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Power Mill Thinning

Environmental Assessment and
Finding of No Significant Impact

EA # DOI-BLM-OR-S040-2010-0007-EA

April 2012

United States Department of the Interior
Bureau of Land Management, Oregon State Office
Salem District, Cascades Resource Area
Marion County, Oregon

T. 8 S., R. 3 E. section 29;
T. 9 S., R. 2 E. sections 11, 13, and 25;
T. 9 S., R. 3 E. sections 17, 19, and 21; W.M.

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BLM
Salem District

As the Nation's principal conservation agency, the Department of Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering economic use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

BLM/OR/WA/AE-11/019+1792

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FINDING OF NO SIGNIFICANT IMPACT

The Bureau of Land Management (BLM) has conducted an environmental analysis for a proposal to thin approximately 615 acres of 45-78 year old forest stands. The project is located on BLM lands in T. 8 S., R. 3 E. section 29, T. 9 S., R.2 E. sections 11, 13, 25, T. 9 S., R. 3 E. sections 17, 19, and 21; W.M. in Marion County, Oregon. The Power Mill Thinning Environmental Assessment (EA) (# DOI-BLM-OR-S040-2010-0007-EA) documents the environmental analysis of the proposed commercial thinning activity. The EA is attached to and is incorporated by reference in this Finding of No Significant Impact (FONSI) determination. The EA and FONSI will be made available for public review from April 11, 2012 through May 11, 2012 (EA section 5.3).

The analysis in this EA is site-specific and supplements analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (RMP/FEIS). The proposed thinning activities have been designed to conform to the *Salem District Record of Decision and Resource Management Plan*, May 1995 (RMP) and related documents, which direct and provide the legal framework for management of BLM lands within the Salem District (EA Section 1.3). Approximately 328 of these acres are in the Matrix land use allocation (LUA), and 287 acres are in the Riparian Reserve LUA as described in the RMP.

Draft Finding of No Significant Impact[1]

Based upon review of the Power Mill Thinning EA and supporting documents, I have determined that the proposed action is not a major federal action; and would not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27. Therefore, supplemental or additional information to the analysis in the RMP/FEIS in the form of a new environmental impact statement is not needed. This finding is based on the following discussion:

Context [40 CFR 1508.27(a)]***:*** Potential effects resulting from the implementation of the proposed action have been analyzed within the context of the project area boundaries, and the following 6th field watersheds: Lower Little North Santiam, Middle Little North Santiam, North Santiam River – Walker Creek, and the North Santiam River – Mad Creek. This project would affect approximately one percent of the 55,450 acre combined 6th field watersheds listed above.

Intensity refers to severity of impact [40 CFR 1508.27(b)]. The following text shows how that the proposed project would not have significant impacts with regard to ten considerations for evaluating intensity, as described in 40 CFR 1508.27(b).

1. *[40 CFR 1508.27(b) (1)]* – **Impacts that may be both beneficial and adverse:** The effects of commercial thinning are unlikely to have significant (beneficial and adverse) impacts (EA section 3.0) for the following reasons:
   - *Project design features* described in EA section 2.2.3 would reduce the risk of effects to affected resources to be within RMP standards and guidelines and to be within the effects described in the RMP/EIS.

[1] This section of the Power Mill Thinning EA is the Draft Finding of No Significant Impact (FONSI). The Cascades Field Manager will finalize the FONSI in the Decision Rationale document after the public comment period.

- *Vegetation and Forest Stand Characteristics (EA section 3.2.1)*: Effects to this resource are not significant because: 1/ the proposed action would retain a forested environment with at least 40 percent canopy cover (see wildlife); 2/ the proposed action would not adversely affect BLM Special Status or Survey & Manage Species because no suitable habitat for any species known or likely to occur would be lost or altered to a degree that may impact these species. Therefore, the project would not contribute to the need to list a species as Threatened or Endangered; and 3/ Noxious Weeds – Increases in the number of invasive/non-native plants are not expected with the application of Project Design Features. (*EA section 2.2.3*), and native species would naturally revegetate after thinning activities reducing the suitable habitat for invasive species.
- *Hydrology; Fisheries and Aquatic Habitat; and Soils (EA sections 3.2.2-3.2.4):* Effects to this resource are not significant because: 1/ Road construction would occur on gentle slopes with stable, vegetated surfaces; 2/ Stream protection zones (85 to 100 feet on perennial streams, 30 to 50 feet on intermittent streams) would maintain current stream temperatures by retaining the current vegetation in the primary shade zone and most of the current levels of shading in the secondary shade zone. Stream protection zones (SPZ) are also expected to prevent sediment as a result of overland flow or surface erosion in logging units from reaching streams during storms of less than a 10 year return interval; 3/ Timber haul and road maintenance project design features would prevent turbidity increases at stream/road junctions from exceeding Oregon Department of Environmental Quality (ODEQ) requirements; and 4/ The proposed action would meet ODEQ water quality standards.
- *Soils (EA section 3.2.4):* Effects to this resource are not significant because no measurable reduction in overall growth and yield in the thinning area would be expected because analysis and decades of BLM experience with similar projects demonstrate that soil compaction and road construction would cause little difference in the average tree spacing, site utilization or overall stand stocking.
- *Wildlife (EA section 3.2.5):* Effects to this resource are not significant because: 1/ Stands proposed for thinning are not presently functioning as late-successional or old growth habitat; 2/ Existing snags, remnant old growth trees and coarse woody debris (CWD) would be reserved. The small number (≤ 10 percent) of large (≥ 15 inches diameter and ≥ 15 feet tall) snags expected to be felled for safety or knocked over by falling and yarding operations would be retained as CWD; 3/ No suitable habitat for BLM Special Status Species known or likely to be present would be lost. Therefore, the project would not contribute to the need to list any BLM Special Status species; 4/ Thinning would not significantly change species richness (a combination of species diversity and abundance) of the Migratory and Resident Bird community. No species would be extirpated in stands as a result of thinning; and 5/ See # 9, for effects to northern spotted owl.
- *Air Quality and Fire Hazard/Risk (EA sections 2.2.2, 2.2.3, 3.2.6):* Effects to this resource are not significant because the proposed project would comply with State of Oregon Air Quality Standards by strict adherence to smoke management regulations. For example, pile burning would take place when wind and air movement patterns would dissipate smoke within one day, reducing the effect of smoke on air quality. Overall, the risk of a fire starting because of the proposed project is expected to be low and the ability to suppress any fire that does start is good.

Potential for human caused ignition would be reduced by treating the fuels most likely to be ignited by human activities, especially fine fuels adjacent to roads that are open to public access. Within one year fire risk would diminish as the highly flammable "red needles" drop and ground cover/understory vegetation "greens up".

- *Carbon Storage, Carbon Emissions and Climate Change (EA section 3.2.7):* Effects to this resource are not significant because the incremental increase in carbon emissions as greenhouse gasses that could be attributable to the proposed action is of such small magnitude that it is unlikely to be detectable at global, continental or regional scales or to affect the results of any models now being used to predict climate change.
- *Recreation, Visual Resources, and Rural Interface (EA section 3.2.8):* Effects to this resource are not significant because changes to the landscape character would be low and would comply with Visual Resource Management guidelines because the project area would maintain a forested setting. Some disturbance to vegetation would be observable after thinning activities and would be expected to develop an undisturbed appearance within five years. The proposed project's effects on recreation are not significant access to BLM lands would remain unchanged from current conditions after operations are completed. Residents within rural interface areas were notified of thinning operations and these areas have historically experienced private timber management operations, thus no effect to this resource.

2. *[40 CFR 1508.27(b) (2)]* - **The degree to which the proposed action affects public health or safety:** The proposed project would not adversely affect public health or safety because the public would be restricted from the project area during operations and the project would not create hazards lasting beyond project operations (Table 17, EA section 3.2.10).

3. *[40 CFR 1508.27(b) (3)]* - **Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas:** The proposed project would not affect historical or cultural resources because all known cultural resources that require protection are outside of the unit boundaries and would not be affected by operations. Any cultural resources discovered in the future would be protected as determined by the BLM Archaeologist. The Proposed project would not affect parklands, prime farmlands, wild and scenic rivers, wilderness, or ecologically critical areas because these resources are not located within the project area (EA Section 3.2.9).

4. *[40 CFR 1508.27(b) (4)]* - **The degree to which the effects on the quality of the human environment are likely to be highly controversial:** The proposed project is not unique or unusual. The BLM has experience implementing similar actions in similar areas without highly controversial effects.

5. *[40 CFR 1508.27(b) (5)]* - **The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks:** The BLM has experience implementing similar actions in similar locations and has designed the project, including project design features, to avoid highly uncertain, unique and unknown risks (EA section 2.2.3). See # 4, above.

