted to tonnes of carbon by dividing by 2,200 (2008 FEIS Appendices-28).
7. Total carbon within individual units was determined by multiplying tonnes of carbon per acre in whole trees by unit acres.

8. Tonnes of carbon in whole trees for the entire project were derived by summing the tonnes of carbon in whole trees for each unit, and represented as "Standing, Live Trees".

Carbon Storage in Forests Other than Live Trees

"Other than Live Trees" is the portion of the carbon pool consisting of shrubs, brush, snags, woody debris, and organic carbon in the soil.

1. Carbon in "other than live trees" was derived by multiplying unit acreage by tonnes of carbon per acre by structural stage, as expressed in Table H-1 (adapted from Table C-2, 2008 FEIS Appendices-29). Stands were aged based on time intervals used in the analysis (i.e. 10, 20, and 50 years after the current condition) and the corresponding tonnes of carbon per acre used to calculate "other than live tree carbon". Stand age for harvested areas was reset to 0 at the time of harvest.

2. The total tonnes of carbon, represented as "Other Than Live Trees", were derived by summing the tonnes of carbon within each unit.

Table H-1. Forest Ecosystem Carbon (Excluding Live Trees) By Structural Stage*

Age of Stand(s)	**Structural Stage**	**Tonnes of Carbon per Acre**
5-34 years	Stand Establishment	67.8
35-94 years	Young	70.3
95-124 years	Mature	88.2
$\geq$ 125 years	Developed Structurally Complex	94.8

* adapted from USDI/BLM 2008A, Appendices-29.

Carbon Storage in Wood Products

"Wood Products" represents the portion of the carbon pool converted from standing, live trees into sawlogs or pulpwood. There would be no carbon pool of wood products under No Action.

1. Tonnes of carbon in whole trees were derived in Steps 1-7 under "Standing, Live Trees" for each time interval expressed in this analysis. The difference between the "current condition" and "at harvest time" would be the tonnes of carbon in whole trees harvested.

2. Tonnes of carbon in whole trees harvested per unit were summed to provide the project total.

3. Tonnes of carbon in whole trees harvested were converted to tonnes of carbon in sawlogs by dividing by 1.85 (2008 FEIS Appendices-28). *Note:* this reversed the calculation that expanded biomass of harvested logs into the biomass of whole trees performed previously (Step 4 of "Standing, Live Trees").

4. At harvest, 13.5 percent of saw log carbon would immediately be released (Smith *et al.* 2006). Remaining tonnes of carbon held in sawlogs were then decayed over time using the values in Table F-2 (adapted from the 2008 FEIS Appendices-30, and Smith *et al.* 2006).

5. Tonnes of carbon held in pulpwood (e.g. chips) were derived by multiplying tonnes of carbon in sawlogs (derived in Step 3 above) by five percent (2008 FEIS Appendices-30). *Note*: Pulpwood tonnage is five percent *in addition to* the sawlogs not five percent *of* the sawlogs.

6. At harvest, 14.8 percent of pulpwood carbon would immediately be released (Smith *et al.* 2006). Tonnes of carbon held in pulpwood were then decayed over time using the values in Table F-2 (adapted from the 2008 FEIS Appendices-30, and Smith *et al.* 2006).

7. The sum of tonnes of carbon immediately released from sawlogs (Step 4 above) and pulpwood (Step 6 above) represents the total amount of carbon released by "Wood Products" at harvest time. The sum of tonnes of carbon held in sawlogs (Step 4 above) and pulpwood (Step 6 above) at each time interval represents carbon stored in "Wood Products".

Table H-2. Fraction of Carbon Remaining or Captured as an Alternative Energy Source*

Time Interval	Sawlogs	Pulpwood
Harvest Time (0 years)	0.865	0.852
+10 years	0.796	0.730
+20 years	0.761	0.691
+50 years	0.702	0.655

*These fractions include; wood products in use, wood products in the landfill, and wood products emitted as energy in lieu of fossil fuels (adapted from USDI/BLM 2008A, Appendices-30 and Smith *et al.* 2006)

Carbon Release in Slash Burning

"Slash Burning" represents the pool of carbon released by prescribed burning. There would be no carbon pool of slash burning under No Action.

1. The amount of slash burned in landing piles for uniform thinning was calculated as two tonnes of biomass per acre, derived by averaging slash burned under similar conditions in recently implemented sales. Total tonnes to be burned were calculated by multiplying the number of acres to be treated by two.

2. A consumption rate of 90 percent was assumed for pile burning would be consumed (Prichard *et al.* 2005). Tonnes consumed were derived by multiplying the tonnes per acre by 0.90.

3. Tonnes consumed were converted to tonnes of carbon released using a conversion factor of 0.50 tonnes of biomass/tonne of carbon. An average of 0.9 tonnes of carbon would be released per acre of thinning unit scheduled for piling and burning.

4. The release of carbon from pile burning in areas treated by regeneration harvest was calculated the same as areas treated by thinning except that 4.0 tonnes per acre was used as a constant. Total carbon released per acre of regeneration treatment was 1.8 tonnes.

5. The amount of slash burned by broadcast burning was calculated by averaging the estimate amount slash loading and consumption by using the Photo Series Post-harvest (Maxwell and Ward 1976). The average used was 15.2 tonnes of slash. These averages were multiplied by the treatment acres proposed for broadcast burning to calculate the total amount of carbon released from broadcast burning

6. The total amount of carbon released from prescribe burning was calculated by adding up the total amount of carbon released from pile burning in regeneration treatment areas, pile burning in thinning treatment areas, and broadcast burning of regeneration treatment areas proposed for broadcast burning.

Carbon Storage in Logging Slash

"Logging Slash" is the portion of the carbon pool held in leaves and needles, twigs and branches, limbs, stumps, and roots of harvested trees that would remain on site post-harvest, not consumed by prescribed burning. There would be no "logging slash" carbon pool under No Action.

1. Tonnes of logging slash remaining on-site was calculated by subtracting tonnes of carbon immediately released from wood products (derived in Step 7 of "Wood Products"), stored in wood products at harvest time (derived in Step 7 of "Wood Products"), and released from slash burning from the total tonnes of carbon in whole trees that would be harvested (derived in Step 2 under "Wood Products").

2. The tonnes of logging slash on-site were then multiplied by the fraction of Douglas-fir slash remaining at each time step as shown in Table H-3 (based on Janisch *et al.* 2005). This represents the amount of carbon stored in "Logging Slash" as it decayed and released carbon over time.

Table H-3. Decay Rates of Carbon from Douglas-fir Slash*

Time Interval	Fraction of Carbon Remaining in Douglas-fir Slash
Harvest Time (0 years)	1.000
+10 years	0.852
+20 years	0.726
+50 years	0.449

* based on Janisch *et al.* 2005.

Carbon Release in Fossil Fuels

The carbon pool of "Fossil Fuels" represents the amount of carbon that would be released by consumption of gasoline and diesel fuel used by; road construction and renovation, timber felling, timber yarding, and log hauling. There would be no "fossil Fuels" carbon pool under No Action.

1. Fuel consumption associated with harvest operations (i.e. timber felling and yarding) was estimated based on production rates and fuel efficiencies from Table F-4, and an 8.5 hour work day.

2. This analysis assumed an average log-truck load of 4,500 BF (based on experience of BLM Contract Administrators and Cruiser/Appraisers), a fuel efficiency of 6 miles per gallon, and 60-mile round trip.

3. It was assumed that 588 gallons of diesel would be consumed per mile of road constructed, and 73 gallons per mile of road renovated (Loeffler *et al*., 2009)

4. It was assumed that for every station (100 ft.) of surfaced road constructed, 57.5 yards of rock would be used. It was also assumed that a truck would hold 10 yards and the average miles per load would be 60. Fuel consumption was assumed to be one gallon for every six miles travelled.

5. Gallons of fuel consumed by harvest operations (derived in Step 1), log hauling (derived in Step 2), road construction and renovation (derived in Step 3), and road rocking (derived in step 4) were summed to provide the total fuel consumption for the project.

6. Total gallons of fuel consumed were converted to tonnes of carbon released using the following conversion factors; 1 gallon of gasoline is equal to 19.4 pounds of CO_2, 1 gallon of diesel is equal to 22.2 pounds of CO_2, 1 pound of carbon is equivalent to 3.67 pounds of CO_2 (U.S. EPA, 2005). The total amount of carbon that would be released by fuel consumption is shown as "Fossil Fuels".

Table H-4. Fossil Fuel Consumption during Harvest Operations

Equipment	Production Rate [a] (acres/day)	Fuel Efficiency [b] (gallons/hour)
Chainsaw (gasoline)	0.4	.2
Motorized Carriage (gasoline)	1	.4
Cable/Skyline Yarder (diesel)	1	6.1
Loader (diesel)	1	4.5
rubber tire skidder (diesel)	2	4.8
tracked tire skidder (diesel)	2	3.6
Harvester (diesel)	3	4.7
Forwarder (diesel)	3	4.3

[a] based on experience of BLM Contract Administrators and Crusier/Appraisers.
[b] based on World Forestry Institute (1997).

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Appendix I. Red Tree Vole Non-High Priority Site Designation Back in Black Regeneration Harvest Plan Roseburg District

Note: This document has been modified from the original document. All tables and figures have been re-numbered to match the Back in Black Regeneration Harvest Plan appendices format.

The 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines" (USDA/FS-USDI/BLM 2001) identified red tree voles (*Arborimus longicaudus*) as a Category C species (Uncommon Species, Pre-Disturbance Surveys Practical) (ROD S&Gs, p. S&G-10). The 2001 ROD S&Gs allows the local line officer to identify non-high priority sites on a case-by-case basis (USDA/FS-USDI/BLM 2001, ROD S&Gs, p. S&G-10). Non-high priority sites are those sites not needed to provide a reasonable assurance of species persistence and do not require site management. This document identifies three sites and a portion of three other sites as non-high priority sites, associated with the Back in Back Regeneration Harvest Plan Environmental Assessment (Back in Black EA).

Introduction

The Black in Black EA identifies nine potential timber harvest units located in the Swiftwater Resource Area (Figure I-1). Five hundred thirty-nine (539) acres were originally identified for regeneration harvest, consistent with the Northwest Forest Plan (1995). As such, to comply with Survey and Manage standards and guidelines (USDA/FS-USDI/BLM 2001), the units were evaluated to determine the need for pre-disturbance surveys for red tree voles using the "Criteria for Determining the Need for Pre-disturbance Surveys" in the red tree vole survey protocol (USDA/FS-USDI/BLM 2012a).

Metric and field review determined that 520 of the 539 acres do not meet the criteria for requiring pre-disturbance surveys. Although these 520 acres meet the quadratic mean diameter (QMD) criteria of 18 inches, they do not meet either of the two general habitat criteria: 1) they are not mature or old growth stands, and 2) they do not contain at least two super-dominant overstory trees per acre.

Nineteen (19) acres within the proposed treatment units meet the criteria for pre-disturbance survey requirements for the red tree vole (including 12 acres within a 15-acre unit (unit 24-03-5E) and 7 acres within a 152-acre unit (unit 25-04-17A) and were surveyed following the red tree vole survey protocol (Table I-1). Although not meeting the protocol criteria for stands requiring surveys, 145 acres of young forest habitat within unit 25-04-17A were surveyed as well. Pre-disturbance surveys to 198 acres (including these 142 acres and Riparian Reserve outside of unit 25-04-17A) had been completed in 2000, prior to the implementation of a commercial thinning project; six (6) active red tree vole nest trees were located during those surveys, but were not protected as red tree voles had been removed from the survey and manage species list in the mesic zone by the time of the timber harvest. As there had been a 15-year gap since that survey effort and the current status of the nest trees was unknown, the stand was resurveyed for the Back in Black project.

In addition, to these 164 acres (145 unit acres in young forest, 19 unit acres in habitat requiring surveys), 108 acres outside the proposed treatment units (including Riparian Reserves) were also surveyed, for a total of 272 acres (203 in young forest, 69 in protocol-quality habitat) surveyed (Table I-1).

Through the survey efforts for this project, 100 active red tree vole nests (55 in young forest) comprising 10 sites were located. The analysis presented in this document identifies two (2) sites and portions of four (4) additional sites as non-high priority. Approximately 40 active red tree vole nests would be included in non-high priority sites as a result of this project.

Table I-1: Treatment Units in the Back in Black Harvest Plan Surveyed for Red Tree Voles.

RTV Analysis Block	Analysis Block Name *(Unit ID)*	Gross Survey Area[1] (acres)	Acres with Previous Survey Effort	Back in Black Harvest Unit (acres)	RR[2] Treatment (acres)	RR[2] Untreated (acres)	Unit Acres Meeting Criteria for Required Surveys	Additional Acres Surveyed Outside of Harvest Unit
1	Duck and Run *(24-03-5E)*	28[3]	0	15	0	2	12	12[6]
2	Little Hoss *(25-04-17A)*	244	201[4]	152[5]	0	51	7	34[6]
TOTALS		***272***	***201***	***167***	***0***	***53***	***19***	***46***

[1] Gross survey area includes acres within and outside (including Riparian Reserves determined at time of project planning and are different than current Riparian Reserve delineation) of the timber sale unit boundary that was surveyed for red tree vole.
[2] RR = Riparian Reserve; RR are not included within the harvest unit boundaries.
[3] Includes 12 acres of protocol-quality habitat within the unit and 16 acres of protocol-quality habitat outside of unit boundaries. Three (3) acres of young forest habitat within the unit were not surveyed for red tree voles.
[4] Of the 201 acres, approximately 181 acres were previously thinned in 2004; approximately 137 acres of previously thinned young forest is currently in unit 25-04-17A.
[5] Includes unit acres as originally proposed in the Back in Black harvest plan, including 145 acres of young forest habitat and 7 acres of protocol-quality habitat.
[6] All acres surveyed outside of harvest unit is protocol-quality habitat.

Analysis Area Existing Conditions

The analysis area is located in the mesic zone of the red tree vole's range and includes three sixth-field watersheds (Table I-2; Figure I-1). This analysis area is consistent with the *Overview Of The Four-Step Process For Identifying Category C And D Non-High Priority Sites* which recommends that analysis be completed on a "…logical analysis unit that more appropriately addresses the species distribution (i.e. fifth-field watershed)" (USDA/FS-USDI/BLM 2012a, p. Attachment 1-2). Often, the fifth-field watershed scale is used as the scale for evaluating non-high priority site status. However, these sixth-field watersheds were selected as the analysis area because they share similar ownership patterns and red tree vole habitat conditions within the general area; contain the red tree vole habitat affected by proposed actions; allow for appropriate analysis of habitat connectivity and habitat distribution; and when combined, these sixth-field watersheds (78,372 acres) approximate the size of an average fifth-field watershed in the range of the species (Table I-2).

Table I-2: Summary of Federal Ownership in the Back in Black Regeneration Harvest Plan Red Tree Vole (RTV) Analysis Area.

RTV Analysis Block	Analysis Block Name	Sixth-Field Watershed	Area (acres)	Federal Ownership (all BLM)	
				Acres	Percent
1	Duck and Run	Hinkle Creek-Calapooya Creek	23,518	1,960	7
2	Little Hoss	Sutherlin Creek	29,324	1,647	6
		Gassy Creek-Calapooya Creek	25,530	3,977	16
		TOTALS	***78,372***	***7,584***	***9.7***

BLM lands comprise less than 10 percent of the total area within these three six-field watersheds. The analysis area is comprised of the General Forest Management Area (3,492 acres), Connectivity/ Diversity Blocks (915 acres), and reserve land use allocations (3,177 acres; includes Known Owl Activity Centers, Area of Critical Environmental Concern, and Riparian Reserves) (Table I-3, Figure I-3). The remaining portion of the analysis area (~90 percent) is privately owned land assumed to be managed for intensive timber production and agriculture or is non-industrial forest or residential areas (Table I-3).