6. *[40 CFR 1508.27(b) (6)]* - **The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration:** The proposed action would not establish a precedent for future actions nor would it represent a decision in principle about a further consideration for the following reasons: 1/ The project is in the scope of proposed activities document in the RMP EIS; and 2/ the BLM has experience implementing similar actions in similar areas without setting a precedent for future actions or representing a decision about a further consideration. See # 4, 5, above.

7. *[40 CFR 1508.27(b) (7)]* - **Whether the action is related to other actions with individually insignificant but cumulatively significant impacts:** The Interdisciplinary Team (IDT) evaluated the project area in context of past, present and reasonably foreseeable actions and determined that the proposed action would be expected to temporarily increase stream turbidity as a result of culvert replacement, road renovation, road maintenance, road use and log fill removal (EA Sections 3.2.2 -3.2.4). These effects are not expected to be significant because any turbidity increase resulting from thinning would be too small to be discernible relative to background turbidity, would not exceed ODEQ water quality standards, would dissipate within 800 meters downstream, and would decrease quickly over time, returning to current levels within minutes or hours. Cumulatively, the proposed action and connected actions would be unlikely to result in any detectable change for water quality on a sixth or seventh field watershed scale and would be unlikely to have any effect on any designated beneficial uses, including fisheries (EA Section 3.2.3).

8. *[40 CFR 1508.27(b) (8)]* - **The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources:** The project would not affect these resources because cultural resource inventories of the affected area would precede any ground disturbing activities (EA section 3.2.9).

9. *[40 CFR 1508.27(b) (9)]* - **The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act (ESA) of 1973:** The proposed project is not expected to adversely affect ESA listed species or critical habitat for the following reasons:

   - *ESA Wildlife - Northern spotted owl (EA Section 3.2.5):* Effects to the species are not significant because: 1/The project is not located in Late Successional Reserve, Critical Habitat, or stands which meet the criteria for Recovery Action 32 for the northern spotted owl; 2/ The project maintains dispersal habitat in 615 treated acres, and does not affect suitable owl habitat within and between known owl sites; 3/ Habitat conditions are expected to improve as thinned stands mature (>20 years); and 4/ Residual trees would increase in size and be available for recruitment or creation of large diameter (>15 inches) snags, culls and coarse woody debris (CWD) for prey species and nesting opportunities, particularly in Riparian Reserves, sooner than would be expected without treatment. ESA Consultation is described in EA section 5.1.1.

- *ESA Fish – UWR Chinook salmon and UWR steelhead trout (EA Section 3.2.3).* Effects to ESA fish are not significant because thinning is not expected to affect these species both because: 1/ Distance - most of the Project Units are >1 mile upstream of salmon and steelhead habitat; and 2/ Project design features minimize impacts from tree thinning and road renovation and maintenance on stream channels, water quality, and fish habitat as described in the Hydrology; Fisheries and Aquatic Habitat; and Soils section, above. Additionally, new road construction would be located in stable locations and would not contribute to degradation of aquatic habitat. ESA Consultation is described in EA section 5.1.2.

10. *[40 CFR 1508.27(b) (10)]* - **Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment:** The proposed thinning activities have been designed to follow Federal, State, and local laws (EA sections 1.3, 3.2.10)

Approved by: _____ _____
Cindy Enstrom, Cascades Resource Area Field Manager Date

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Approved by: Cindy Enstrom 4/3/2012
Cindy Enstrom, Cascades Resource Area Field Manager Date

1.0 INTRODUCTION

1.1 Proposed Action

The Cascades Resource Area, Salem District Bureau of Land Management (BLM), proposes to thin approximately 615 acres of 45-78 year old forest stands. Connected actions include constructing, decommissioning, improving, renovating, blocking and stabilizing roads; and fuels treatments (EA Sections 2.0 and 3.0).

1.1.1 Project Area Location and Vicinity

The proposed project area is within the Little North Santiam and Middle North Santiam 5th field watersheds, near Mill City in Marion County, Oregon. The Little North Santiam is a Tier 1 key watershed. BLM-administered land is intermixed with privately-owned land (agricultural, industrial timber and residential), creating an assortment of ownership patterns. The project is located within Township 8 South, Range 3 East, section 29; Township 9 south, Range 2 East, sections 11, 13, and 25; Township 9 South, Range 3 East, sections 17, 19, and 21; Willamette Meridian. See EA Sections 7.1.1 - Vicinity Map and7.1.2 – Proposed Action Maps.

1.2 Purpose of and Need for Action

1.2.1 Need for the Action

BLM staff members have analyzed forest inventory data and conducted field examinations to identify specific forest stands in the project area vicinity that need forest management actions to continue meeting land use objectives defined in the *Salem District Record of Decision and Resource Management Plan*, May 1995 (RMP). These stands are overstocked, or will soon grow into an overstocked condition. Overstocked stands have more trees than the sites have water, nutrients and growing space to sustain. If these overstocked stands are not managed growth rates decline, the health and vigor of the trees and other vegetation decline, and the stands begin to "self-thin" as the smaller trees die. This typically results in lower timber productivity and delays development of complex stand structure for habitat.

1.2.2 Purpose (Objectives) of the Project

This project has been designed under the RMP and related documents which direct and provide the legal framework for management of BLM lands within the Salem District (EA Section 1.3). The area proposed for treatment falls within the Matrix and Riparian Reserve Land Use Allocations (LUA) as defined in the RMP (p. 8) and Northwest Forest Plan (NWFP) (pp. A-4, A-5). Objectives for these LUA include:

1. GFMA - **Matrix LUA**: For this project, all Matrix land is within the General Forest Management Area (GFMA), so the terms “Matrix” and “GFMA” may be used interchangeably in this document. Lands within the Matrix LUA are designated for the sustained production of timber. Overstocked stands within this LUA have declining growth rates which results in reduced volume yield and value over the planned timber rotation.

The proposed forest management activities are needed in these stands to reverse these trends so the stands will persist and contribute to future forest production and other goals of the RMP (EA section 1.2.2 and RMP pp. 46-48.

2. Riparian Reserves - **Riparian Reserve LUA**: The Riparian Reserve LUA (RR) includes the stream and the area extending one site-potential tree height (slope distance) from the edges of the stream channel (each side) for non-fish bearing streams and two site-potential tree heights for fish bearing streams. For this project the width of the Riparian Reserve LUA is 240 feet on each side of non-fish bearing streams and 480 feet on each side of fish bearing streams.

   Lands within the Riparian Reserves are designated for restoring and maintaining the ecological health of watersheds and aquatic ecosystems (RMP p. 5), and for providing habitat for terrestrial species (RMP p. 9). The conifer stands identified for treatment in this LUA are overstocked, resulting in simple stand structure and declining growth rates that result in delayed development of large diameter snags and other habitat characteristics associated with late-successional forests.

   The NWFP/ROD (p. C-32) and the RMP (p.11) direct the BLM to apply silvicultural practices in the Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy (ACS) objectives. The RMP (p. D-6) states that merchantable logs may be removed "where such action would not be detrimental to the purposes for which the Riparian Reserves were established". EA section 3.2.10 describes the project's compliance with the Aquatic Conservation Strategy, including the nine ACS objectives.

   The NWFP/ROD (p. B-31) states that "active silvicultural programs will be necessary to restore large conifers in Riparian Reserves".

<u>Project Objectives within the Matrix (GFMA) LUA</u>

1. Manage developing stands on available lands to promote tree survival and growth to: 1/ achieve a balance between wood volume production, quality of wood, and timber value at harvest (RMP p. 46); 2/ increase the proportion of merchantable volume in the stand; 3/ produce larger, more valuable logs; 4/ anticipate mortality of small trees as the stand develops; and to 5/ maintain good crown ratios and stable, wind-firm trees (RMP p. D-2) by applying commercial thinning treatments.

2. Supply a sustainable source of forest commodities from the Matrix/GFMA LUA to provide jobs and contribute to community stability (RMP pp. 1, 46-48). 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 (RMP p. 47) by developing timber sales that can be successfully offered to the market place.

3. Provide for important ecological function such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees to provide habitat for a variety of organisms associated with both late-successional and younger forest (RMP p. 20).

Project Objectives within the Riparian Reserve LUA

4. Maintain water quality standards (RMP p.2) and improve stream conditions by:
   - Maintaining effective shade for streams pursuant to BLM's TMDL agreement with the State of Oregon (EA Section 2.2.3).
   - Designing new roads and using existing roads to avoid increasing the quantity of water and sediment transported to streams (EA Section 2.2.3).
5. Maintain and develop or accelerate development of:
   - Large conifers with deep crowns and large limbs; future source material (large green trees) for coarse woody debris (CWD) meeting RMP standards; future source material (large green trees) for large (>15 inches diameter and 15 feet tall) snag habitat; long-term structural, spatial and tree species diversity; multi-layered stands; and other elements of late-successional forest habitat; and
   - Habitat for Special Status, SEIS special attention and other terrestrial species (RMP p. 9)

   By applying commercial thinning treatments within the Riparian Reserve LUA concurrent with treatments in the adjacent Matrix/GFMA LUA (RMP pp. 9-15, D-6; NWFP p. B-31, C-32).

Project Objectives within Both Matrix and Riparian Reserve LUA

6. Increase habitat diversity for species associated with openings and younger forest characteristics by creating low density thinning patches (RMP p. 20)
7. Protect, manage, and conserve federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act and Bureau Special Status Species policies (RMP p. 28).
8. Maintain and develop a safe, efficient and environmentally sound road system (RMP p. 62) and reduce environmental effects associated with identified existing roads within the project area (RMP p. 11) by:
   - Providing appropriate access for timber harvest, silvicultural practices, and fire protection vehicles needed to meet the objectives above;
   - Performing road work to prevent road deterioration or failure and to prevent road generated sedimentation that exceeds ODEQ standards.
9. Increase protection for the public, facilities and high-value resources from large, intense wildfires in the rural/urban interface (RMP, pp. 39, 43) in accordance with the National Fire Plan's Healthy Forest Initiative and Restoration Act by:
   - Reducing natural and activity fuel hazards on BLM-administered lands in Rural Interface Areas;
   - Protecting resources on BLM-administered land from potential wildfires originating on adjacent private land by reducing fuel hazards; and
   - Limiting potential human sources of wildfire ignition by controlling access and reducing fuel hazards on BLM-administered lands.

1.2.3 Decision to be Made

The Decision Maker will decide whether to implement the proposed project, what additional project design features would be incorporated into the project, and which alternative best meets the purpose of and need for the project.

1.2.4 Decision Factors

In choosing the alternative that best meets the purpose and need, the Cascades Resource Area Field Manager will consider the extent to which each alternative would:

1. Provide timber resources to the market and revenue to the government from the sale of those resources (objectives 1 and 2);
2. Provide for economically efficient short-term and long-term management of public lands in the project area (objectives 2 and 8);
3. Provide for safe, economically efficient and environmentally sound access for logging operations, fire suppression and administration on public lands (objectives 2, 4 and 8;
4. Provide for increased survival and growth of conifer species while retaining structural and habitat components, such as large trees, snags, and coarse woody debris (objectives 1, 2, 3, 5, 6 and 7;
5. Provide habitat for special status, SEIS special attention and other terrestrial species associated with a variety of seral stages and forest stand characteristics in the vicinity of the project area (objectives 3, 5, 6 and 7);
6. Provide for aquatic habitat and water quality/quantity by designing new roads and using all roads to avoid increasing the quantity of water and sediment delivered to streams (objectives 4 and 8);
7. Minimize the potential for human sources of wildfire ignition and prevent large scale, intense wildfires in the project area (objectives 8 and 9).

1.3 Conformance with Land Use Plan, Statutes, Regulations, and other Plans

The BLM revised their resource management (land use) plans in 2008. On July 16, 2009, the Secretary of the Interior withdrew the 2008 *Records of Decision for the Revision of Resource Management Plans of the Western Oregon Bureau of Land Management* (2008 RODs/RMPs); and directed the BLM to implement actions in conformance with the resource management plans for western Oregon that were in place prior to December 30, 2008. For the Salem District, the plan in place prior to December 30, 2008 is the 1995 *Salem District Record of Decision and Resource Management Plan* (1995 ROD/RMP), which provides the specific direction for implementing the Northwest Forest Plan (NWFP).

On March 31, 2011, the United States District Court for the District of Columbia vacated and remanded the Secretary of the Interior's decision to withdraw the 2008 RODs/RMPs (Douglas Timber Operators et al. v. Salazar) effectively returning the districts to the 2008 RODs/RMPs. Plaintiffs in the Pacific Rivers Council V. Shepard litigation filed a partial motion for summary judgment in the U.S. District Court for the District of Oregon on Endangered Species Act (ESA) claims and requested the court to vacate and remand the 2008 RODs/RMPs.

A magistrate judge issued findings and recommendations on September 29, 2011 and recommended granting the Plaintiffs' motion for partial summary judgment on their ESA claim. The Court recommends setting aside the agency action, vacating the 2008 RODs and reinstating the Northwest Forest Plan as the appropriate remedy. The Northwest Forest Plan was incorporated into the 1995 RODs/RMPs. The Court will review and rule on any objections prior to issuing a final order.

Given the current uncertainty surrounding planning in western Oregon, the Salem District has designed projects to be consistent with the goals and objectives the 1995 ROD/RMP and the 2008 ROD/RMP. The 1995 ROD/RMP is hereafter referred to in this EA as the RMP.

Additional documents that direct and provide the legal framework for management of BLM lands within the Salem District and for this project include the:

- *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl, April 1994 (the Northwest Forest Plan, or NWFP);*
- *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, January 2001, as amended by the Settlement Agreement (July, 2011).

The analysis in the Power Mill Thinning EA is site-specific, and supplements analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (RMP/FEIS) and the *Final Environmental Impact Statement for the Revision of Resource Management Plans of the Western Oregon Bureau of Land Management*, October 2008 (2008 RMP/FEIS). The RMP/FEIS includes the analysis from the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl*, February 1994 (NWFP/FSEIS). The RMP/FEIS is amended by the *Final Supplemental Environmental Impact Statement for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, November 2000.

Information from the Little North Santiam Watershed Analysis,1997 and the North Santiam Watershed Analysis,2002 has been incorporated into the development of the proposed thinning activities and into the description of the affected environment and environmental effects (*EA section 3.0*). The Little North Santiam and the North Santiam portions of these two watershed analyses include all of the proposed thinning areas analyzed for this project.

The above documents are available for review in the Salem District Office. Additional information about the proposed activities is available in the Power Mill Thinning EA analysis file, available for review at the Salem District Office.

Survey and Manage Review:

On December 17, 2009, the U.S. District Court for the Western District of Washington issued an order in *Conservation Northwest, et al. v. Rey, et al.*, No. 08-1067 (W.D. Wash.) (Coughenour, J.), granting Plaintiffs' motion for partial summary judgment and finding a variety of NEPA violations in the *Final Supplemental to the 2004 Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* (USDA and USDI, June 2007).

In response, parties entered into settlement negotiations in April 2010, and the Court filed approval of the resulting Settlement Agreement on July 6, 2011. Projects that are within the range of the northern spotted owl are subject to the survey and management standards and guidelines in the 2001 ROD, as modified by the 2011 Settlement Agreement (IM-OR-2011-063, July 2011).

Previously in 2006, the District Court (Judge Pechman) had invalidated the agencies' 2004 RODs eliminating Survey and Manage due to NEPA violations. On October 10, 2006, following the District Court's 2006 ruling, parties to the litigation entered into a stipulation exempting certain activities from the Survey and Manage standard (Pechman exemptions), including thinning projects in stands less than 80 years old (Exemption A). As part of the 2011 Settlement Agreement, the 2006 Pechman Exemptions remain in force.

The Power Mill Thinning Project conforms to the Salem District Resource Management Plan/Forest Land and Resource Management Plan as amended by 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* (2001 ROD), as modified by the 2011 Settlement Agreement.

1.3.1 Relevant Statutes/Authorities

This section is a summary of the relevant statutes/authorities that apply to this project.

- Archaeological Resources Protection Act (ARPA) 1979 – Protects archeological resources and sites on federally-administered lands.
- Clean Air Act (CAA) 1990 – Provides the principal framework for national, state, and local efforts to protect air quality.
- Clean Water Act (CWA) 1987 – Establishes objectives to restore and maintain the chemical, physical, and biological integrity of the nation's water.
- Endangered Species Act (ESA) 1973 – Directs Federal agencies to ensure their actions do not jeopardize threatened and endangered species.
- Federal Land Policy and Management Act (FLPMA) 1976 – Defines BLM's organization and provides the basic policy guidance for BLM's management of public lands.
- Healthy Forests Initiative (HFI) 2002 - Focuses on reducing the risk of catastrophic fire by thinning dense undergrowth and brush in priority locations that are identified on a collaborative basis with selected Federal, state, tribal, and local officials and communities.
- Migratory Bird Treaty Act of 1918 - Establishment of a Federal prohibition, unless permitted by regulations, to take any migratory bird included in the terms of this Convention (16 U.S.C. 703).

- National Environmental Policy Act (NEPA) 1969 – Requires the preparation of EAs or EISs on federal actions. These documents describe the environmental effects of these actions and determine whether the actions have a significant effect on the human environment.
- Oregon and California Act (O&C) 1937 – Requires the BLM to manage O&C lands for permanent forest production in accordance with sustained-yield principles. Management of O&C lands must also protect watersheds, regulate streamflow, provide for recreational facilities, and contribute to the economic stability of local communities and industries.

Additional authorities and management direction are described in EA section 3.2.10, Table 17.