Table I-3: Summary of Land Use Allocations within BLM Ownership in the Back in Black Regeneration Harvest Plan Red Tree Vole Analysis Area.

Land Use Allocation or Management Emphasis	Total Area[1] (acres)	Percent of BLM Land in Allocation	Percent All Land Ownership
Late-Successional Reserves (LSR)	0	0	0
Known Owl Activity Center (KOAC)	686	9	0.9
Area of Critical Environmental Concern (ACEC)	223	3	0.3
Riparian Reserves (RR) [2]	2,268	30	2.9
Connectivity/Diversity Blocks (C/D)	915	12	1.1
General Forest Management Area (GFMA)	3,492	46	4.5
TOTAL on FEDERAL LANDS	***7,584***	***100***	***9.7***

[1]Acreages are mutually exclusive (e.g. Riparian Reserves and KOACs were subtracted from Matrix land use allocations). However, Riparian Reserves were not subtracted from KOACs (habitat reserved and managed for the northern spotted owl).
[2] Does not include acres in Riparian Reserves in KOACs or ACEC.
[3] Does not include acres in Riparian Reserves or KOACs.

Red tree vole habitat

For analysis purposes, protocol-quality habitat (habitat requiring surveys as identified by the survey protocol, Huff *et al.* 2012) was simplistically modeled as 100 year old (or older) conifer stands. One-hundred years is the average age by which the quadratic mean diameter (QMD) of 18 inches or larger is met, and the stand also meets one of the two general habitat criteria of being mature or old-growth forest. This simplistic model is based upon the professional experience of the District Silviculturalist as well as the modeling done for the 2016 Western Oregon Plan Revision (Vol. 4, Table S-114, p. 1736), where 95.6 years was identified as the mean age for initiation of the mature forest structural stage. For ease of modeling protocol-quality habitat across the analysis area, that age requirement was rounded up to 100 years. This simplistic model underestimates the amount of potential protocol-quality habitat within the analysis area in two ways:

1) Some stands may meet the QMD and mature forest criteria at a younger age (80 years, for instance), and therefore meet the protocol criteria.

2) Some stands meeting the QMD but not yet 100 years old, may have 2 super-dominant trees per acre, and thus meet the protocol criteria.

Based on this simplistic habitat modeling and applying it to the most recent BLM vegetation data from the Forest Operations Inventory (FOI) database, shows that there are 2,146 acres of habitat that meet the survey protocol criteria on the BLM lands (7,584 acres) within the analysis area.

In addition, for BLM modeling purposes for this non-high priority site analysis, BLM stands that are within a 10-year age class between 40 and 90 years old are considered to be young forest habitat, in accordance with the description above. Within the analysis area, there are 4,364 acres that fall within these age classes.

Of the 539 acres within the proposed treatment units, 520 acres are considered young forest resulting from previous regeneration harvest treatments. With the exception of 7 of the 520 acres, all of the young forest stands proposed for harvest were previously thinned between 1999 and 2006. These forest stands generally are comprised of a homogenous overstory canopy of Douglas fir and lack canopy complexity (including two (2) or more super-dominant conifer trees per acre).

The proposed harvest of the 19 acres of protocol-quality habitat would occur in two blocks (Figures I-4 through I-9) that are located in the Matrix (General Forest Management Area) land use allocation. These blocks are located in the valley margin of the Western Cascades, separated from large areas of contiguous federal ownership by at least three (3) miles (Figure I-3).

Analysis **Block 1** is 376 acres of federally owned land near the north boundary of the Roseburg District and includes Duck and Run unit 24-03-5E (15 acres; 12 acres of protocol-quality habitat) which is contiguous with red tree vole habitat into the southwest corner and along the south boundary of the block. This habitat is contiguous with habitat in the northeast corner of the adjacent section to the southwest (Figures I-4, I-6, and I-7). Block 1 is separated from other federal lands to the north and east by three to seven miles of forest managed for intensive timber production (Figure I-3). The block includes 55 acres of red tree vole protocol-quality habitat.

Analysis **Block 2** is 311 acres of federally owned land and includes Little Hoss unit 25-04-17A (152 acres) (Figures I-5, I-8 and I-9). There are 41 acres of red tree vole protocol-quality habitat in the block. Block 2 is adjoined on all sides by private land and is separated from other federal lands to the north by up to 20 miles and to the east by five (5) miles of forest managed for intensive timber production (Figure I-3). Federal lands, currently comprised of early seral forest are adjacent to the southwest corner of the block.

Table I-4: Current Conditions within Treatment Units in the Back in Black Harvest Plan Surveyed for Red Tree Voles.

RTV Analysis Block	Analysis Block Name *(Unit ID)*	Upland Treatment Unit (acres)	Unit Acres of Young Forest Habitat	Unit Acres of Protocol-quality habitat	Canopy Cover (percent) >6" DBH	QMD[1]
1	Duck and Run *(24-03-5E)*	15	3	12	72	21

2	Little Hoss *(25-04-17A)*	152[2]	143[2]	7[2]	55[3]	20
TOTALS		***157***	***146***	***19***		

[1] QMD = Quadratic Mean Diameter
[2] Includes unit acres as originally proposed in the Back in Black harvest plan.
[3] Stand average canopy cover represents 91 percent (137 acres) of the current harvest unit that was previously thinned, as well as the remaining 7 acres of young forest and 7 acres of protocol-quality habitat not previously thinned (Figures I-1 and I-2).

BLM lands within the analysis area exist within a sea of younger forest stands. It is assumed that large industrial land managers comprising the major land owners in the analysis area will continue to manage primarily for timber production on a rotation of 40 to 65 years and lands converted to agricultural use will continue to be managed for agricultural purposes. Therefore, privately owned lands in the analysis area are not expected to provide habitat that meets the red tree vole survey protocol criteria, but will provide young forest red tree vole habitat in varying spatial patterns and patch sizes over time, in a transitory manner.

The recently completed High Priority Management Recommendations for Red Tree Vole (Huff 2016, pp. 13-14), documents that young forest may provide habitat for red tree voles and in some cases may be important in landscapes lacking older-forests. Specifically, that document noted:

- Red tree voles may begin to move into young, unthinned forest when trees become large enough to support arboreal nests, or if remnant trees from a previous cohort are present. Swingle (2005) found two-thirds of the 173 nests found in young forest were in branch whorls or forked trunks.

- Young forest can sometimes have high densities of vole (Clifton 1960, Maser 1966, Thompson and Diller 2002, Swingle 2005).

- Young forest may be important habitat for red tree voles, especially in landscapes where old forests have been eliminated or much reduced (Swingle and Forsman 2009).

- Young forests can provide connectivity. Swingle (2005) noted that young forests may provide connectivity between remnant patches of old forest.

- Where there is little old forest available as connectivity areas, select forested links that can provide a sheltered environment for red tree vole (e.g., unthinned stands $\geq$20 years old; Forsman and Swingle pers. comm. 2013).

- Small patches of forest can sometimes act as refugia for tree voles and should not be discounted, especially in a landscape deficient in habitat (Price *et al.* 2015). Small patches that interrupt expanses of unsuitable habitat may act as stepping stones for some species (Dramstad *et al.* 1996), helping facilitate movement across an inhospitable landscape.

Given the low amount, distribution and fragmented BLM ownership within these three (3) sixth-field watersheds, BLM management alone cannot provide for a reasonable assurance of persistence throughout the entire analysis area. BLM lands can provide some population hubs within habitat meeting the survey protocol criteria, with connectivity within and between watersheds relying on young forest habitat on private lands.

Proposed Treatment

This discussion is limited to units where pre-disturbance surveys were triggered or otherwise completed (see Tables I-1 and I-2). Under the action alternative (Alternative 2), regeneration harvest would be applied to Matrix lands in unit 24-03-5E *("Duck and Run";* 15 acres) and unit 25-04-17A *("Little Hoss";* 143 acres –final acres proposed for treatment after nine (9) acres of unit were dropped). The treatment is designed to retain 20-30 percent of the pre-harvest basal area, through a combination of both skips (no harvest retention aggregate areas) and dispersed retention. Canopy cover would be reduced to 10 to 15 percent outside of the retention aggregates (Table I-4; EA, Chapter 3, Section 3.3.2). On average at the individual unit scale, nine green trees per acre would be retained outside the retention aggregates to meet the post-harvest six (6) to eight (8) green conifer tree retention Roseburg Resource Management Plan requirements plus one (1) additional green tree to provide for future snag recruitment (ROD/RMP, pp. 34, 38, 64, 146, 150-151). Selection of retention trees would be distributed in variable patterns and would reflect the existing conifer species composition of the stands and full range of diameter classes greater than 20 inches diameter breast height (ROD/RMP, pp. 64, 150), if available, or the largest trees (ROD/RMP, p. 151). Operational considerations, including road construction and landings, would affect placement of retention trees. Table I-5 summarizes the post-harvest stand conditions predicted for the two units.

Table I-5. Immediate Post-treatment Stand Conditions within the Back in Black Harvest Plan Treatment Units that were Surveyed for Red Tree Voles.

Analysis Block Name *(Unit ID)*	Timber Sale Unit Acres	Green-tree Retention[1]		QMD[2]	Basal Area (feet^2/ac)[4]	Canopy Cover[4]
		No. Trees per acre[3]	Basal Area per Acre[4]			
Duck and Run *(24-03-5E)*	15	9	20%	23	25	10-15%
Little Hoss *(25-04-17A)*	142[5]	9	30%	25	35	10-15%

[1] Includes trees with a diameter breast height (DBH) greater than or equal to 20 inches.
[2] QMD = Quadratic Mean Diameter
[3] Target based on proposed harvest prescription.
[4] Modeled target using ORGANON growth and yield model (Hann 2011).
[5] Only includes final unit acres resulting from dropping 11 acres (7 acres protocol-quality habitat and 4 acres of young forest habitat) from the harvest plan as a result of red tree survey results. See discussion for Block 2 on page 8 below.

Red Tree Vole Survey Results

Pre-disturbance surveys were conducted to the 19 acres of suitable red tree vole habitat that is within the proposed treatment units. In addition, approximately 198 acres of young forest habitat which had been previously surveyed in 2000, was resurveyed, to update the known site status of red tree vole nests discovered in that past survey. At that time, six (6) active red tree vole nests were located in the young forest habitat, but no site(s) was delineated because the red tree vole was removed from the Survey and Manage standards and guidelines in the mesic survey zone in 2003 (IM-OR-2003-034) (Figure I-2). As a result, five (5) of the six (6) nest trees were not protected during the thinning treatment. The sixth nest tree was protected in the Riparian Reserve established at that time. Subsequently, the red tree vole was reinstated into Survey and Manage in 2006 (IM-OR-2006-029).

Survey efforts followed the 2012 Survey Protocol for the Red Tree Vole, and included using the Modified Line Transect Survey Method followed by surveys within 100 meters of confirmed red tree vole nests within the unit boundaries and in adjacent protocol-quality habitat within 100 meters outside of unit boundaries. All portions of the two harvest units were surveyed including the "no-treatment" areas in

Riparian Reserves and protocol-quality habitat adjacent to units. BLM biologists and qualified contractors completed the ground surveys in 2015/2016 and qualified contractors conducted tree climbing efforts during the winter of 2015/2016 (Figures I-4 and I-5). Subsequently in February 2016, the contractor completed 100 meter surveys around confirmed red tree vole trees resulting from the previous survey effort in each block. Site status was determined by the contractor and confirmed by BLM biologists.

BLOCK 1: The 12 acres of protocol-quality habitat in the harvest unit (15 acres) and a portion (16 acres) of the habitat adjacent and contiguous with the unit were surveyed for red tree voles (Figure I-4). Within the 28 acres surveyed, nine (9) active red tree vole nests comprising three (3) active red tree vole sites were discovered (Table I-6). This equates to one (1) active red tree vole nest for every 3.1 acres surveyed.

BLOCK 2: Forty-one (41) acres meeting the survey protocol-quality habitat definition were surveyed, and 203 acres of young forest habitat were surveyed– including two (2) acres of young forest habitat not previously surveyed and resurveying 201 acres of young forest habitat that had been surveyed in 2000. Surveys to these 244 acres resulted in the discovery of 91 active red tree vole nests, comprising seven (7) red tree vole sites (Table I-6). In protocol quality habitat, active nests were located for every 1.1 acres surveyed (36 nests/41 acres surveyed). For young forest habitat, active nests were found for every 3.7 acres surveyed. (55 nests/203 acres surveyed)

A general observation to note, is that although the 201acre stand of young habitat did not meet the protocol criteria of an average of two super-dominant trees per acre, portions of the stand do contain this component where remnant trees were retained after the initial regeneration harvest and subsequent thinning; in general, these retention tree areas contained the concentrations of red tree vole nests within the young forest habitat, particularly where adjacent to protocol-quality habitat.

Table I-6. Results of BLM Red Tree Vole Surveys within the Back in Black Analysis Area.

RTV Analysis Block	Analysis Block Name	No. of Active RTV Trees[1]	No. of Inactive RTV Trees[2]	No. of Confirmed Non-RTV Nest Trees[3]	No. of Undetermined Nest Trees[4]	Total	No. of Sites Determined
1	Duck and Run	9	6	10	0	**25**	**3**
2	Little Hoss	91	33	105	0	**229**	**7**
Total		***100***	***39***	***115***	***0***	***254***	***10***

[1] An arboreal nest that is confirmed to be currently in use by a red tree vole, by visual of a red tree vole or by the presence of fresh, bright green to pale green resin ducts, and/or bright green to brown (or a combination of both within nest) fecal pellets, either in the nest or on the ground beneath it (Huff *et al.* p. 15).
[2] An arboreal nest confirmed to be a red tree vole, but is not currently in use, determined by a nest that is compacted or falling apart and the fecal pellets are dark brown to black with no green resin ducts or cuttings; nest material is comprised primarily of a composted layer of compressed fecal pellets, orange, tan or brown resin ducts, often with a layer of debris (conifer needles, sticks, lichens, etc.) that has fallen onto the nest. The vole nest material is often in various stages of decomposition, and can become difficult to identify in very old nests (Huff *et al.* p. 15).
[3] An arboreal nest that is confirmed to another species.
[4] Any arboreal nest that is not confirmed as belonging to a red tree vole or any other species. Some of these undetermined structures may not be rodent nests but rather a bird nest or accumulation of litter fall. If the nest is not examined by a climber, then the activity status is undetermined. Nests classified as red tree vole, "status undetermined", are to be managed as if they are "active" red tree vole nests (Huff *et al.* p. 14).

Environmental Consequences of Proposed Actions

Of the 100 active red tree vole nest trees located during the Black in Black survey effort, 60 of the trees would not be harvested under the proposed action because:

1) Four (4) red tree vole sites, including nine (9) active red tree vole trees, are located in areas outside of harvest unit boundaries;
2) Four (4) red tree vole sites are partially located in the harvest unit boundary and adjacent habitat; for these four (4), a total of 51 active red tree vole trees would be retained and managed in habitat adjacent to the timber sale units, and 15 active red tree vole trees would be protected in a skip within the unit boundary. These 15 are contiguous to adjacent habitat.