1.4 Scoping and Identification of Relevant Issues

1.4.1 Scoping

The Interdisciplinary Team (IDT) of BLM resource specialists conducted internal scoping through the project planning process which includes record searches, on-site field examinations of the project area by IDT members, professional observation and judgment, literature review and IDT discussion. In the project planning process the IDT considered elements of the environment that are particular to this project as well as elements of the environment that are common to all similar timber management projects.

The BLM conducted external scoping for this project by means of a scoping letter sent out to approximately 76 federal, state and municipal government agencies, nearby landowners, tribal authorities, and interested parties on the Cascades Resource Area mailing list on April 13, 2010. The BLM received approximately eight comment letters/emails during the scoping period. The scoping and EA comment letters/emails/postcards are available for review at the Salem District BLM Office.

1.4.2 Relevant Issues

The IDT identified relevant issues based on applicable law, management direction contained in the RMP, and information gathered during the scoping and project planning process. Issues are considered to be relevant if they determine the appropriate range of alternatives to analyze, determine whether the proposed action should be modified, and determine the significance of the project's effects on elements of the environment. Analysis of these issues provides a basis for comparing the environmental effects of action alternative(s) and the no action alternative and aids in the decision-making process.

The IDT considered the following issues as it developed and refined the project alternatives, identified project design features (PDF), and analyzed the environmental effects. Response to scoping comments received, including these issues can be found in EA section 9.0.

1.4.2.1 Issue 1: The Effects of Management Actions on Water Quality, Fisheries, Riparian Reserves and Aquatic Conservation Strategy

Elements of the issue: effects of replacing and removing large culvert(s) on a fish-bearing stream; the need to build new roads; effects of road work on connectivity to the stream network and hydrological processes; effects of the project on Salem's municipal watershed; effects of thinning within Riparian Reserves on water quality and other Aquatic Conservation Strategy objectives.

1.4.2.2 Issue 2: The Effects of Management Actions on Forest Structure

Elements of the issue: effects of thinning on snag, large woody debris (LWD) and coarse woody debris (CWD) recruitment and retention; minor tree species retention; effects to wildlife habitat; and a request for the creation of early seral vegetation and forage for big game and other species of wildlife whose populations are at risk of decline.

1.4.2.3 Issue 3: The Effects of Management Actions on Special Status Species (includes ESA threatened/endangered species)

Elements of the issue: impacts to Special Status Species, including plant, bird, fish, and animal species. See Issues 1 and 2.

1.4.2.4 Issue 4: Economic Viability of Management Actions

Elements of the issue: request that harvest prescriptions and logging plans be designed for an economically viable timber sale that would be practical and efficient for a range of potential purchasers and operators

1.4.2.5 Issue 5: The Effects of Management Actions on Visual Resources

Elements of the issue identified in scoping: visibility of thinned units from Highway 22 and other visual effects of the proposed thinning.

2.0 ALTERNATIVES

2.1 Alternative Development

Pursuant to Section 102 (2)(E) of the National Environmental Policy Act (NEPA) of 1969, as amended, Federal agencies shall "…study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." For this project the IDT initially identified the stream crossings on 9-2E-12.1 in section 11 as an issue driving an alternative (see Issue 1 above, replacing and removing culvert(s) on a fish bearing stream). The IDT dropped further consideration of this alternative due to potential impacts to fisheries identified in preliminary analysis. See EA section 2.6, *Alternative Analyzed and Later Dropped*. This EA will analyze the effects of Proposed Action and the "No Action alternative" (which provides the baseline to evaluate effects).

2.1.1 Planning and Implementation Process

In planning the Power Mill Thinning project proposal, the IDT developed criteria to implement the Management Actions/Direction in the RMP (pp. 20-22, 46-48) for selecting stands to be treated, type of silvicultural treatments, boundary locations, logging systems, fuel treatments, and road system design and use.

The IDT also developed a set of project design features (PDF) that would guide implementation of the project. The actions described in EA Section 2.2 and analyzed in EA Section 3.0, and the PDF described in EA Section 2.2.3, taken together, form the best management practices (BMP) for the Power Mill Thinning project. These actions are based on site-specific application of the principles contained in chapter 2 and Appendices G and K of the RMP/FEIS, and pp. 20-50 and Appendices C and D of the RMP.

The BLM would implement the selected actions and PDF analyzed in this EA in project layout (physical delineation of treatment boundaries and road locations) and timber sale contract provisions. The timber sale contract would be written and administered by the BLM and require the timber sale operator to accomplish the requirements of the contract in a manner that is consistent with the actions and PDF analyzed in this EA. Administration of contract provisions would be done by trained and authorized BLM employees.

2.2 Proposed Action

2.2.1 Proposed Treatments

The BLM proposes to thin 615 acres of overstocked 45-78 year old forest stands, using ground-based yarding on approximately 334 acres and skyline yarding on approximately 281 acres. BLM requires the logging operators to submit an operating plan to BLM and receive BLM approval of this plan prior to implementing harvest treatments. Table 1 shows the proposed action by watershed.

Table 1: Power Mill Proposed Action by Watershed

Township Range Section Unit	Stand Age (yrs.)	Unit Acres	Thinning Acres by			
			Land Use Allocation		Harvest Method	
			Matrix	Riparian Reserve	Ground-based Yarding	Skyline Yarding
Little North Santiam (LNS) (Tier 1 key watershed)						
8-3-29A	53	136	85	51	69	67
8-3-29B	53	28	14	14	0	28
9-2-11A	71	15	6	9	0	15
9-2-11B	71	156	82	74	58	98
9-2-11C	71	28	11	17	9	19
9-2-11D	71	10	4	6	8	2
9-2-11E	71	36	18	18	25	11
9-2-13A	69	28	21	7	0	28
9-3-17A	**45**	10	6	4	0	10
9-3-17B	45	8	2	6	5	3
Subtotal LNS		455	249	206	174	281
Middle North Santiam (MNS) Watershed						
9-2-25A	78	13	10	3	13	0

Township Range Section Unit	Stand Age (yrs.)	Unit Acres	Thinning Acres by			
			Land Use Allocation		Harvest Method	
			Matrix	Riparian Reserve	Ground-based Yarding	Skyline Yarding
9-2-25B	78	10	1	9	10	0
9-2-25C	78	10	1	9	10	0
9-3-19A	68	21	14	7	21	0
9-3-19B	68	20	11	9	20	0
9-3-19J	64	9	1	8	9	0
9-3-21A	64	77	41	36	77	0
Subtotal MNS		160	79	81	160	0
Totals		**615**	**328**	**287**	**334**	**281**

In addition, to improve structural diversity within the thinning units the BLM proposes to create up to nine (9) low density thinning patches, each up to one acre in size, in 8S-3E-29, 9S-2E-11 and 9S-2E-21. These patches would be thinned to 10-12 trees per acre (TPA) with average tree spacing of 60 to 65 feet (LNSWA Chapter 7, pp. 5-6; NSWA Section 3, p. 8). (See Objective 6 in EA section 1.2.2). These patches would not encroach into the Stream Protection Zones. To encourage establishment and growth of grasses, forbs, and understory vegetation within these low density patches and provide access for big game animals, logging slash would be removed and scattered, or piled and burned.

In the Matrix LUA

The BLM proposes to thin 328 acres within the GFMA. Of this, ground-based yarding would take place on approximately 59 percent (194 acres) and skyline yarding on the remaining 41 percent (134 acres). For Matrix LUA objectives, refer to EA section 1.2.2. To achieve these objectives, the proposed prescription would:

- Retain trees that are generally larger than the average diameter for the stand, emphasizing the largest, healthiest and best formed dominant and co-dominant trees;
- Thin from below removing primarily suppressed and intermediate trees, and some larger trees that are directly competing with the trees selected for retention to increase the light, water and nutrients available for healthy growth of retained trees;
- Remove some dominant and co-dominant trees to achieve desired stocking levels and spacing, and to facilitate safe and economical logging;
- Maintain spacing to provide adequate growing room for retained trees based on target stocking (number of trees per acre to be retained in each stand);
- Thin to an average relative density of approximately 35-40 on all units to accelerate growth on retained trees and maintain an average canopy cover of retained dominant and co-dominant trees of at least 40 percent (typically ranges from 55-70 in actual practice) following thinning;
- Maintain sufficient growing stock to insure the site is fully utilized and total net yield throughout the rotation is not substantially reduced;
- Retain a mix of the species that are currently present in the stand, including hardwood trees.

- Retain and protect 90 percent of existing large (>15 inches diameter and 15 feet tall) snags from damage during timber harvest activities;
- Retain and protect 90 percent of existing CWD (down logs ≥20 inches diameter and ≥20 feet long) from damage during timber harvest activities;
- Maintain spotted owl dispersal habitat (minimum 40 percent canopy cover) after thinning; and
- Retain and protect all remnant old-growth trees.

<u>In the Riparian Reserve LUA</u>

The BLM proposes to thin 287 acres within the Riparian Reserve LUA. Of this, ground-based yarding on would be done on approximately 49 percent (140 acres) and skyline yarding on the remaining 51 percent (147 acres). For Riparian Reserve LUA objectives, refer to EA section 1.2.2. To achieve these objectives, the proposed prescription would:

- Maintain an average of at least 50 percent canopy cover of retained dominant and co-dominant trees (typically ranging from 55-70 percent) following thinning;
- Maintain stream protection zones (SPZ) on all perennial and intermittent streams to retain primary shade and protect stream water temperatures. SPZ would have a minimum width of 30 feet each side on intermittent streams. Table 2 shows minimum SPZ widths on perennial streams for this project based on tree height and hill slope;

Table 2: Streamside Buffers (i.e. Stream protection zones) on Perennial Streams (feet) based on Slope (percent) and Tree Height (average height of stand in feet)

Tree Height	Width of Primary Shade Zones/ Streamside Buffers on Perennial Streams (feet each side of the stream)		
	< 30 % Hill Slope	30 to 60 % Hill Slope	>60 % Hill Slope
Trees < 20 feet	12	14	15
Trees 20 to 60 feet	28	33	55
Trees > 60 to 100 feet	50	55	60
Trees > 100 to 140 feet	70	75	85
Blue shaded cells do not occur in the proposed thinning units.			

  - Minimum SPZ widths increase to 100 feet on perennial streams and 50 feet on intermittent streams within one mile upstream of ESA listed fish habitat;
  - No direct disturbance would be allowed within the SPZ in sections 13, 17, 21, and 25.
  - Disturbance within the SPZ in sections 11, 19, and 29 would be allowed only within the rights-of-way of roads used to access thinning units. See road work (EA section 2.2.2).
- Retain the remaining forest stands within the Riparian Reserve LUA (955 acres) on BLM managed lands within T. 8 S., R. 3 E. section 29; T. 9 S., R. 2 E. sections 11, 13, and 25; T. 9 S., R. 3 E. sections 17, 19, and 21. These untreated areas include:
  - Areas with steep, unstable slopes;
  - Areas where hardwood trees and brush species already provide desired levels of structural complexity;

- Areas where logging is not feasible in conjunction with operations in the adjacent Matrix thinning; and
- Areas where constructing a new road would be required specifically to treat stands within the Riparian Reserve.

2.2.2 Connected Actions

1. **Road Work (**EA Section 2.2.3; EA Section 7.2-Maps**):** Proposed road work is shown in Table 3.

Table 3: Road Work

Township Range Section Unit	New Road Construction Miles			Decommission Constructed Road	Road Renovation Miles		
	BLM	Private	Total		BLM	Private	Total
Little North Santiam (LNS) (Tier 1 Key Watershed)							
8-3-29A	0.8	0.1	0.9	0.8	2.0	1.2	3.2
8-3-29B	0	0	0	0	0.4	1.5	1.9
9-2-11A	0.2	0.05	0.25	0.2	0	0	0
9-2-11B	0.75	0.1	0.85	0.5	1.2	0	1.2
9-2-11C	0	0	0	0	0.3	0	0.3
9-2-11D	0	0	0	0	0.2	0	0.2
9-2-11E	0	0	0	0	0.7	0.2	0.9
9-2-13A	0.3	0	0.3	0.3	0	0	0
9-3-17A	0	0	0	0	0	0	0
9-3-17B	0	0	0	0	0.1	0	0.1
Subtotal LNS	2.05	0.25	2.3	1.8	4.9	2.9	7.8
Middle North Santiam (MNS) Watershed							
9-2-25A	0	0	0	0	0	0	0
9-2-25B	0	0	0	0	0	0	0
9-2-25C	0	0	0	0	0	0	0
9-3-19A	0.1	0	0.1	0	0.3	0	0.3
9-3-19B	0.35	0	0.35	0	0.3	0	0.3
9-3-19J	0.1	0.2	0.3	0	0	0	0
9-3-21A	0.8	0.05	0.85	0	0	0	0
Subtotal MNS	1.35	0.25	1.6	0	0.6	0	0.6
Total for proposed action	3.4	0.5	3.9	1.8	5.5	2.9	8.4

New Road Construction: New Road Construction builds a road where either none existed or where the existing roadbed has deteriorated and intermediate or larger trees are growing in the roadbed. The BLM would design and construct approximately 3.4 miles of new road on BLM land and approximately 0.5 mile of new road on private land to provide access to the proposed thinning units for logging and hauling.

New construction includes clearing vegetation within the road Right-of-Way (R-o-W) using ground based logging equipment. Clearing would average less than 30 feet wide.

Little North Santiam (LNS) Watershed (Units in sections 11, 13, and 29): The BLM would decommission 1.8 miles of road (see Table 3), which is all of the new road construction on federal land associated with this project except P11-4 and P11-5 after harvest operations. Road Decommissioning consists of the following actions:

- Decompacting the road surface to approximately 4-6" depth by tilling or roughening the surface;
- Seeding with native plant species and mulching with logging slash or approved sterile mulch to establish effective ground cover prior to the wet season;
- Reestablishing natural drainage patterns by removing all culverts, using water bars or other drainage features to prevent water erosion of exposed soil; and
- Blocking vehicle access, typically with earth/debris barricades.

If these roads need to overwinter to provide access for fuel treatments, they would be stabilized as necessary to prevent erosion and sediment transport. Intermediate stabilization techniques would be determined for each road upon inspection by BLM engineering staff.

Road spurs P11-4 and P11-5 (0.25 mile) would be retained because they are ridgetop roads on stable ground with no hydrological connectivity. These roads provide stable access to the proposed units. The 0.25 mile of new road on private land (accessing sections 11 and 29) would be retained because these roads are located on ridge tops or flat benches on stable ground and the private landowners require BLM to leave roads constructed on their land for their future logging operations as part of a license agreement. These locations are located behind private gates.

The BLM would retain 0.5 mile of the road proposed for construction to provide long-term access to private and BLM managed lands. These roads would be blocked and stabilized after operations. The BLM is in compliance with the "no net increase in road mileage" in this watershed because there is still a net decrease in road mileage during the RMP planning cycle. The BLM decommissioned[2] approximately 1.2 miles of existing BLM roads in the Little North Santiam River Tier 1 Watershed in 1999. Approximately 0.58 mile of this decommissioning would be applied to the Power Mill project, see Table 4.

[2] (culverts removed, shaped for drainage, subgrades ripped, revegetated and blocked)

Table 4: Roads Decommissioned under Contract 53-04R4-8-2660J in Little North Santiam

Status		Road Number	Miles
Decommissioned Road Mileage	Net decrease in road mileage	8-3E-25.6	0.14
		9-2E-13.1	0.04
		9-3E-14	0.29
		9-3E-15.2	0.14
		subtotal	**0.61**
	Mileage applied to Power Mill Project	8-4E-30.2	0.07
		9-2E-13.3	0.20
		9-2E-13.4	0.11
		9-3E-19	0.20
		subtotal	**0.58**
	Total Decommissioning Miles		**1.19**
Retained (blocked and stabilized) road construction in LNS – Power Mill			**0.5**

Middle North Santiam (MNS) Watershed (Units in sections 19, 21): New road construction would be blocked and stabilized after operations to prevent erosion. This work includes shaping the road surface to drain water onto stable vegetated slopes, tilling as needed to provide a seedbed, seeding with native species to vegetate disturbed soil, covering the roadbed with logging slash and debris or other suitable material to provide additional stability, and blocking these roads to prevent unauthorized vehicle use after logging. Some stabilization measures may be delayed until after fuel treatments are accomplished if the BLM determines that delay would not cause erosion and sediment production. The subgrade would be left intact so that the road could be renovated for future use.

Road Renovation: Renovation would bring existing roads up to safe timber haul standards by adding rock, blading and shaping the road, cleaning ditches and culverts, and cutting roadside brush. Roads 9-2E-12.1, 9-2E-12.2 and 9-3E-17.3 (Maps, EA section 7.1.2) would be renovated. These roads have a visible road prism for most of their length have only low growing vegetation such as ferns, Oregon grape, and salal growing in the road prism. Brush would be removed where it is growing adjacent to the road prism and branches are encroaching over the road surface. Culverts would be replaced at approximately 18 stream crossings where log fills or under-sized culverts are failing or are in danger of failing in sections 11, 19, and 29.

The BLM would maintain and renovate approximately 5.5 miles of existing road on BLM managed land and approximately 2.9 miles of existing road on private land.

All proposed culvert work would be done during the dry season (Oregon Dept. Fish & Wildlife in-stream work period in the project area is July 15– August 31) when most of these streams have very low or no flow. After the completion of project operations, the BLM proposes to stabilize, seed and mulch disturbed soils within the right-of-way.

Road Maintenance: The BLM and private landowners would perform routine maintenance on existing roads along the timber haul route.