The remaining 40 active nest trees are associated with two (2) sites (15 active red tree vole trees total) and a portion of four (4) sites (25 active red tree vole trees total) and would be impacted by regeneration harvest. The following is a summary of impacts within each block:

BLOCK 1: Regeneration harvest in unit 24-3-5E would remove approximately 15 acres, including three (3) acres of young forest habitat and 12 acres of protocol-quality habitat (Table I-7; Figures I-6 and I-7).

In addition, there are other timber sale units present within this block, none of which triggered pre-disturbance surveys for the red tree vole. Units 24-3-5C and 24-3-5D under the Back in Black Regeneration Harvest Plan (Table I-7) would remove 197 acres of young forest habitat in the north half of Block 1 and 53 acres of young habitat in the south half of the Block would be thinned in units 24-3-5A and 5B (Good Boyd) under the Calapooya Creek Harvest Plan (Figures I-6 and I-7). Riparian Reserves would not be treated. Cumulatively, within the 376 acres of BLM lands within this block, 212 acres would be regeneration harvested and 53 acres would be thinned, for a total of 265 acres being treated.

Three (3) known red tree vole sites (which include nine (9) active red tree vole nests) are located within Block 1.

- One (1) known red tree vole site (which includes one (1) active red tree vole nest tree) would be fully retained within 41 acres of contiguous protocol-quality habitat in the southwest corner of the block.
- One (1) red tree vole site that includes two (2) active red tree vole nest trees is located at the north end of the stand outside of the harvest boundary but within approximately 110 feet of the timber harvest boundary (Figure I-7); although the two (2) active red tree vole nest trees themselves would be retained, a site-tree buffer (180 feet) would not be fully provided and therefore, canopy cover would be removed within 110-180 feet of the red tree vole nest trees. In addition, the location of the active nest tree is within 22 feet of private lands, and therefore the full site-tree buffer distance (180 feet) around this nest tree is not attainable. Because of recent harvest, currently the condition of the private land does not provide some level of habitat and protection. The contiguous stand (43 acres) of red tree vole habitat adjacent to and including this site would be maintained; three (3) of the nine (9) active red tree vole trees known within Block 1 would remain in this protected habitat.
- The third red tree vole site, containing six (6) active red tree vole nest trees, is located almost exclusively within unit 24-3- 5E and is proposed for regeneration harvest (Figure I-6). Although two (2) of the six (6) active nests are located and will be retained within the Riparian Reserve, a site-tree buffer (180 feet) would not be provided. The remaining four (4) red tree vole nest trees within the unit would be marked and retained where feasible.
-

Retained skips in the uplands and “no-treatment” areas in Riparian Reserves may support red tree voles in treated areas and provide connectivity to the remaining habitat in the southern portion of the block (Figure I-6). Active nest trees would be retained as much as practicable. The 53 acres of the remaining young habitat planned to be thinned within the next three years (Calapooya Creek Harvest

Plan) is expected to be protocol quality habitat in approximately 20 years post-harvest or when 60 percent tree canopy cover is re-established (Figures I-6 and I-7).

BLOCK 2: Regeneration harvest in unit 25-4-17A would remove approximately 143 acres of young habitat (Table I-7), including approximately 71 acres (59 percent) of a 120-acre red tree vole habitat management area (Figures I-8 and I-9). Based on the red tree vole survey results, the seven (7) acres of protocol quality habitat that was originally proposed for harvest in this block was dropped from the action alternative (Figure I-14). In addition, two (2) acres of young forest habitat located along the west boundary of the block and two (2) acres of young habitat located between Riparian Reserve and partially within a red tree vole site was also dropped from the action alternative (Figure I-14).

To protect active red tree vole trees and habitat features associated with older forest (e.g. large snags, large trees, large down wood) in the southeast corner of the unit, a skip (~3.6 acres) encompassing this area would be retained. The seven (7) acres of protocol-quality habitat originally proposed for harvest was dropped from the harvest plan in order to maintain all quality habitat within the Block. Additional red tree vole nest trees would be retained as much as practicable as retention trees within the unit boundary. Riparian Reserves would not be treated and all three (3) stands of habitat (totaling 41 acres) would be maintained in the western and southern portions of the block (Table I-7, Figures I-8 and I-9). Additionally, two (2) acres of young habitat between the Riparian Reserve corridors were dropped from the harvest plan in order to maintain habitat within the site-tree buffer (180 feet) located in the Riparian Reserve (Figure I-14). No protocol-quality habitat would be harvested in this block.

Seven (7) red tree vole sites (includes 91 active red tree vole nest trees) are located within Block 2.

- Three (3) red tree vole sites would be fully retained in habitat outside of the timber harvest boundary, including two (2) sites (one (1) active red tree vole tree each) located within protocol quality habitat and one (1) site (six (6) active red tree vole trees) located in the Riparian Reserve.

- Three (3) red tree vole sites would be partially retained:

    - 1) 36 active red tree vole trees are distributed within three (3) stands of protocol-quality habitat adjacent to unit 25-04-17A, and

    - 2) 13 active red tree vole nest trees within young habitat in the southeast corner of unit 25-04-17A would be protected in the 3.6 acre skip mentioned above; this area is contiguous with adjacent habitat. The young habitat within the remaining two (2) red tree vole sites would be harvested.

- One (1) entire red tree vole site, containing nine (9) active red tree vole nest trees, would be harvested. This site is not within protocol quality habitat (Figure I-14).

At least 60 percent of the 41 red tree vole nest trees located within the young habitat to be harvested (outside of Riparian Reserve and 3.6 acre skip) are marked for retention.

Table I-7: Summary of Impact to Red Tree Vole Habitat in the Back in Black Regeneration Harvest Plan Red Tree Vole Analysis Area.

RTV Analysis Block	Analysis Block Name	Young Habitat		Protocol-quality habitat	
		Pre-harvest (acres)	Post-harvest (acres)	Pre-harvest (acres)	Post-harvest (acres)
1	Duck and Run	321	124	55	43
2	Little Hoss	194	52	41	41

Table I-8: Summary of Impacts to active Red Tree Vole Trees in the Back in Black Regeneration Harvest Plan Red Tree Vole Analysis Area.

RTV Analysis Block	Analysis Block Name	Total Active RTV Trees	# of Active RTV Trees in Young Habitat		# of Active RTV Trees in Protocol-quality habitat	
			Pre-harvest	Post-harvest	Pre-harvest	Post-harvest
1	Duck and Run	9	0	0	9	3
2	Little Hoss	91	55	19[1]	36	36
	TOTALS	***100***	***55***	***19***	***45***	***39***

[1] Includes 15 red tree vole trees in the southeast corner of the unit that will be managed as part of a site associated with the adjacent protocol-quality habitat and six (6) trees associated with one site located within the Riparian Reserve.

Where regeneration harvest is applied, forest stands would not be considered protocol-quality red tree vole habitat for approximately 100 years or until QMD exceeds 18 inches. Active nest trees may be retained in skips and as dispersed retention trees where practicable. However, red tree voles would be vulnerable to predation in the concentrated harvest area. Retained aggregates and dispersed retention trees would provide important nesting habitat structures in future habitat. Habitat connectivity including nesting potential would be expected to develop in approximately 40-50 years or when canopy cover reaches 60 percent (Swingle 2005, p. 39).

In total, for the whole project, because seven (7) acres of protocol-quality habitat in unit 24-3-17A were dropped from the proposed action, only 12 acres of habitat, located in unit 24-3-5E, or approximately 0.4 percent in the analysis area, would be affected by proposed actions.

Non-High Priority Site Analysis

Red tree voles are a Survey and Manage species, Category C (uncommon, pre-disturbance surveys practical) species, because they were found to meet the following criteria (USDA/FS-USDI/BLM 2001, p. S&G-10):

- The species is uncommon, and not all known sites or population areas are likely to be necessary for reasonable assurance of persistence, as indicated by one or more of the following:
    - A higher number of likely extant sites/records do not indicate rarity of the species.
    - Low-to-high number of individuals per site.
    - Less restricted distribution pattern relative to range or potential habitat.
    - Moderate-to broad ecological amplitude.
    - Moderate-to high likelihood of sites in reserves.

  and
- Pre-disturbance surveys are practical.

Management direction for Category C species is: "[h]igh-priority sites will be managed according to the management recommendations for the species…assume all sites are high priority, or local determination…of non-high priority sites may be made on a case-by-case basis…" (USDA/FS-USDI/BLM, S&G-10).

Non-high priority status will be evaluated based upon meeting most of the following criteria (USDA/FS-USDI/BLM 2012b, Attachment 1-2):

- "Moderate-to-high number of likely extant sites/records.
- High proportion of sites and habitat in reserve land allocations or limited number of sites within reserves, but the proportion or amount of potential habitat within reserves is high and there is a high probability that the habitat is occupied.
- Sites are relatively well distributed within the species range.
- Matrix S&G or other elements of the Northwest Forest Plan (NWFP) provide a reasonable assurance of species persistence."

Moderate-to-High number of likely extant sites/records

Using random plot survey data, Rosenberg *et al.* (*in prep*) reported the highest density of red tree voles within the species' range along the middle Oregon Western Cascades foothills and mountains, from the southern part of the Willamette National Forest south through the Umpqua National Forest, including Roseburg BLM and portions of Eugene BLM, and along the central and southern part of the Oregon Coast Ranges. They determined Roseburg BLM has the highest occurrence rate of red tree voles of any of the NWFP units, where red tree voles were documented on 88 percent of the one hectare plots randomly sampled (Rosenberg *et al., in prep*).

A query of the BLM's special status species databases (GeoBOB, data queried 05/10/2016) identified over 10,170 observations of red tree vole nesting structures (active, inactive, or unknown status) on BLM lands in Oregon; over 3,965 within the mesic zone. Four thousand-two hundred forty (4,240) surveys have been completed on over 165,000 acres on BLM-administered lands; 707 surveys of over 27,570 acres were in the mesic zone. Red tree voles have been detected on 72 percent (514 of 707) of the units surveyed (22,107 acres) in the mesic Zone (GeoBOB Data) with a density of 0.11 red tree vole per acre (3,086 red tree voles detected in survey units *(not including incidental observations)*/27,570 acres surveyed). In the Swiftwater Resource Area portion of the mesic Zone, 3,385 acres have been surveyed for red tree vole with a detection rate of 61 percent (GeoBOB Data). These detection rates (from 61-88 percent) show that red tree voles are common in protocol-quality habitat on the Roseburg BLM District, including the Swiftwater Resource Area, and likely extant populations in protocol-quality habitat are at least moderate, if not high.

The BLM surveyed 272 acres for the Back in Black Regeneration Harvest project (Table I-1) and located 100 active red tree vole nest trees (Table I-8) equating to a density of 0.4 active nest trees per acre (or one (1) active site for every 2.7 acres). Within the stands that met the protocol criteria for requiring surveys, the density rate was 45 nests/69 acres surveyed or one (1) active nest for every 1.5 acres. For the young forest habitat that was surveyed, 55 nests/203 acres surveyed, or one (1) active nest for every 3.7 acres. These density estimates should be considered as conservative, as we are unable to visually locate all nest structures from the ground.

Using the simplistic habitat modeling discussed previously, there are at least 2,146 acres of protocol quality red tree vole habitat outside of the project units (including the seven (7) acres dropped from unit 25-4-17A in the original Back in Black Harvest Plan) on federal lands in the analysis area (Table I-9).

Based on the amount of protocol-quality habitat within the analysis area and outside of the project area (at least 2,146 acres; Table I-9) and the probability that habitat is occupied (61-88 percent); there are at least a moderate number of likely extant sites within the analysis area, especially when considering the contribution of the young forest habitat. Using the 0.4 percent average detection rate (100 active red tree vole trees/272 acres surveyed) determined by BLM surveys conducted within both young habitat and protocol-quality habitat for the Back in Black project, approximately 2,604 active red tree vole nest trees are estimated within young forest and protocol habitat in the analysis area (Table I-9).

Based on the estimates of red tree vole nests within the analysis area, the two units of the Back in Black project where pre-disturbance red tree vole surveys were conducted would affect approximately 1.5 percent (40 of 2,604) of the estimated red tree vole nests within the analysis area. Using the BLM detection rates of 0.3 (55 active red tree vole trees/203 acres surveyed) for young habitat for the other seven (7) Back in Black units (520 acres) of young forest habitat not requiring red tree vole surveys, an additional six (6) percent (156 of 2,604) of the estimated red tree vole nests may be affected within the analysis area.

To estimate potential active red tree vole nests within the analysis area in protocol-quality habitat, using the BLM detection rate of 0.4 for all of the Back in Black surveys as the lower limit, and 0.7 (the detection rate in protocol quality habitat) as the upper limit, yields between 858-1,502 potential active red tree vole nests within protocol quality habitat within the analysis area. In younger forest habitat, using the detection rate for young forest habitat surveys of the Back in Black units as the lower limit (0.3), and the detection rate for all Back in Black surveys as the upper limit (0.4) shows a potential for 1,309-1,745 active red tree vole nests within young forest habitat within the analysis area .

However, estimates within young habitat may be high depending on quality of young habitat (e.g. proximity to older forest, whether or not some larger remnant trees are present within the stand, or other structural characteristics exist to support red tree vole nests).

Table I-9. Estimated Number of Red Tree Voles in Young and Protocol-Quality Habitat within the Analysis Area.

Land Use Allocation or Management Emphasis	Total Area[1]		Habitat within Land Use Allocations					
			Young Forest Habitat		Protocol Habitat		Total Habitat	
	BLM Acres	Percent of BLM Lands	Acres of Habitat	Estimate No. of Active RTV Nests[1]	Acres of Habitat	Estimate No. of Active RTV Nests[2]	Acres of Habitat	Estimate No. of Active RTV Nests[3]
Late-Successional Reserves (LSR)	0	0	0	0	0	0	0	0
Known Owl Activity Center (KOAC)	685	9	97	38	563	394	660	264
Area of Critical Environmental Concern (ACEC)	223	3	0	0	162	113	162	65
Riparian Reserves (RR)	2,269	30	1,222	489	557	390	1,779	712
Connectivity/Diversity Blocks (C/D)	915	12	628	251	127[4]	89	755	302
General Forest Management Area (GFMA)	3,492	46	2,417	967	737	516	3,154	1262
TOTAL on FEDERAL LANDS	***7,584***	***100***	***4,364***	***1,745***	***2,146***	***1,502***	***6,510***	***2,604***

[1] The number of active red tree vole nests was estimated using the 0.3 percent detection rate determined by BLM surveys conducted in young habitat for the Back in Black project.
[2] The number of active red tree vole nests was estimated using the 0.7 percent detection rate determined by BLM surveys conducted in protocol-quality habitat for the Back in Black project.
[3] The number of active red tree vole nests was estimated using the average 0.4 percent detection rate determined by BLM surveys conducted in protocol-quality habitat and young habitat for the Back in Black project.
[4] Each C/D block must be maintained in 25-30 percent of late-successional forest at any point in time. Inclusions of RR and other allocations with late-succession forest (e.g. KOACs) within the gross mapped C/D blocks count toward this percentage (RMP p. 34).

Based on recent survey effort, there are currently 100 known active red tree vole sites within protocol-quality or young habitat within the analysis area. Depending upon their arrangement, the potential active red tree vole nest trees represent several hundred to over two thousand active red tree vole sites on federal lands within the analysis area. Based on Rosenberg *et al. (in prep*) findings that Roseburg BLM has the highest occurrence rate of red tree voles, it is reasonable to assume these potential nest sites are occupied.

High proportion of sites and habitat in reserve land allocations or limited number of sites within reserves, but the proportion or amount of potential habitat within reserves is high and there is a high probability that the habitat is occupied.

Table I-10 shows a hierarchical approach to the BLM land use allocation in the analysis area. There are approximately 3,177 acres (42 percent) of reserve land use allocations on BLM-administered lands in the analysis area: 2,269 acres of Riparian Reserves, 223 acres in an Area of Environmental Concern, and 685 acres in a Known Owl Activity Center (Table I-10; Figure I-12). Forty (40) percent (1,282 acres) of these reserve lands contain protocol-quality habitat, with 48 percent of the protocol-quality habitat in the analysis area in these reserves. Management objectives for reserves are to protect and enhance late-successional and old growth habitats. Additionally, the objective of treatments of young forests (stands under 80 years of age) within reserves is to foster the development of late-successional forest structure

and composition. The reserve system functions to facilitate connectivity for terrestrial species, including the red tree vole, across the landscape. None of the reserve acres are proposed for treatment in the Back in Black project.

Matrix land use allocations (GFMA and C/D) comprise 59 percent of the BLM lands and contain 11 percent (864 acres) protocol-quality habitat (Table I-10), with 40 percent of the protocol-quality habitat within the analysis area in these lands.

Table I-10. Red Tree Vole Habitat in Reserves and Areas Managed for Late-Successional Forest Habitat.

Land Use Allocation or Management Emphasis	Total Area[1]		Habitat within Land Use Allocations					
			Young Forest Habitat[2]		Protocol Habitat[3]		Total Habitat	
	acres	percent	acres	percent	acres	percent	acres	percent
Late-Successional Reserves (LSR)	0	0	0	0	0	0	0	0
Known Owl Activity Center (KOAC)	685	9	97	1	563	7	660	9
Area of Critical Environmental Concern (ACEC)	223	3	0	0	162	2	162	2
Riparian Reserves (RR)	2,269	30	1,222	16	557	7	1,779	23
Connectivity/Diversity Blocks (C/D)	915	13	628	8	127	2	755	10
General Forest Management Area (GFMA)	3,492	46	2,417	32	737	10	3,154	42
TOTAL on FEDERAL LANDS	***7,584***	***100***	***4,364***	***57***	***2,146***	***28***	***6,510***	***90***

[1]Acreages are mutually exclusive (e.g. Riparian Reserves and KOACs were subtracted from Matrix land use allocations). However, Riparian Reserves were not subtracted from KOACs (habitat reserved and managed for the northern spotted owl).
[2] Habitat is defined as conifer stands with a ten-year age class of 40-90 years
[3] Protocol-quality habitat is conifer stands with a ten-year age class ≥100 years; an estimate of those stands with a QMD ≥18 inches.

C/D lands (1,808 acres which includes reserves for this discussion) or 24 percent of the federal land base; Table I-11) are managed on a long rotation (150-year area controlled) with a minimum of 25-30 percent of each C/D block to be retained in late-successional forest to provide for dispersal opportunities for late-successional species. Inclusions of Riparian Reserve and other allocations with late-succession forest (i.e. KOACs) within the mapped C/D blocks count toward this percentage (RMP p. 34). The amount of 150 years or older stands range from 25-28 percent of the C/D blocks, and therefore, all three (3) C/D blocks within the analysis area meets the 25-30 percent late-successional habitat (stands ≥ 150 years) minimum (Table I-11). Approximately 43 percent (586 of 1,808 acres) of the lands in C/D are in reserves, of which 16 percent (146 of 1,808 acres) of the forest habitat is currently 150 years or older.

Table I-11. Current Conditions in Connectivity/Diversity Blocks within the Analysis Area.

C/D Block ID #	Total C/D Block Acres	Acres ≥ 150 years	Percent Block ≥ 150 years	Acres in KOAC	Acres of Riparian Reserve[1]	Percent Block in Reserves[2]	Acres KOAC ≥ 150 years	Acres Riparian Reserve ≥ 150 years[1]	Percent Block of ≥ 150 years in Reserve[2]
91	513[3]	128	25%	39	75[4]	22%	36	8[4]	8%
92	799	225	28%	158	119[5]	35%	110	54[5]	21%
93	496	130	26%	0	392	79%	0	75	15%
TOTAL	***1,808***	***483***	***27%***	***197***	***586***	***43%***	***146***	***137***	***16%***

[1]Acres are mutually exclusive from KOAC acres. Acres of RR in KOAC were not included in RR totals.
[2]Based on total acres of KOAC and RR.
[3] Approximately 153 acres of the block are outside of the analysis area.
[4] Acres of reserve are mutually exclusive and does not include 10 acres of RR located in the KOAC.
[5] Acres of reserve are mutually exclusive and does not include 55 acres of RR located in the KOAC.

Fourteen (14) percent (127 acres) of the C/D lands are protocol-quality habitat, which represents six (6) percent of protocol-quality habitat in the analysis area. Since 25 percent of the C/D lands must be retained as late-successional forest (and hence, protocol-quality habitat) at any given time, this means at least another 127 acres of protocol-quality habitat are protected in this land allocation (Table I-10). This raises the total acreage of protocol-quality habitat "reserved" to 1,409 acres out of the 2,146 acres in the analysis area, or 66 percent of the protocol-quality habitat is reserved (and 34 percent is not).

This is a high level of the existing protocol-quality habitat reserved.

As addressed in the previous criteria, there is a high probability that protocol-quality habitat in the analysis area is occupied. Thus, this criterion is met as a high proportion of the potential habitat in the analysis area is reserved, and there is a high probability that the habitat is occupied.

Sites are relatively well distributed

Forsman *et al.* (2004, p. 300) found that red tree voles are "widely distributed" in the Roseburg District, based upon analysis of northern spotted owl pellets. Figure I-11 illustrates the distribution of red tree vole habitat in and adjacent to the analysis area. The majority of the analysis area contains very little federal land (<10 percent); private forest lands provide patches of young forest habitat, but eventually forested lands transition into valley bottom oak forests, grasslands, and residential areas. The proposed treatments do not significantly alter the existing conditions in the analysis area.

Connectivity in the majority of the analysis area is facilitated by forest habitat on intermingled private lands, as well as adjacency of shared BLM corners, transitory habitat on non-federal lands (Figure I-11), and habitat in Riparian Reserves/riparian areas. Because of the low distribution of BLM lands within the analysis area, connectivity for red tree voles cannot be provided solely by BLM lands. At best, BLM lands can provide population sources for long-term red tree vole persistence across the landscape. Connectivity between the population sources on BLM lands within the analysis area and adjacent watersheds is primarily dependent upon private lands. BLM ownership provides some north-south connectivity generally through the middle of the analysis area. The southern end of analysis area is best connected to continuous blocks of BLM ownership, north of the North Umpqua River and east into the Western Cascades. Connectivity to the south is restricted by the valley bottoms of the North Umpqua River and the river itself. North of the North Umpqua River, connectivity to the west and north is

restricted by the valley bottoms of the Calapooya River and the river itself, as well as oak forests, grasslands, residential areas, the cities of Sutherlin and Oakland, and Interstate-5.

Protocol-quality habitat is located in nearly all federally managed blocks (Figure I-8). Blocks lacking protocol-quality habitat contain primarily young forest habitat. The majority of protocol-quality habitat (2,125 of 2,146 acres, 99 percent) on BLM ownership in the analysis area is unsurveyed. There are 13 known red tree vole sites located within the analysis area, including the 10 sites identified in association with the Back in Black Harvest Plan surveys efforts. The remaining three (3) sites were identified in surveys completed in 2000-2001, including one in the far western portion of the analysis area and two (2) sites in the northwestern portion of the analysis area, just north of the Duck and Run Block 1 (Figure I-8), outside the project area.

Red tree vole dispersal is supported by both protocol-quality and young forest habitats providing connectivity on BLM-administered lands and private lands above the valley margins of the Umpqua Valley and east into the Western Cascades. In addition to existing blocks of protocol-quality habitat on BLM-administered lands, habitat modeling (Dunk and Hawley 2009) illustrates large patches of red tree vole habitat distributed on private lands throughout the analysis area (Figure I-11). Additionally, connectivity is provided by the network of reserves on BLM-administered lands in the analysis area (Figure I-12). Connectivity for red tree voles in this analysis area would not be measurably reduced given the existing habitat potential and land use patterns.

As discussed above, BLM surveyors located, on average, 0.4 active red tree vole nest trees per acre in the surveyed portions of the analysis area. Active red tree vole nest trees have been located on 61 percent of all surveyed units in the Swiftwater Resource Area. Given the conclusion made by Forsman *et al*. (2004), the prevalence of unsurveyed red tree vole habitat in the analysis area, the moderate to high detection rates in the Swiftwater Resource Area in red tree vole habitat, and the use of young forest habitat by red tree voles, it is highly probable that red tree voles are well distributed in the analysis area and would continue to remain well distributed under the action alternative.

Matrix Standards and Guidelines or other elements of the Northwest Forest Plan provide a reasonable assurance of the species persistence.

Red trees voles are prevalent within the analysis area within young forests, as indicated by our survey effort, where we located 55 active nests within 203 acres of young forest surveyed. In addition, most of the acreage (181 acres) where these red tree voles were located had been commercially thinned approximately 12 years ago (Bonanza Commercial Thin) showing the resiliency and adaptability of red tree voles within this part of their range. Red tree voles either persisted through the thinning operations in these stands, or moved into these stands within the last 10 years, indicating that thinning operations here result in only a temporary reduction in habitat, for 10 or fewer years.

In addition, Matrix lands have not been managed as proposed in the Northwest Forest Plan. Davis *et al.* (*in prep*) state,

> "…net changes in the amount of older forests on federal lands managed under the NWFP have been small (a 2.8 to 2.9 percent net decrease). This occurred despite gross losses from wildfire (4.2 to 5.4 percent), timber harvest (1.2 to 1.3 percent), and insects or other causes (0.7 to 0.9 percent)…The [Northwest Forest] Plan anticipated a continued decline in older forests for the first few decades…Decadal gross losses of about 5 percent per decade as a result of timber harvesting and wildfire were expected. Observed losses from wildfire were about what was expected, but losses from timber harvesting were about one quarter of what was anticipated."

For the past two decades, harvest on the Roseburg District has focused primarily on thinning stands less than 80 years old – stands that are not considered protocol-quality habitat. Furthermore, the Roseburg District has harvested an average of 0.3 percent of the District land base per year for the past 20 years, which is a trend that may continue under the NWFP. However, the NWFP may be replaced by the 2016 revision of the Western Oregon Proposed Resource Management Plan (PRMP 2016) in summer 2016. Based on the assumptions provided in Appendix C of the 2016 PRMP (Volume 3, pp. 1163-191), models were used to determine the timber harvest level that the BLM would be able to sustain over time. For the Roseburg District, modeled estimates of timber harvest are projected to average 0.4 percent per year (1,672 acres harvested/ 425,805 total acres of BLM-administered lands), of which 0.1 percent (613 acres) is projected as regeneration harvest, 0.04 percent (181 acres) as selective harvest, and 0.2 percent (878 acres) as commercial thinning (calculated from PRMP 2016, Appendix T, Table V-2, p. 1825).

Timber harvest rates under either management plan indicate existing protocol-quality habitat will remain available, well-distributed, and occupied. Implementing the proposed action of the Back in Black Regeneration Harvest Plan would affect 12 acres of protocol-quality habitat in Matrix lands (0.003 percent of the BLM-administered District Lands; 0.2 percent of the analysis area), and would not alter that conclusion.

The NWFP also requires the retention of green-trees and snags in regeneration harvest units, which can help the development of habitat for species such as the red tree vole faster than if those components were not retained. In addition, retaining habitat features within skips (e.g. protection buffers for other Special Status or Survey and Manage species and/or around large down wood) and the creation of gaps also retains habitat conditions and structure that will foster the development of suitable habitat within the managed stands faster for late-successional dependent species, including the red tree vole.

Additionally, red tree voles benefit incidentally from the presence of northern spotted owl (NSO) critical habitat (17 percent of federal lands in the analysis area); and the protection of NSO sites and older, structurally-complex owl habitat, recommended in Recovery Actions 10 and 32 (USDI/FWS 2011a, pp. III-43 and III-67). Outside of reserves and C/D stands ≥ 150 years of age, there are approximately 1,077 additional acres (14 percent of federal lands in the analysis area) of late-successional habitat (≥ 80 years of age), of which 92 percent (995 of 1,077 acres) are considered older, structurally-complex habitat as defined under Recovery Action 32 (USDI/FWS 2011a, pp. III-67). The objective to create and maintain long-term ecologically sustainable suitable owl habitat also provides red tree vole habitat. While these stands are mostly Matrix lands designated for sustained yield timber production and are not designated or being managed as reserves, BLM has exercised its management discretion with regard to the timing, location and type of harvest to manage these stands consistent with the goals of designated critical habitat and northern spotted owl recovery, thereby providing additional late-successional habitat conditions that benefit the red tree vole.

Conclusions

All four of the criteria indicating little to no concern for persistence within the analysis area have been met.

1. Based on the amount of protocol-quality habitat within the analysis area (at least 2,146 acres), and the overall likelihood of it being occupied (61-88 percent), there is a moderate number of likely extant sites in the analysis area. Completed surveys and database analyses validate this conclusion.

2. A high proportion (66 percent) of the protocol-quality habitat within the analysis area is reserved or within land-use allocations similar to reserves, and there is a high likelihood that habitat is occupied by red tree voles.

3. Red tree vole habitat, which is highly likely to be occupied, is well distributed on BLM lands within the analysis area, and hence, sites (and potential sites) are well distributed throughout the analysis area. In addition, red tree voles utilize younger forest throughout this portion of their range. Both protocol-quality habitat and young forest habitat are well-distributed on BLM lands, and young habitat on non-federal lands allows for connectivity throughout the analysis area- this allows for red tree voles to disperse throughout this landscape (Figure I-11).

4. Given the high amount of the analysis area reserved, a high amount of protocol-quality habitat reserved, and a high likelihood that habitat is occupied, coupled with the rate of harvest in the Matrix land base, the rapid recolonization of thinned stands by red tree voles, and the use of younger forests by red tree voles in this portion of the species range, Matrix land management within the analysis area may provide a reasonable assurance of species persistence for red tree voles.

Non-high priority sites identified

Two (2) red tree vole sites and a portion of four (4) others are identified as non-high priority, unnecessary to protect, to provide a reasonable assurance of species persistence within the analysis area. Of the 100 active red tree vole nest trees located in the Black in Black due to the survey effort, will continue to be managed within maintained red tree vole sites (Table I-12). Of the 40 active red tree vole nests identified as non-high priority, 32 are within young forest habitat, while eight (8) are within protocol-quality habitat. Of the 34 non-high priority red tree vole nests within young forest habitat, 15 will be protected within a skip that is contiguous to adjacent protocol-quality habitat; however, they will not receive full site-tree buffers (180 feet). Of the eight (8) non-high priority red tree vole nest trees within protocol-quality habitat, two (2) will be retained just outside of the unit boundary and therefore, will not receive full site-tree buffers.