2. **Fuels Treatments**

Fuel treatments would be implemented in selected areas to reduce potential for human caused wildfire ignition, to reduce the potential for wildfire to cross property lines between BLM and private land, and to reduce long-term potential severity of wildfires in these stands. Fuel treatments in the low density thinning areas would also be done as site preparation for grass and forb establishment and to remove barriers to big game use of these areas (EA section 2.2.1).

Of the 615 acres proposed for thinning in the Power Mill Thinning project, up to 30 acres are proposed for fuel reduction treatment as shown in Table 5.

Treatments include: creating, covering and burning landing piles; machine piling, covering and burning slash in the low density thinning areas; and creating fuel reduction corridors adjacent to roads which are open to the public and private plantations by pulling slash and logs less than six inches in diameter back into the units. Fuel reduction corridors would be 50 feet wide adjacent to private plantations and to roads with public access.

Table 5: Fuels Treatment Methods

Section	Treatment
8S-3E-29 9S-2E-11	Machine pile, cover and burn landing piles. Machine pile, cover and burn approximately 5 acres within the low density thinning areas (3 acres section 11, 2 acres section 29).
9S-2E-13, 25 9S-3E-17, 19	Machine pile, cover and burn landing piles.
9S-3E-21	Machine pile, cover and burn landing piles. Machine pile, cover and burn approximately 4 acres within the low density thinning areas. Slash pull-back (50') along property lines

The total amount of slash debris expected to be piled for burning is estimated to be between 400 and 1400 tons. Burning would be done after the fall rains begin and soils are damp. All burning would be done in compliance with Oregon Smoke Management requirements.

There are two potential scenarios that could reduce the amount of slash and woody debris burned in landing piles:

- Some of the slash may be used as mulch to cover roadbeds during stabilization (see EA section 2.2.2, Item 1, above).
- Some of the material may be removed as biomass for energy production, though the BLM considers this to be unlikely because there is little or no foreseeable market for this material during the time of the Power Mill Thinning project.

3. **Landings:** The BLM would require the timber sale operator to construct ground-based and skyline landings according to the approved logging plan. No landings would be placed in the Stream Protection Zones.

4. **Preventing Unauthorized Off-Highway Motor Vehicle (OHV) Use (RMP p. 41)**

   During operations the timber sale purchaser would prevent unauthorized access, including OHV, during operations as part of their normal security measures. The BLM requires that physical barriers be placed to block OHV access to closed roads and skid trails at the end of operations (*EA section 2.2.3).*

5. **Special Forest Products (SFP) (RMP p. 49)**

   The BLM would make permits available to the public for collecting Special Forest Products such as firewood, mushrooms, ferns, etc. where collection does not interfere with the proposed project operations or have effects beyond those analyzed in this EA.

2.2.3 Project Design Features

This section summarizes the project design features that would keep the project's effects on the affected resources described in EA sections 3.1-3.2 within the effects analyzed in the RMP/FEIS. Project design features described in this section would be implemented in the Proposed Action unless otherwise specified. Many project design features contribute to achieving multiple objectives. Table 6 shows the project design features for the proposed action and the benefitting resource. These design features are based on the management guidance, design features and best management practices (BMP) described in the RMP/FEIS (chapter 2; Appendices G, K and S); and RMP (pp. 20-50; Appendices C and D).

Based on its combined experience, professional judgment, familiarity with published research, and field analysis of this project area, the BLM Interdisciplinary Team of Resource Specialists (IDT) then refined them into the proposed project actions and project design features (PDF) described in this EA.

The BLM would incorporate the selected action and design features into the project layout, contract requirements, and contract administration to ensure that the project is implemented as analyzed in this EA.

The Contracting Officer enforces compliance with the contract and would suspend operations if the operator fails to perform the required preventive and restorative practices analyzed in this EA and stipulated in the timber sale contract. The BLM timber sale contract holds the purchaser and operator financially liable and requires bonding in an amount sufficient for the BLM to complete restoration work if the purchaser fails to perform the preventive and restorative requirements of the contract.

The following project design features would:

- Protect special status species (Vegetation); soil productivity (Soil); water quality and quantity (Water); fisheries, listed fish and aquatic habitat (Fish); stand structure, habitat and species (Wildlife); air quality (Fire/Air); public safety, rural interface and recreation (Public); cultural resources (Cultural).
- Prevent or reduce: spread of invasive/non-native plant species populations (Invasives), fire hazards and risks (Fire/ Air)
- Achieve: Desired forest stand composition (Vegetation); Economic Efficiency (Economic), fuel reduction (Fire/Air)

Table 6: Project Design Features and Benefitting Resources

Applicable Resources / Objectives Project Design Features (RMP/FEIS references for key points)	Vegetation	Soil	Water	Fisheries	Wildlife	Invasive	Fire / Air	Public	Cultural	Economic
In All Logging Operations: RMP/FEIS (pp. 2-34 -- 2-37; 4-11 -- 4-13; G-1,2)										
1. Limit the area compacted by logging operations (skidding, yarding and landings) to less than 10 percent of the harvest area in each unit, outside of road rights-of-way.	♦	♦	♦	♦	♦	♦		♦		♦
2. Locate skid trails and skyline corridors to avoid concentrating runoff water flows that could cause rill or gully erosion with potential to displace soil.	♦	♦	♦	♦						
3. Lift the leading end of all logs off of the ground during yarding (one-end suspension) to prevent the blunt ends of logs from displacing soil.	♦	♦	♦	♦						
4. Limit the size and number of landings to the minimum needed for safe and efficient operations.	♦	♦	♦		♦	♦	♦			♦
5. Retain duff, litter and logging slash on the forest floor as much as possible.	♦	♦	♦	♦	♦	♦				
6. Implement erosion control measures such as seeding with native species to prevent rill or gully erosion that would displace soil more than several feet.	♦	♦	♦	♦	♦	♦				
7. Prevent unauthorized off-highway motor vehicle (OHV) use by blocking access with debris, gates, or berms. Roads would be able to be re-opened for use by fire-fighting equipment.	♦	♦	♦	♦	♦	♦	♦	♦		
8. Directionally fall trees in the harvest units so that they would not enter the designated Stream Protection Zone (SPZ). If any trees or snags in the SPZ must be felled for safe logging operations, the BLM would require the operator to leave them on site in order to create CWD habitat.	♦			♦	♦					
In Ground-based Logging Operations: RMP/FEIS (pp. 2-34 through 2-37; 4-11 through 4-13; G-2)										
9. Allow ground based logging operations only when the site specific combination of soil conditions, rainfall and operating methods would not result in soil compaction, displacement and erosion impacts exceeding those analyzed in the RMP/FEIS.	♦	♦	♦	♦		♦				♦
10. Re-use existing skid trails whenever possible for logging operations according to the approved logging plan.	♦	♦	♦	♦	♦	♦				♦
11. Generally locate new skid trails on slopes no greater than 35 percent.	♦	♦	♦	♦		♦				♦
12. Generally limit uphill skidding to slopes where skidders would not break traction to avoid soil displacement.[3]		♦	♦							
13. Allow use of mechanized falling/processing and log handling machinery on slopes up to 45 percent where the machinery design and operating techniques (i.e. slash mat) would prevent gouging, soil compaction and displacement, and erosion with effects exceeding those analyzed in the RMP/FEIS (pp. 4-11 through 4-13).	♦	♦	♦	♦						♦

[3] Traction is a highly variable combination of the power required to skid logs, equipment characteristics, operating techniques and soil strength. The potential to break traction increases as slope steepness increases. BLM field experience confirms that 20 percent slope generally provides for adequate traction when skidding uphill while steeper slopes require additional site-specific evaluation.