BLOCK 1: Of the three (3) red tree vole sites (nine (9) active red tree vole trees) within this block, the following is proposed (Figure I-13):

- One (1) red tree vole site (containing one (1) active red tree vole nest tree) located within protocol-quality habitat in the southwest corner of the block will continue to be managed as a high priority site (Figure I-13).
- One (1) site (containing six (6) red tree vole nest trees) fully located within the unit boundary is considered a non-high priority site (Table I-12); these trees would be marked and retained where feasible within the unit boundary for retention (Figure I-13).
- One (1) red tree vole site (containing two (2) active red tree vole trees) would partially be designated and managed as non-high priority. Based on their proximity to the harvest unit boundary, part of this site would be designated as non-high priority because these two trees would not receive the full site-tree buffers as recommended in the management recommendations for red tree voles. However, these trees would not be harvested and would be managed within a protocol-quality stand contiguous with a site that will continue to be managed as high priority (Figure I-13).

BLOCK 2: Of the seven (7) red tree vole sites (91 active red tree vole trees) within this block, the following is proposed (Figure I-14):

- Three (3) sites will continue to be managed as high priority sites, including two (2) individual sites within protocol-quality habitat, and one (1) site (six (6) active red tree vole trees) located within young habitat in Riparian Reserve (Table I-12, Figure I-14).

- One (1) site is located in young habitat within the harvest unit (east) boundary and is considered a non-high priority site (Table I-12); these nest trees would be marked and retained where feasible.
- Three (3) sites are each partially located in protocol-quality habitat (36 active red tree vole trees) and young habitat (34 active red tree vole trees). The protocol-quality habitat areas of each of the sites will continue to be managed as high priority. Active red tree vole trees located in young habitat in the site located in the southeast corner of the block will also continue to be managed as high priority. The portions of the remaining two (2) sites with young habitat located within the harvest unit boundary would be considered non-high priority. Additional details for the site designations are as follows:
    - A portion of two (2) red tree vole sites (located west and southwest within the block) with 34 active red tree vole trees located in the young habitat within Unit 25-04-17A would be designated as non-high priority sites (Figure I-14).
    - Within the stands of protocol-quality habitat in the west and southwest portion of the block, the site-tree buffers for 10 active red tree vole trees are currently impacted by an existing road which has created a canopy gap of 30 feet or more between the protocol and young habitat within the sites. These trees will continue to be managed as a high-priority site, but because there is an existing canopy gap within the buffers of these 10 active red tree vole trees, they would not receive the full recommended site-tree buffers that would extend across the road and into the harvest unit boundary (Figure I-14).
    - The site occurring in the southeast corner of the block contains both young and protocol-quality habitat that is not bisected by an existing road (Figure I-14). The young habitat in this part of the unit differs from the rest of the harvest unit in that it contains some structural components associated with mature forest habitat (i.e. larger trees and snags) and therefore, would be retained within the harvest unit as a 3.6 acre skip. Nine (9) of the 15 active red tree vole trees located in the young habitat within this red tree vole site would be considered non-high priority because they would not receive full site-tree buffers; however, they would be retained and will continue to be managed as a high priority site contiguous with protocol-quality habitat containing another protected site (Figure I-14).

Table I-12: Summary of Non-High Priority Red Tree Vole Site Designation within the Analysis Blocks.

RTV Analysis Block	Analysis Block Name	Sites continued to be Managed as High Priority		Partial Sites Non-High Priority			Non-High Priority Sites	
		# of Sites	# of RTV Nest Trees	# of Sites	# of RTV Nest Trees		# of Sites	# of RTV Nest Trees
					High Priority	Non-High Priority[1]		
1	Duck and Run	1	1	1	0	2[1a]	1	6
2	Little Hoss	3	8	3	51	23[1b]	1	9

[1] Although trees are designated as non-high priority, the following would apply: a) Trees would not be harvested, but full site-tree (180-foot) buffer would not be applied. These two (2) trees would be managed within a high priority site in contiguous protocol-quality habitat. b) Although nine (9) of the 23 trees in young forest habitat would not be harvested, they would not receive a full site-tree buffer. However, the nine (9) would be managed as part of a high priority site contiguous with adjacent protocol-quality habitat in the southeast corner of the block. The remaining 14 trees would be marked and retained where feasible within the harvest unit.

Retention of 88 percent of the protocol-quality habitat in Block 1 and 100 percent of the protocol-quality habitat in Block 2 would protect 60 percent of the active red tree vole nest trees located around units 24-3-5E and 25-04-17A. In addition, another 11 percent of the active red tree vole nest trees would be retained in a skip within the unit boundary contiguous with adjacent protocol-quality habitat, although this may not

provide continued persistence of these nests. By protecting all but 12 acres of protocol-quality habitat, and 71 percent of the red tree vole nest trees located within the project area, in addition to maintaining suitable red tree vole nesting structures and other remnant Douglas-fir trees throughout the units, red tree voles would be expected to remain and persist within each of the Blocks analyzed in this proposal. In addition, based on the past harvest history and current red tree vole presence within these stands, particularly in Block 2, there is evidence of re-establishment by red tree vole post-harvest in these areas. Those stands that remained as sources during the initial harvest would continue to be a source for the population in these treatment areas once habitat conditions reestablish.

Concurrence

We concur with the determination that the above sites are non-high priority sties, in accordance to the Survey and Manage management options described for Category C species (Uncommon Occurrence, Pre-disturbance Surveys Practical) (USFS and BLM, 2001, pp. S&G - 10).

Max Yager, Field Manager
Roseburg District - Swiftwater Field Office, BLM

JULY 1st, 2016
Date

SEE ATTACHED
Bill O'Sullivan, Field Manager
Eugene District - Upper Willamette Field Office, BLM

JULY 7th, 2016
Date

SEE ATTACHED
Alice Carlton, Forest Supervisor
Umpqua National Forest, USFS

JULY 1st, 2016
Date

SEE ATTACHED
Jim Thrailkill, Field Supervisor
Roseburg Field Office, USFWS

JULY 7th, 2016
Date

USDA United States Department of Agriculture & Interior | Forest Service | Umpqua National Forest

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File Code: 2670

Date: July 01, 2016

Max Yager
Field Manager
Swiftwater Field Office
Roseburg District, BLM
777 NW Garden Valley Blvd.
Roseburg, OR 97471

Dear Max,

The Umpqua National Forest has reviewed the BLM, Roseburg District's proposal to designate known red tree vole sites as "non-high priority" (NHP) in the Back in Black Regeneration Harvest Plan Project under the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines.

We concur with the recommendations to designate the above described red tree vole sites as Non-High Priority Sites, in accordance to the Survey and Manage management options described for Category C species (Uncommon Occurrence, Pre-disturbance Surveys Practical) (USFS and BLM, 2001, pp. S&G - 10).

The Forest Wildlife Biologist, Tiffany Young, has reviewed this project and provided comments to Roseburg BLM and the Regional Office (Carol Hughes) during this NHP process. This involvement during the development process gave us confidence in the results and expedited our review.

We appreciate the opportunity to review this proposal and look forward to hearing about the results.

If you have questions, please contact Tiffany Young, Umpqua National Forest at 541-957-3260 or myself.

Sincerely,

for - Alice Carlton
Umpqua Forest Supervisor

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Banwell, Erin <ebanwell@blm.gov>

Concurrence

Papen, Christopher <cpapen@blm.gov> Thu, Jul 7, 2016 at 7:14 AM
To: Max Yager <myager@blm.gov>, Erin Banwell <ebanwell@blm.gov>
Cc: William O'Sullivan <wosulliv@blm.gov>, Brian Bickford <bbickfor@blm.gov>

Mr. Yager

The Eugene District of the Bureau of Land Management has reviewed your June 24, 2016 proposal to designate select red tree vole nests and "sites" as Non-High Priority. This determination is based on, and consistent with: the "2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures, Standards and Guidelines"; and the process for identifying Non-High Priority Sites transmitted in BLM Instruction Memorandum No. OR-2012-036. As required, your analysis adequately demonstrated achievement of the four criteria indicating little or no concern for persistence within the analysis area.

Based on our examination, I concur with your findings.

Sincerely,

William O'Sullivan
Field Manager
Upper Willamette Field Office
BLM Eugene District

Banwell, Erin <ebanwell@blm.gov>

RTV Non-High Priority Site

Thrailkill, Jim <jim_thrailkill@fws.gov> Thu, Jul 7, 2016 at 2:48 PM
To: "Yager, Max" <myager@blm.gov>
Cc: "Center, Scott" <scott_center@fws.gov>, Elizabeth Gayner <egayner@blm.gov>, Erin Banwell <ebanwell@blm.gov>, Rex L McGraw <rmcgraw@blm.gov>, Holly Cotton <hcotton@blm.gov>, "Young, Tiffany A -FS" <tayoung@fs.fed.us>

Hi Max,

The U.S Fish and Wildlife Service's (Service) Roseburg Field Office has reviewed your proposal to designate non-high priority sites for red tree voles (*Aborimus longicaudus*) associated with the Roseburg District BLM's Back in Black Regeneration Harvest Plan. Based on the information and the analytical process provided, the Service concurs with the District's findings to designate two sites and a portion of fours sites within and adjacent to two harvest units as non-high priority sites for red tree voles.

Thanks,

Jim Thrailkill

Jim Thrailkill
Field Supervisor
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Figure I-1: Proposed Timber Harvest Units and their survey Status in the Back in Black Harvest Plan.

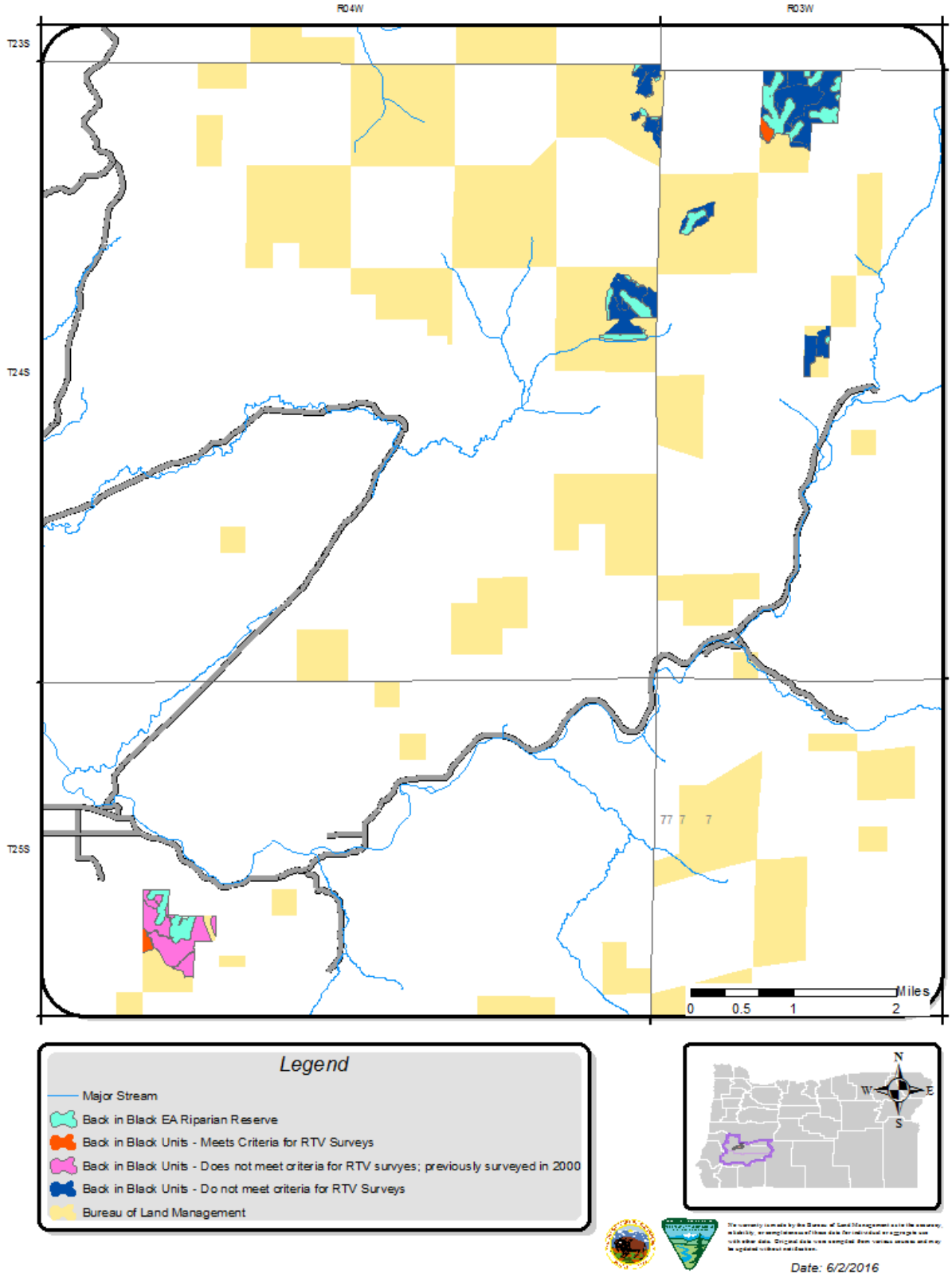

Figure I-2: Historic Active Red Tree Vole Nest Tree Locations Resulting from the 2000 Survey Efforts in Harvest Unit 24-05-17A.

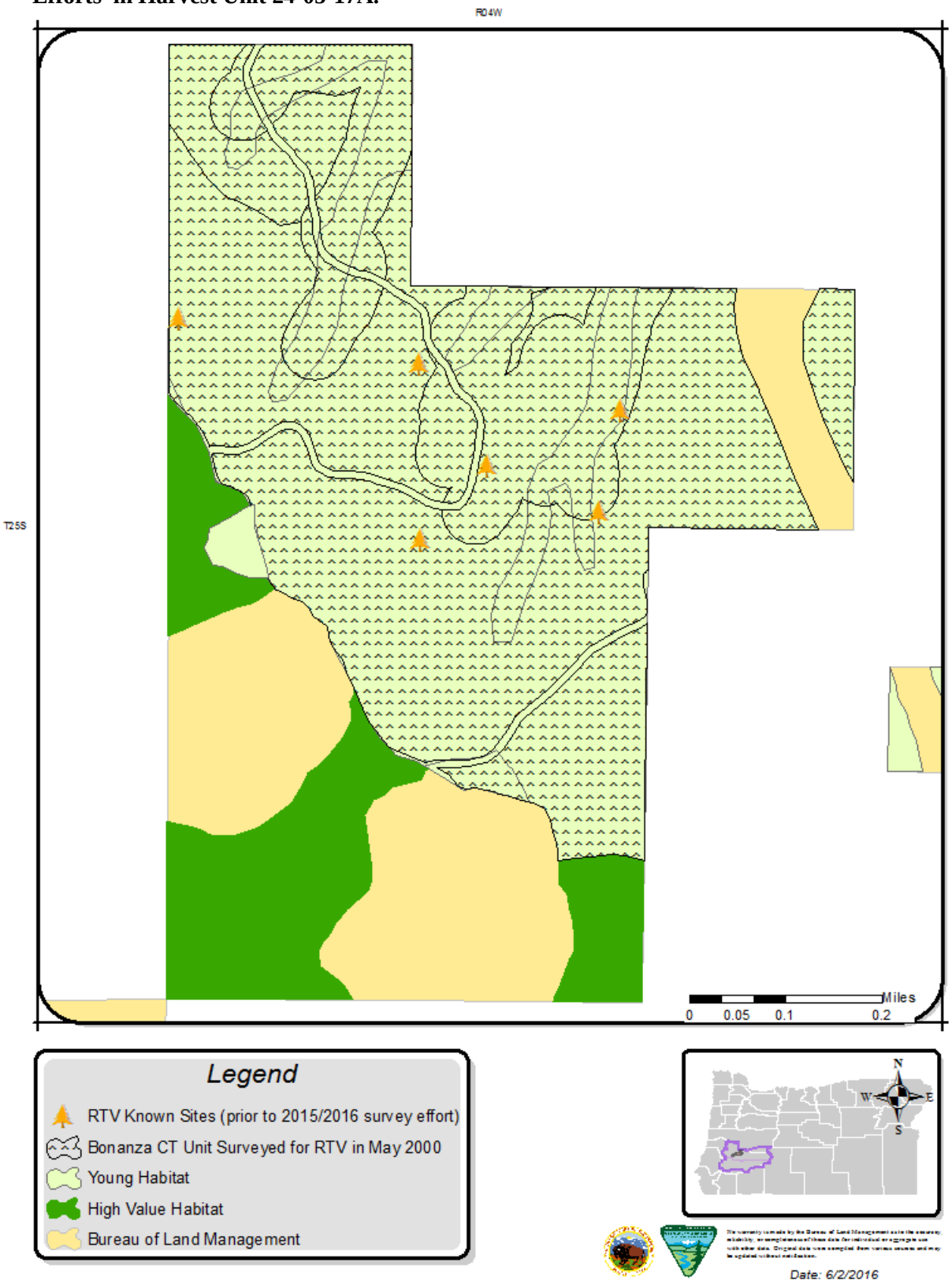

Figure I-3: Location of the Back in Black Harvest Plan Red Tree Vole Analysis Area, Analysis Blocks, and Survey Units.

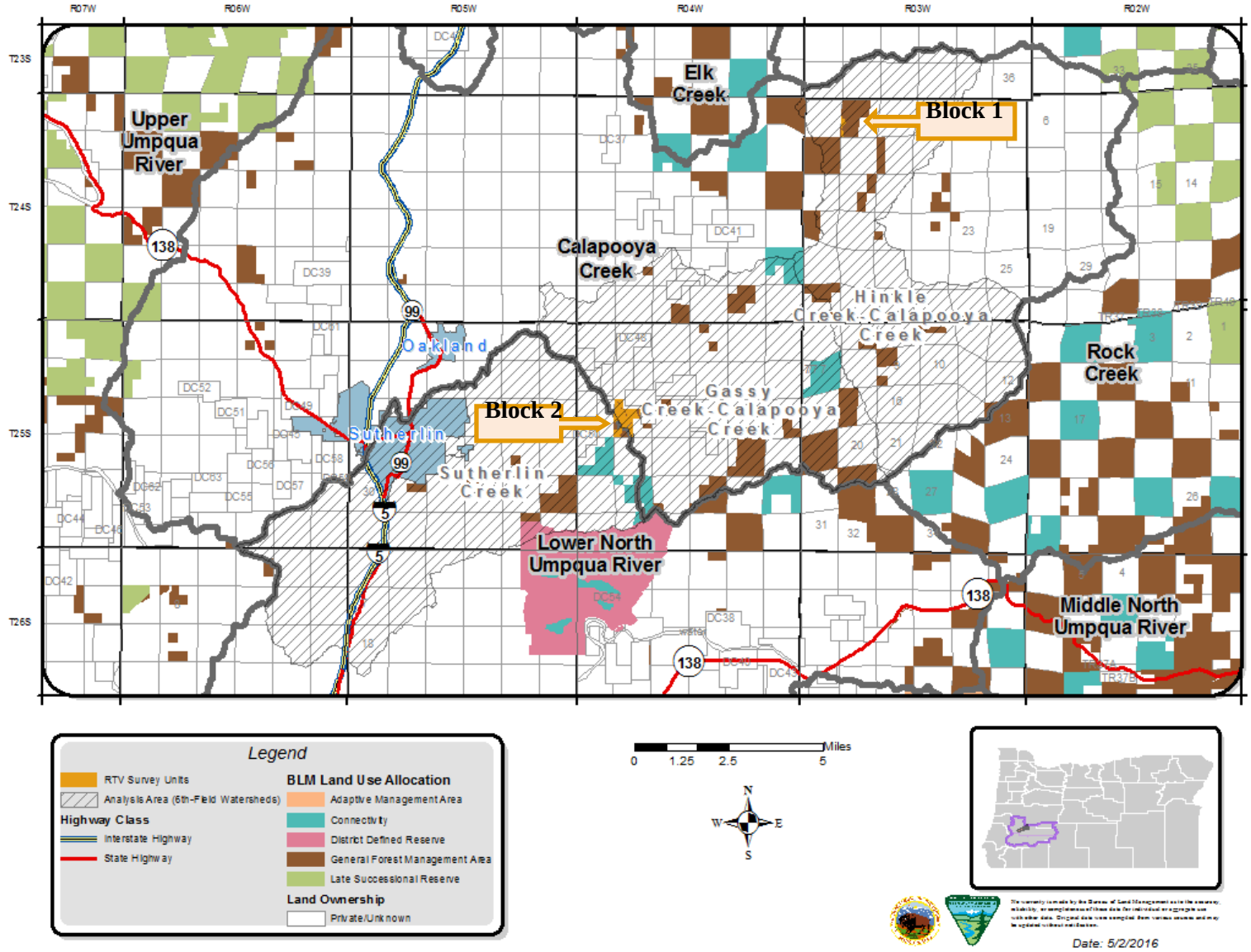

Figure I-4: Red Tree Vole Survey Area and Survey Results in Analysis Block 1 *(Duck and Run)*.

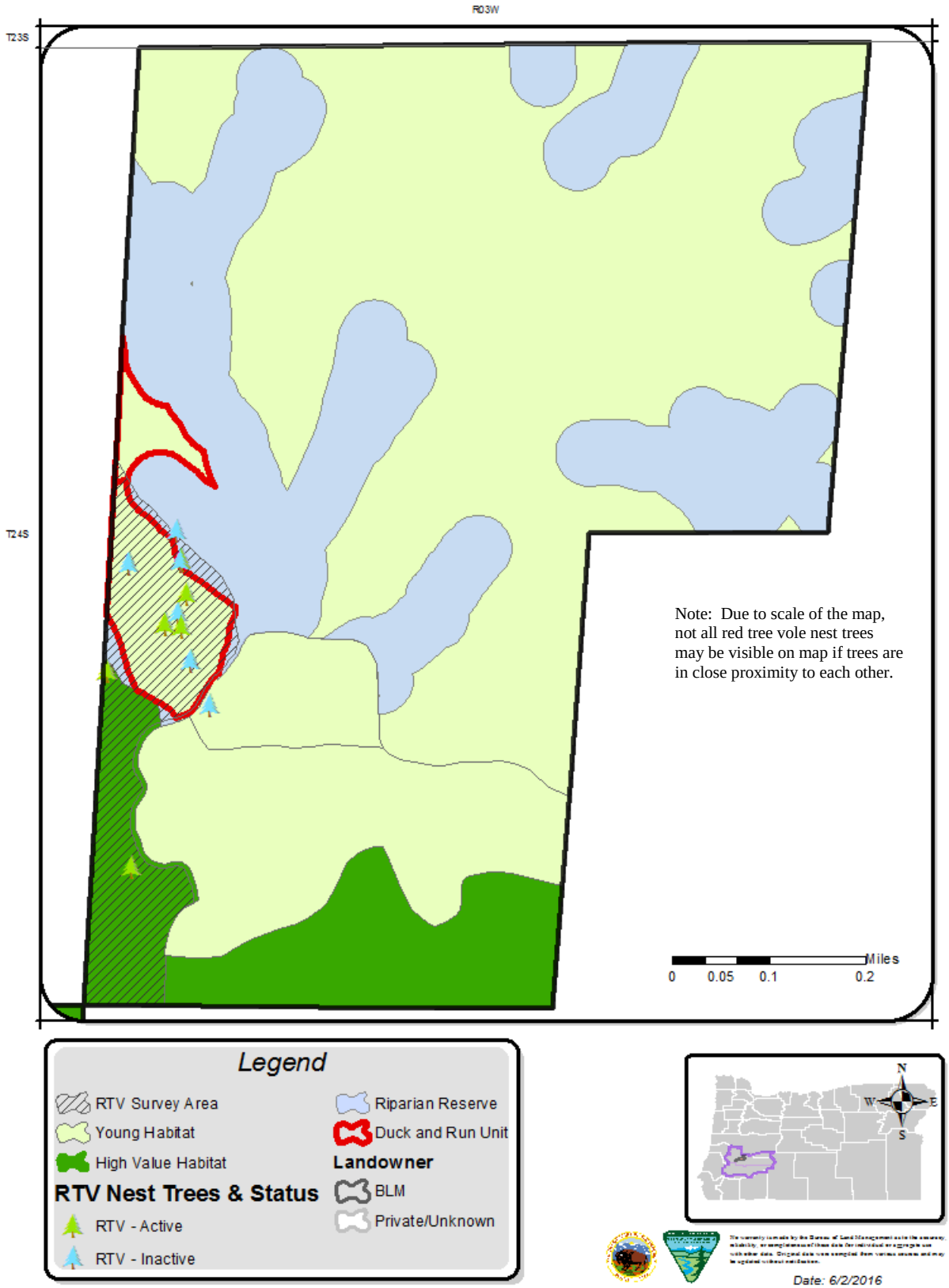

Figure I-5: Red Tree Vole Survey Area and Survey Results in Analysis Block 2 *(Little Hoss)*.

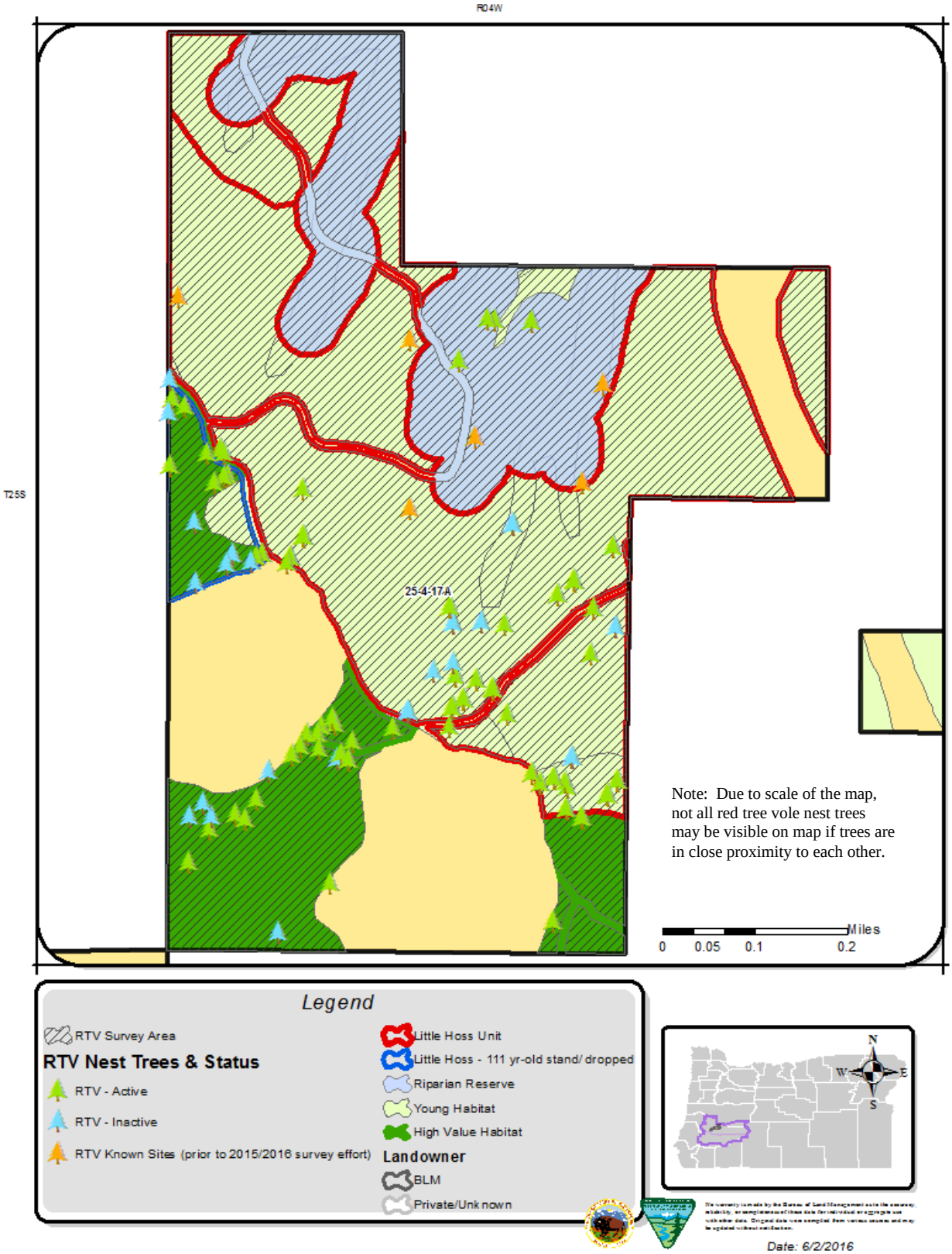

Figure I-6: Timber Harvest Units and Red tree vole sites in Analysis Block 1.

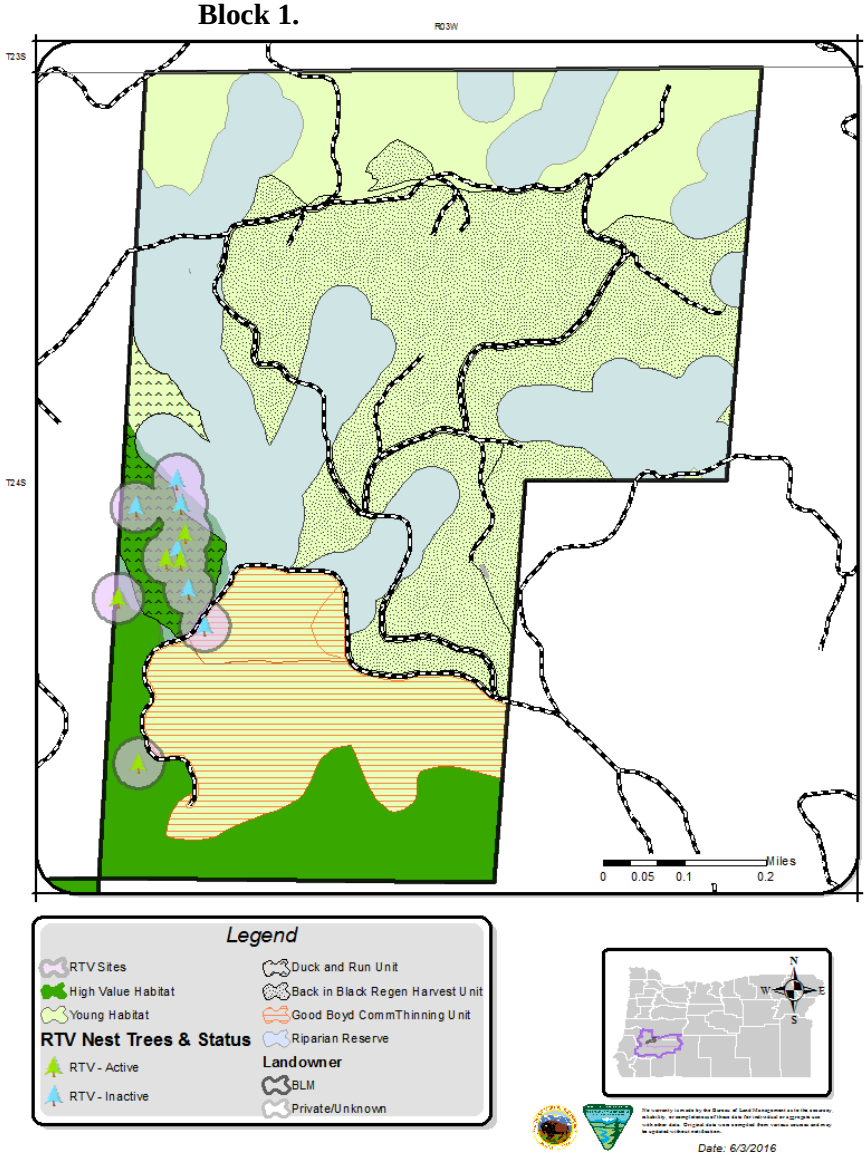

Figure I-7: and Red Tree Vole Habitat Area in Analysis Block 1.