Applicable Resources / Objectives Project Design Features (RMP/FEIS references for key points)	Vegetation	Soil	Water	Fisheries	Wildlife	Invasive	Fire / Air	Public	Cultural	Economic
In Skyline Yarding Operations:[4] RMP/FEIS (pp. 2-34 through 2-37; 4-11 through 4-13; G-1,2)										
14. Design the skyline yarding layout so that corridors average 150 feet apart on at least one end of the corridors and to laterally yard logs to the skyline to limit the ground area impacted. For lateral yarding operations where it is not feasible to achieve one-end suspension (cable angles may not create enough lift to achieve one-end suspension until logs get close to the skyline), fall trees to orient logs so that they cause the least soil disturbance and damage to retained trees during lateral yarding.	♦	♦	♦	♦	♦					♦
In Other Operations: RMP/FEIS (pp. 2-34 -- 2-37; 4-8 -- 4-13; G-1,2)										
15. Locate and construct piles of logging slash and debris to provide for safe logging and burning operations.								♦		♦
16. Pile logging slash and debris to be burned so that the piles are clean, tightly constructed and designed to create a small "footprint" of soil where heat could reduce soil productivity.	♦	♦				♦	♦	♦		♦
17. Construct and cover slash and debris piles so that they will burn efficiently during the wet season, protect retained trees, reduce heat damage to soils, and prevent burning forest fuels outside of the piles.	♦	♦			♦	♦	♦	♦		♦
18. Conduct all burning operations (landing debris and fuel reduction treatment piles) in compliance with the Oregon Smoke Management Plan to maintain air quality and visibility in a manner consistent with the Clean Air Act. Prepare a Burn Plan after piles are created that defines specific environmental parameters for burning operations, which typically occur in the fall after wetting rains begin.	♦	♦					♦	♦		♦
19. No burn piles would be placed under the powerlines in section 19	♦	♦				♦	♦	♦		♦
20. Piles would be located to minimize heat damage to reserve tree crowns or tree boles.	♦	♦			♦	♦	♦	♦		♦
21. Restrict or suspend ground disturbing activities immediately if prehistoric cultural resources are encountered during project implementation and develop appropriate management practices to protect the site/cultural values.									♦	
Road Construction, Reconstruction Renovation, Maintenance, Stabilization and Closure: RMP/FEIS (pp. 2-22,68,69; 2-75,76; 4-11 -- 4-19; G-2 -- G-7)										
22. Locate, design and construct roads to drain surface water to adjacent slopes where it would infiltrate into the soil and groundwater; and to avoid collecting water (in ditches and on road surfaces) where it could be channeled directly to streams (Wemple et al. 1996).		♦	♦	♦						

[4] In skyline yarding operations, a cable is suspended above the ground which holds a carriage that uses another cable to pull logs laterally across the slope to the skyline. A yarder (machinery with a tower, cables and winches) located on the landing then pulls the carriage up the skyline and pulls (yards) logs up to the landing. The leading end of the log is suspended off the ground while being moved.

Applicable Resources / Objectives Project Design Features (RMP/FEIS references for key points)	Vegetation	Soil	Water	Fisheries	Wildlife	Invasive	Fire / Air	Public	Cultural	Economic
23. When replacing culverts on streams that are flowing: to reduce potential increases in turbidity, flow would be captured and piped/pumped around the worksite. Dewater streams during culvert installation/removal operations in flowing streams by pumping or piping water around the construction site.		♦	♦	♦						
24. Locate, design and construct roads in upland areas on stable ground with side slopes generally less than 30 percent that do not require extensive cut-and-fill construction methods, in order to avoid increasing mass failure (landslide) potential and to avoid intercepting groundwater.		♦	♦	♦		♦				♦
25. No timber transport on natural surface roads during the wet season.		♦	♦	♦						
26. During log hauling, BLM personnel would visually monitor at stream crossings on the haul route, comparing water above and below the crossing. If there is a visible (more than a 10 percent) increase in turbidity below the mixing zone (approximately 100 meters), suspend hauling and other operations immediately and implement measures to reduce fine sediment run-off into the stream. Allow operations to resume when ODEQ turbidity standards are met.			♦	♦						♦
27. Use sediment control measures such as vegetation in the ditch, small settling basins, or wattles as sediment traps and/or filters in ditches that drain to stream crossings to prevent sediment transport that would cause a visible increase in turbidity in streams.			♦	♦		♦				♦
28. Use water bars or other surface shaping to drain runoff water to vegetated slopes; surface tilling; seeding with native species; sediment traps and/or other techniques to promote infiltration, to stabilize roads, to prevent erosion and sediment transport to streams that would cause a visible increase in turbidity, and to prevent increases in peak flows.	♦	♦	♦	♦	♦	♦	♦	♦		♦
29. Close and stabilize: 1/ all new roads in the Middle North Santiam watershed, 2/ road spurs P11-4, P11-5, and road construction on private land in the Little North Santiam watershed, and 3/ some existing roads after use to reduce changes to natural drainage patterns, prevent erosion, and prevent unauthorized use by motor vehicles (including OHV).	♦	♦	♦	♦	♦	♦	♦	♦		♦
30. Culverts and subgrades of closed and stabilized roads would be left intact so that the road can be renovated for future use or fire control use with minimal disturbance and expense.	♦					♦	♦	♦		♦
31. Restrict road construction, and stabilizing operations to times, weather conditions and soil conditions when no surface mud or sediment laden runoff would be generated.		♦	♦	♦		♦				♦
32. Decommission newly constructed roads in the Little North Santiam watershed (except P11-4, P11-5 and road construction on private land), as specified in the description of road construction in EA section 2.2.2, #1, during the appropriate season (see Table 7) after fuel treatments (EA section 2.2.2, #2) are completed.			♦	♦						
33. Winterize new road construction after season's operations, using erosion control measures described in PDF #28.										

Applicable Resources / Objectives Project Design Features (RMP/FEIS references for key points)	Vegetation	Soil	Water	Fisheries	Wildlife	Invasive	Fire / Air	Public	Cultural	Economic
Stand Structure, Wildlife Habitat and other Vegetation: RMP/FEIS (pp. 2-17,22,26,32--3337--38,59--62;80--92; 4-11 through 4-13; G-1,2; K-1--3)										
34. Retain and protect old-growth trees[5] by individually designating them as reserved, and protect them from logging damage that would potentially affect the health or function of the trees.	♦				♦					♦
35. Retain and protect (intact and standing) at least 90 percent of snags larger than 15 inches diameter and taller than 15 feet during logging activities[6].					♦					♦
36. Retain and protect existing Coarse Woody Debris (CWD) meeting RMP standards of at least 20 inches diameter (large end) and 20 feet long wherever feasible (a minimum of 90 percent) and protect them from logging damage. Design skid trail location and operating techniques that require minimal movement of CWD to protect its physical integrity. (RMP p. 21)		♦			♦					♦
37. Retain some (number varies according to local abundance) trees that have desirable characteristics for wildlife habitat (e.g.: multiple or broken tops, large limbs, dead areas being used by cavity excavators, deep crevices and cavities).	♦				♦					
38. Avoid damaging retained trees by using techniques such as: seasonal restrictions on falling and yarding during the spring growing season when bark is easily damaged (typically March through June); directional falling to lead with skid trail or skyline corridor alignment; lateral yarding to skylines; using selected "cut" trees as rub trees in locations where logs "turn a corner" during logging.	♦				♦					♦
39. Seed and mulch disturbed soil in roads and landings using certified weed free native plant species seed and sterile mulch, in order to stabilize the soil and prevent establishing invasive/non-native plant species on disturbed soil in the project area.	♦	♦	♦	♦	♦	♦				
40. Clean all ground-disturbing logging and road construction equipment of off-site soil, plant parts and seed prior to entering the project area to prevent introducing invasive and non-native plants into the project area.						♦				
41. Retain all hardwoods, allow them to be felled and left in place if needed to facilitate safe and efficient logging.	♦				♦					
42. Restrict or suspend operations, or modify project boundaries at any time if plant or animal populations that require protection are found during ongoing surveys or are found incidental to operations or other activity in the project area.	♦				♦					

Seasonal Restrictions and Operational Periods: The Seasonal Restrictions and Operating Periods are summarized in Table 7.

[5] Trees older than 200 years – RMP/FEIS, Table 3-16, p. 3-28 and glossary.
[6] Snags would be cut when necessary to provide for safe operations as required by Oregon Occupational Safety and Health Division (OR-OSHA, Oregon Occupational Safety And Health Standards, OAR Chapter 437, Division 7, Forest Activities).

Table 7: Summary of Seasonal Restrictions and Operational Periods

Seasonal Restriction	Reason	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
8S-3E-sec. 29 (all units) All operations and hauling	Peregrine falcon												
9S-2E-sec. 13 All operation and hauling	Spotted Owl												
Falling and yarding	Bark slippage												
Hauling	Water quality and sedimentation, fish habitat												
Ground-based yarding	Soil damage/erosion control												
Skyline yarding	Soil damage/erosion control												
Road Construction / Decommissioning	Soil damage/erosion control												
In-water work: stream crossings/ culvert work	Protect fish and aquatic habitat												
Logging operations	Fire season, ODF industrial fire precaution levels, and regulated use												

Key	Operations generally allowed.	Operations restricted, modified or allowed depending on conditions.	Operations generally restricted

2.3 Scope of the Proposed Action

Table 8: Acres of BLM Land, Matrix, and Riparian Reserve

T.S. R.E. section	Total Acres by Section			Power Mill Proposed Action			No Thinning		
	BLM Land	Matrix LUA	Riparian LUA	Total Acres	Matrix Thinning	Riparian Thinning	BLM Land	Matrix LUA	Riparian LUA
8-3-29	246	149	97	164	99	65	82	50	32
9-2-11	435	147	288	245	121	124	190	26	164
9-2-13	608	372	236	28	21	7	580	351	229
9-3-17	203	98	105	18	8	10	185	90	95
9-2-25	304	124	180	33	12	21	271	112	159
9-3-19	164	41	123	50	26	24	114	15	99
9-3-21	320	107	213	77	41	36	243	66	177
Totals	2280	1038	1242	615	328	287	1665	710	955

The proposed action would thin:

- 615 acres out of a total of the 2280 acres (27 percent) of BLM land within the project area.
- 287 acres out of a total of the 1242 acres (23 percent) of BLM land within the Riparian Reserve LUA within the project area.