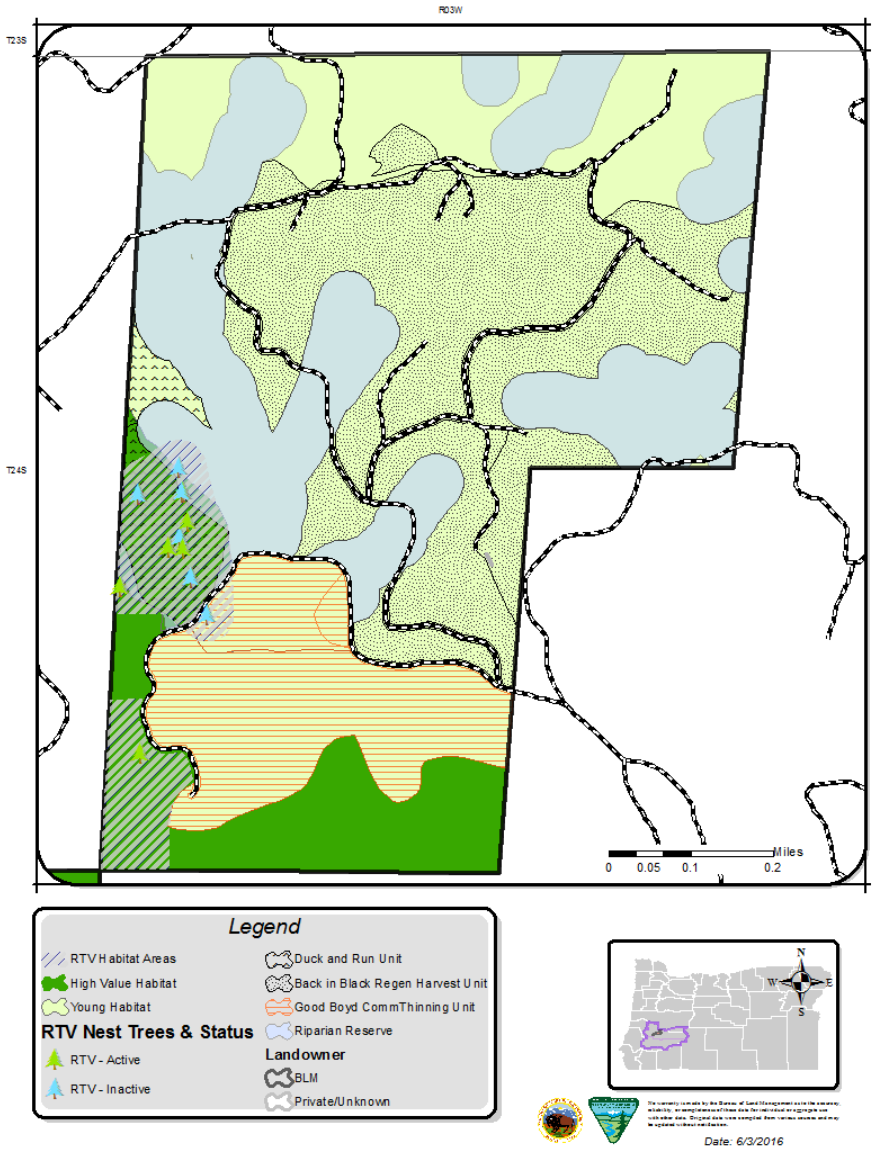

Figure I-8: Red tree vole sites in Analysis Block 2.

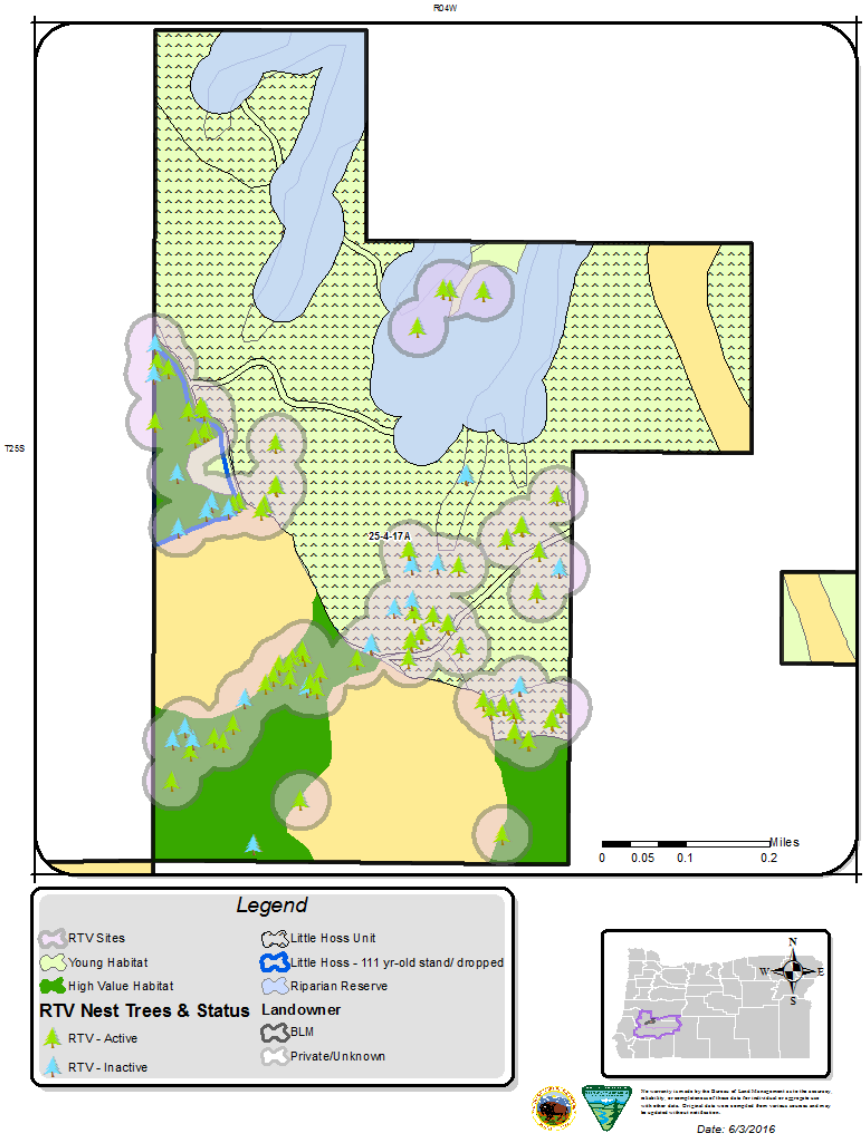

Figure I-9: Timber Harvest Unit and Red Tree Vole Habitat Area in Analysis Block 2.

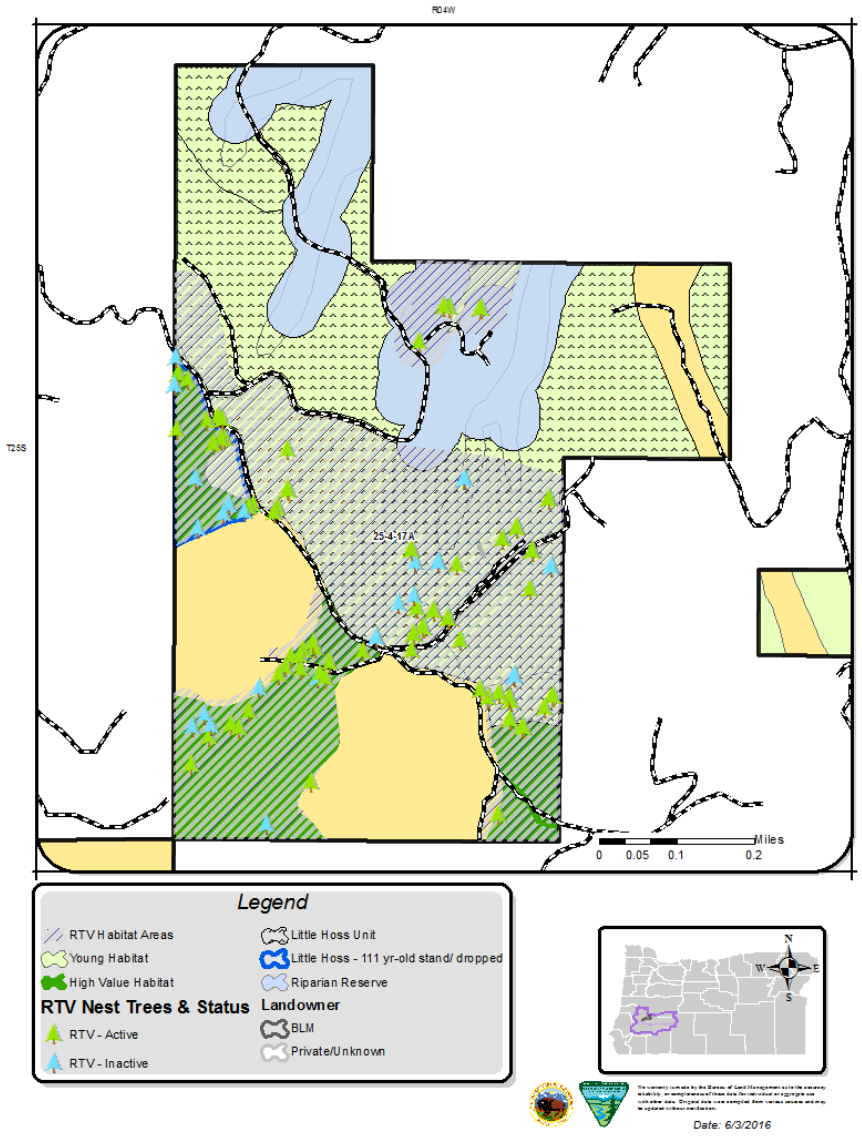

Figure I-10: Red Tree Vole Habitat and Sites (or observations) on BLM lands in the Back in Black Harvest Plan Red Tree Vole Analysis Area.

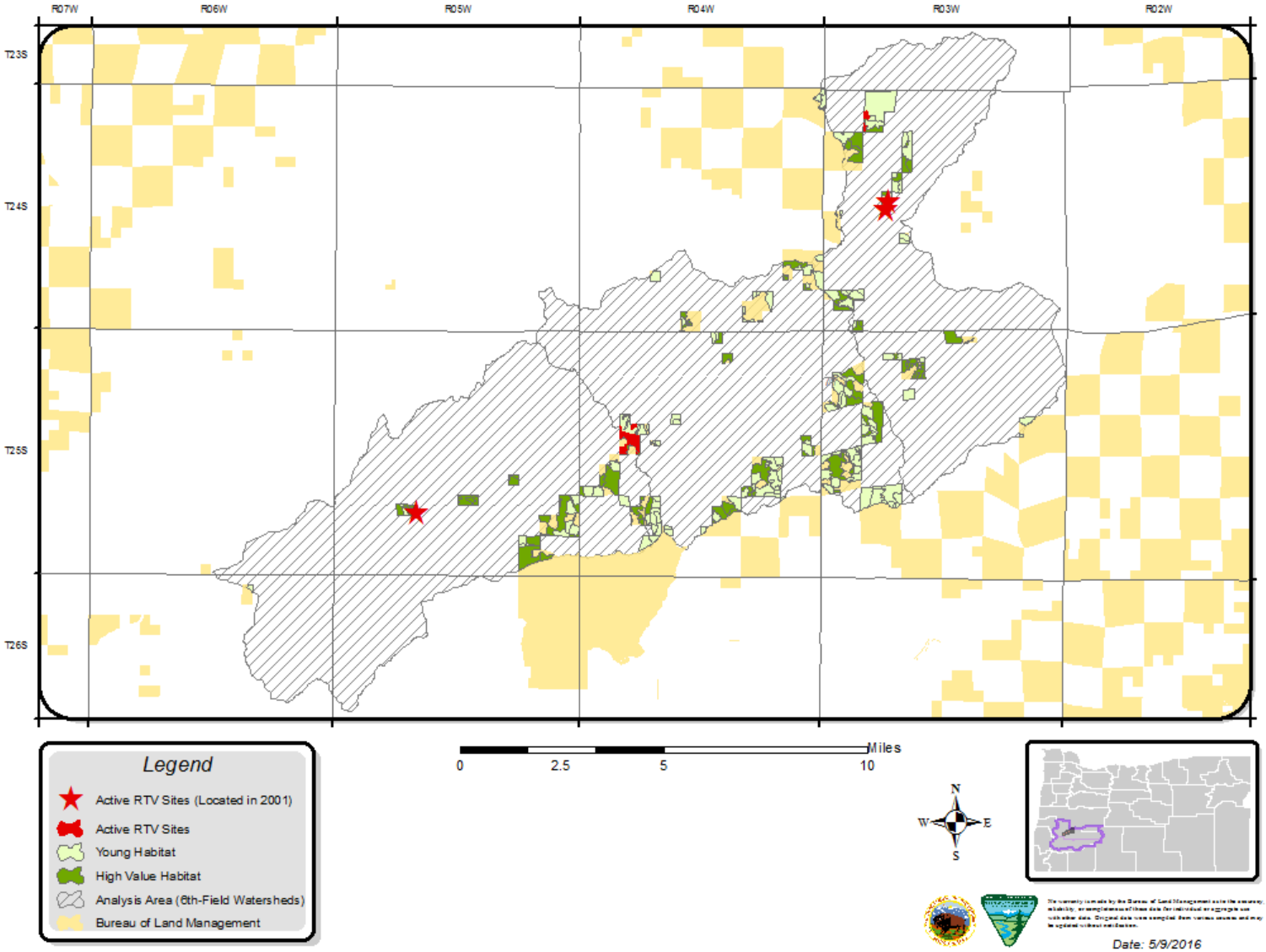

Figure I-11: High-quality Red Tree Vole habitat in, and adjacent to, the Back in Black Harvest Plan Red Tree Vole Analysis Area.

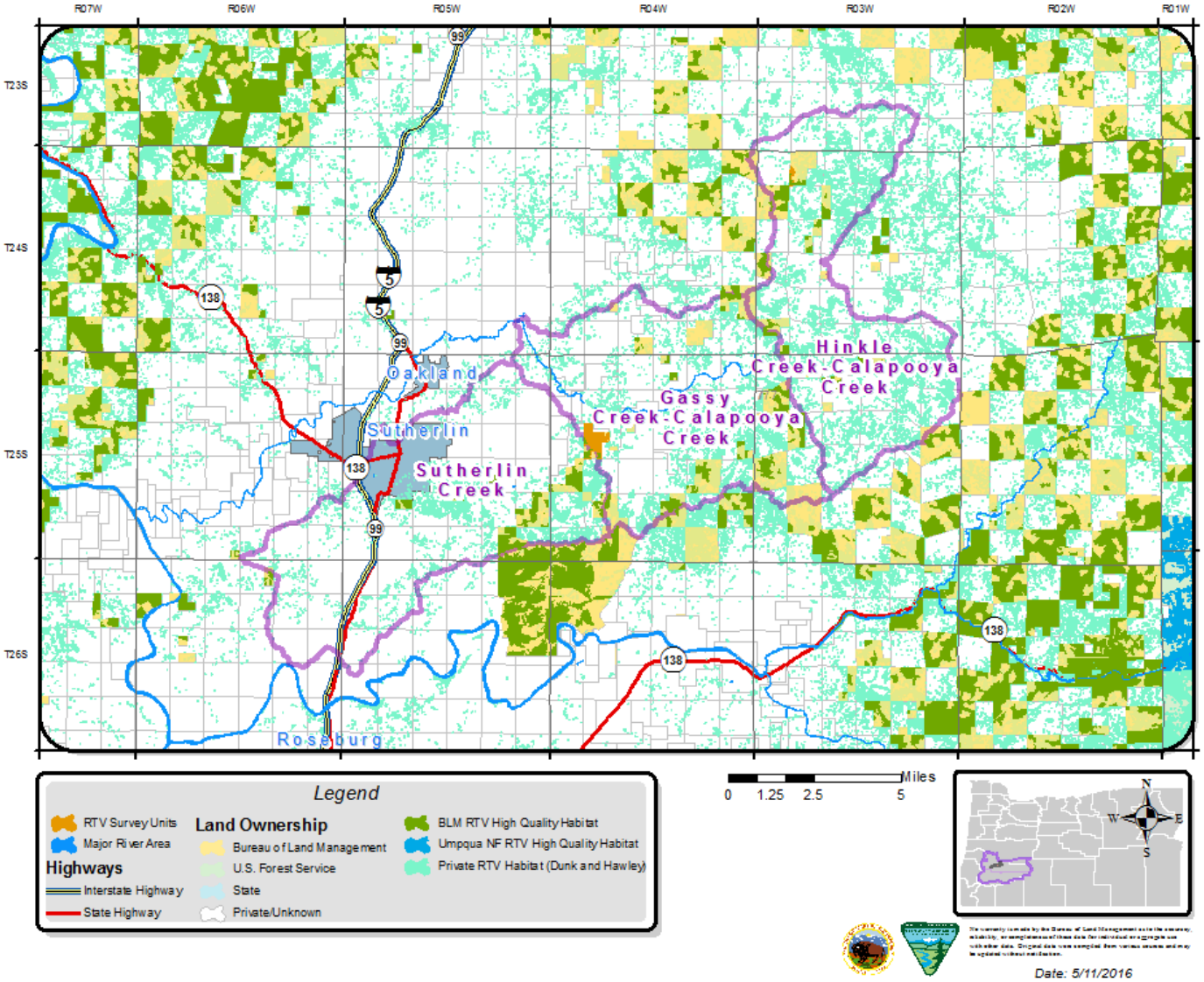

Figure I-12. Allocated reserves, including KOACs and Riparian Reserves that will be Managed to Maintain and/or Develop Late-Successional Forest Habitat.

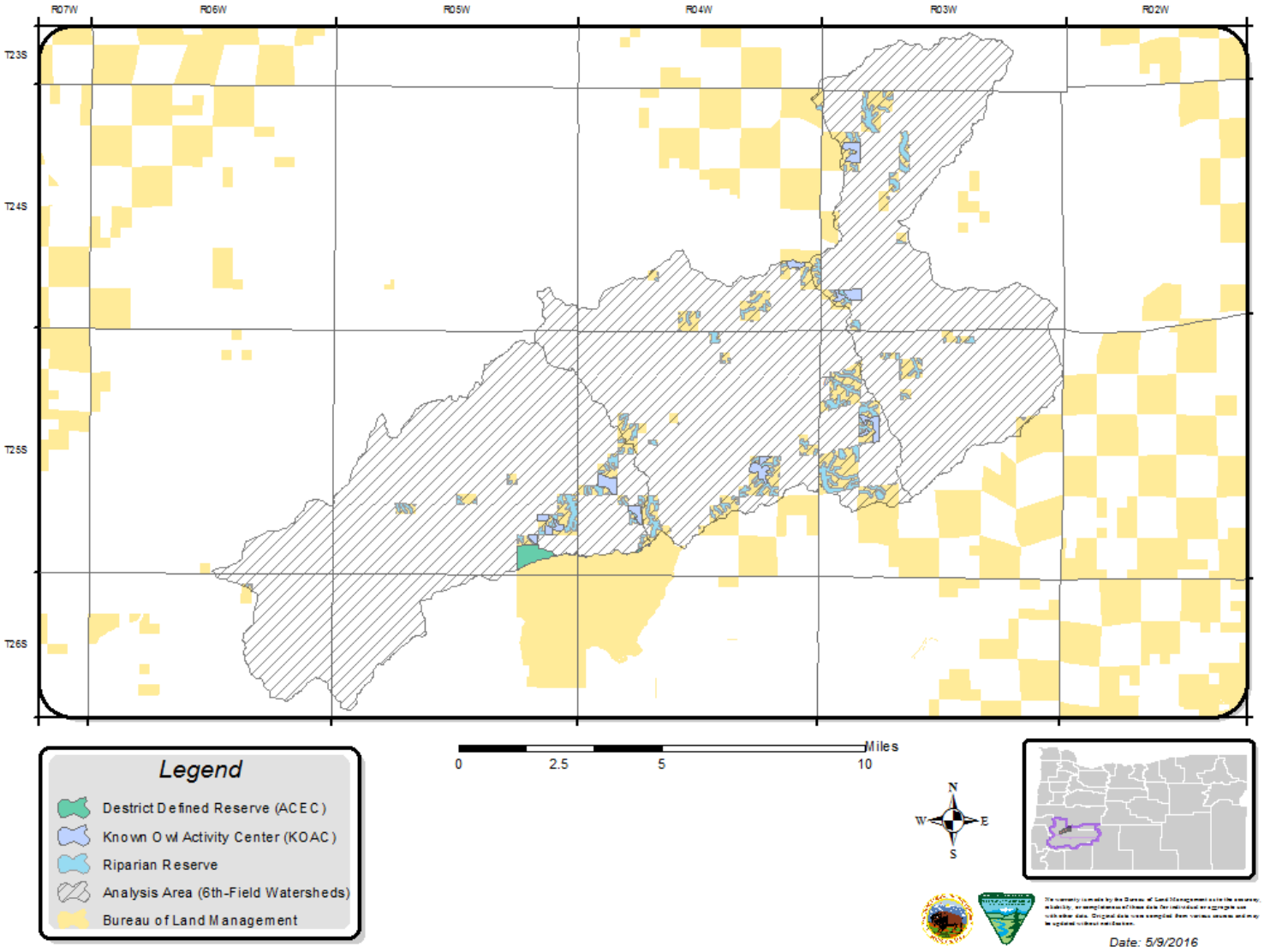

Figure I-13. Red Tree Vole Site Designation in Block 1 within the Back in Black Harvest Plan Red Tree Vole Analysis Area.

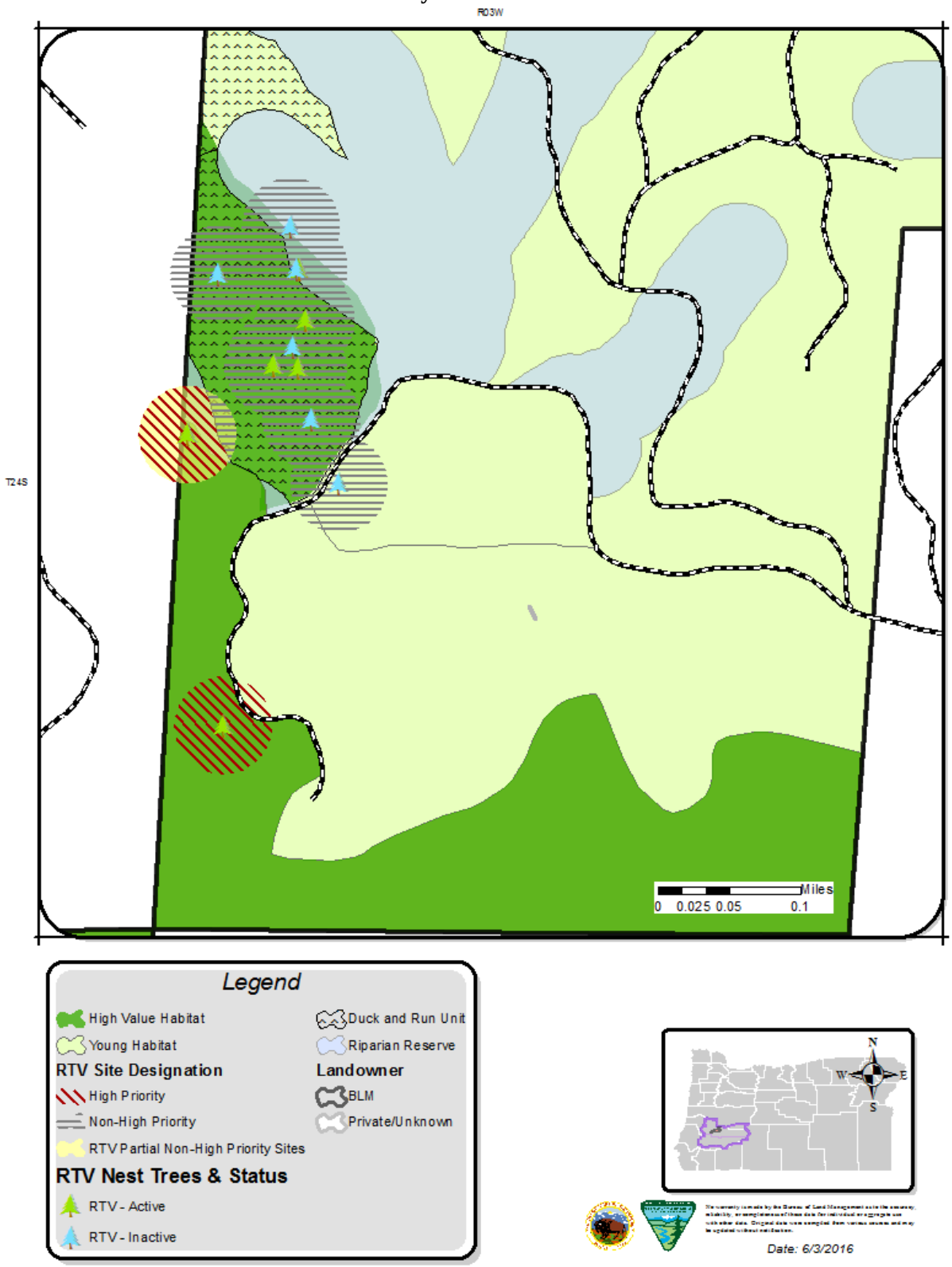
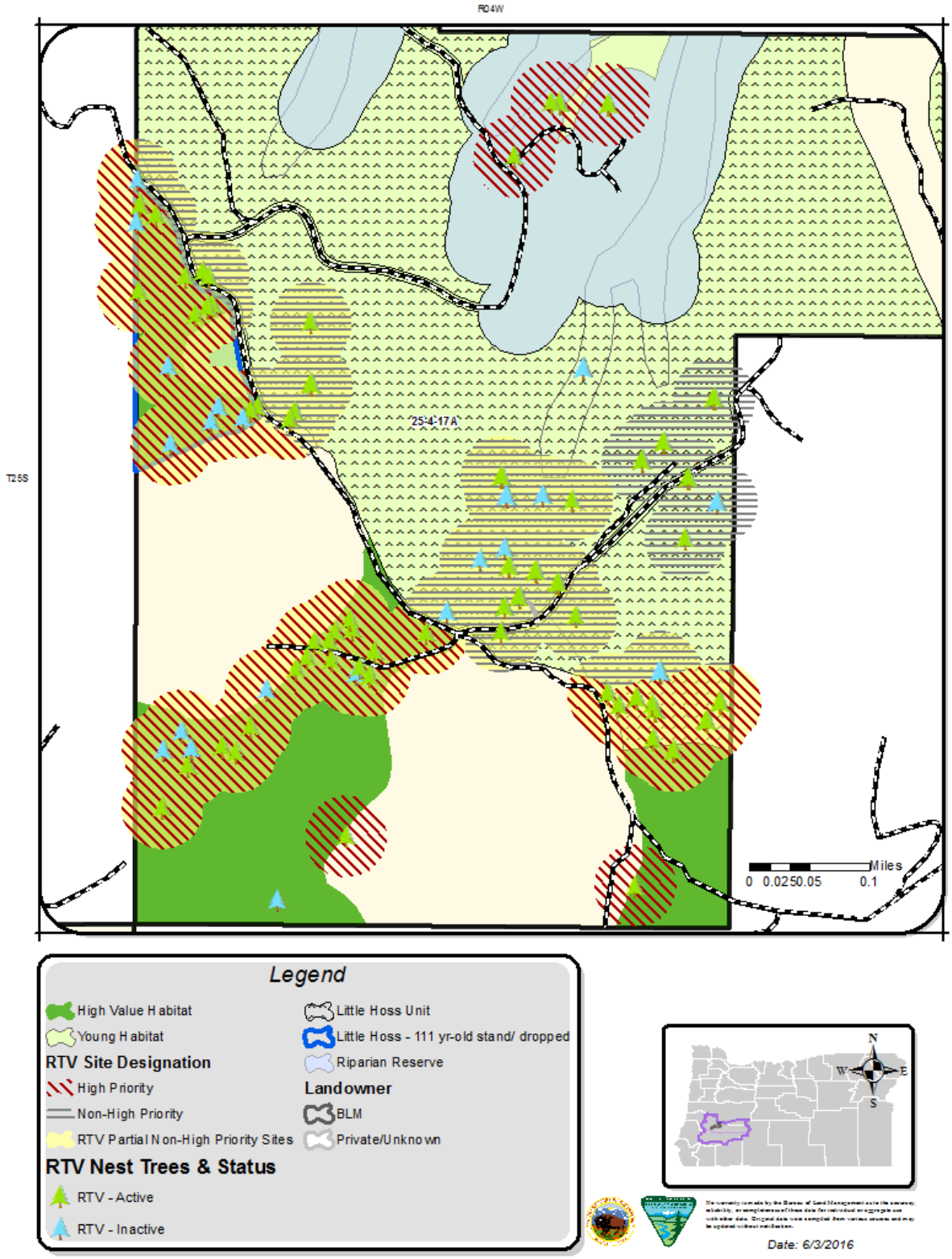
Figure I-14. Red Tree Vole Site Designation in Block 2 within the Back in Black Harvest Plan Red Tree Vole Analysis Area.