2.4 No Action Alternative

The No Action alternative describes the baseline against which the effects of the proposed project can be compared, i.e. the existing conditions in the project area and the continuing trends in those conditions if the BLM does not implement the proposed project. Consideration of this alternative also answers the question: "What would it mean for the objectives to not be achieved?" The "No Action alternative" means that no timber management actions, fuel reduction treatments, or connected actions would occur.

If this alternative were to be selected, the following activities would not take place in the project area at this time: silviculture treatments; timber harvest; road construction, renovation, improvement or closure; stream crossing restoration projects such as culvert upgrades or removal of failing culverts; and fuel reduction projects. Only normal administrative activities and other uses (e.g. road use, programmed road maintenance, harvest of special forest products on public land) would continue on BLM within the project area. On private lands adjacent to the project area, forest management and related activities would continue to occur.

Selection of the No Action alternative would not constitute a decision to change the land use allocations of these lands. Selection of the No Action alternative would not set a precedent for consideration of future action proposals.

2.5 Alternatives Considered But Not Analyzed In Detail

Treatment of other forest stands within the Riparian Reserve LUA:

The IDT evaluated all Riparian Reserve stands adjacent to proposed harvest units to determine whether treatment would contribute to attaining ACS objectives for habitat. Two general criteria were used in this screening process: 1) If the stand has a simple structure that would benefit from thinning to accelerate development of elements of complex structure for habitat enhancement; and 2) If the stand can be treated in conjunction with the adjacent Matrix unit using only existing roads and roads that would be constructed to manage Matrix land (no road construction for the sole purpose of treating Riparian Reserve stands). Riparian Reserve stands that did not meet both of the above conditions were dropped from further consideration for treatment.

Units dropped from the Proposed Action:

Two units (23A and 23B) were originally proposed that were 72 and 98 years old. These units were determined to not be good candidates for thinning due to a low relative density, and potential impacts to spotted owls. Several potential units in T9S-R3E-section 19 were dropped from consideration early in the IDT evaluation process due to the large number of streams in the area.

Units considered for adding to the Proposed Action:

An additional unit was considered for treatment in T9S, R3E, section 13. The silviculturists on the IDT determined that tree size and density in the stand is not yet suitable for commercial thinning.

Reserve the stands in the project area for carbon storage:

This alternative was not analyzed in detail for the following reasons. This Alternative:

- Does not respond to the purpose for the project (EA section 1.2);
- Is not in conformance with the RMP which sets the basic policy objectives for the management of the project area, in which Matrix lands are managed primarily for timber production, and Riparian Reserves are managed to help develop late successional habitat conditions in line with the Aquatic Conservation Strategy. The RMP does not include a Land Use Allocation that reserves lands or stands for carbon storage; and this alternative
- Is substantially similar in design to the "No Action alternative" which is analyzed in the EA, in that this alternative would leave the stands unaltered and unmanaged just as under the "No Action alternative".

2.6 Alternative Analyzed and Later Dropped

Accessing units east of Jeeter Creek along road 9-2-12.1:

BLM considered renovating that portion of road 9-3-12.1 east of Jeeter Creek to access an additional 29 acres of thinning in unit 11E and allow haul to the east on Jeeter Creek road. Renovating this road segment would include replacing one elongated 60 inch diameter culvert on Jeeter Creek and one standard 48 inch diameter culvert on Kiel Creek. This alternative was not analyzed in detail due to the potential impacts to fisheries.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

Analysis Assumptions

- Timber management activities will occur on BLM-administered lands allocated to planned, sustainable harvest. The type, quantity, and impacts of allocating these lands for the type and quantity of these timber management activities were analyzed in the Salem RMP/FEIS for both the short-term (10 years) and long-term (decades). Under the RMP, this applies to Matrix/GFMA lands in the proposed project area.
- Future timber management activities on those BLM-administered lands will re-use the transportation system of skid trails, landings and truck roads proposed for this project.
- The Riparian Reserve LUA on BLM-administered lands will be managed for protection of watershed values such as water quality and aquatic habitat and for terrestrial wildlife habitat on both a local and landscape level.
- If the proposed project is implemented, no further silvicultural treatments would be done for approximately the next 20 years in these stands, both Matrix/GFMA and Riparian Reserve.

- Most private industrial forest lands in these watersheds will be intensively managed with regeneration harvests scheduled on commercial economic rotations occurring at 50-60 year intervals (RMP/FEIS 1994, p. 4-3). BLM observations of recent trends in industrial forest management indicate that this interval may be reduced to 30-40 years for some landowners.

Methodology:

The forest condition information was compiled from a variety of resources:

- The RMP/FEIS provided general resource information for the Salem District planning area as of September 1994.
- Research publications provided further information specific to forest vegetation and the impacts of managing or not managing forest stands (Silvicultural Report pp. 6-7, Wildlife Report pp. 2-3).
- Geographic Information System (GIS) data, aerial photographs and satellite imagery, BLM's Forest Operations Inventory (FOI) records, resource specific field surveys (see the following EA sections for specific surveys conducted) and field reconnaissance by BLM resource specialists were used to describe vegetation, habitat and plant and animal species present on BLM lands.

3.1 General Setting

Sources Incorporated by Reference: *E & S Environmental Chemistry, Inc. and North Santiam Watershed Council 2002. North Santiam River Watershed Assessment. Little North Santiam Watershed Analysis, Cascade Resource Area, Salem, OR 1997.*

The proposed project area is within the Lower Little North Santiam, Middle Little North Santiam, North Santiam River - Walker Creek, and North Santiam River - Mad Creek 6th field watersheds, between two and seven miles north and northwest of Mill City in Marion County, Oregon.

The proposed thinning units are between 800 - 3500 feet elevation in T. 9S., R. 2E., sections 11, 13 and 25; T. 9S., R. 3E., sections 17 19, & 21; T. 8S., R3E., section 29. Slopes are mostly 0-30 percent with a few areas of 30-60 percent slope. Aspect varies for each unit.

BLM-administered land is intermixed with privately-owned land (agricultural, industrial timber and residential), creating an assortment of ownership patterns. The entire Power Mill project area is surrounded by private ownership and all but the units in section 19 are only accessible through Freres Lumber Co. controlled gates.

Adjacent private lands are primarily Douglas-fir regeneration units intermixed with young Douglas-fir plantations. There are occasional Douglas-fir stands with a brush understory on private land. There are residences near the Highway 22 corridor, North Fork Road, and the city of Mill City within one mile of proposed thinning units in sections 11, 19, 21. Some areas are used by the public for walk-in activities such as hunting and mushroom picking. Unit 19 has a high voltage power transmission line that splits the unit.

BLM archival records show that most of the BLM managed land in the area was logged under BLM timber sales between 1929 and 1951, including those stands that are now within the Riparian LUA. Section 17 was logged in the early 1960's.

The Oregon Department of Forestry shows that the 1951 Sardine Creek Fire, burned approximately 21,400 acres northeast of Mehama and that private timber companies harvested most of the forest in the Santiam Canyon between 1880 and 1930. By the 1930's and 1940's most of the land in this part of the Santiam Canyon had either been logged over or burned by wildfire, or both.

Vegetative mapping using GIS data shows that forest stands on private industrial forest land within the four 6th field watersheds described above range from young plantations to mid-seral stands that are similar to the proposed action (forest structure map 3/2012).

3.2 Resource Specific Affected Environment and Environmental Effects

This section of the EA describes the current condition and trend of the affected resources and the environmental effects of the alternatives on those resources. The interdisciplinary team of resource specialists (IDT) reviewed the elements of the human environment, required by law, regulation, Executive Order and policy, to determine if they would be affected by the proposed action (BLM Handbook H-1790-1: p. 137), [40 CFR 1508.27(b)(3)], [40 CFR 1508.27(b)(8)] (EA section 3.2.10), as well as the issues raised in scoping (EA section 1.4.2).

The resources potentially affected by the proposed thinning activities are described in the following sections: Vegetation and Forest Stand Characteristics; Hydrology; Fisheries and Aquatic Habitat; Soils; Wildlife; Air Quality and Fire Hazard/Risk; Carbon Storage and Carbon Emissions; Recreation, Visual Resources and Rural Interface; and Cultural Resources.

3.2.1 Vegetation and Forest Stand Characteristics

Sources Incorporated by Reference: *Power Mill Silvicultural Prescription-Commercial Thinning, Bonney 2010; Botanical Report for Proposed Power Mill Thinning, Fennel 2010; Wildlife Report Power Mill Projects, England 2010; Power Mill Thinning Projects Air Quality and Fire Hazard/Risk Specialist Report, Caliva 2010.*

Methodology:

- For stand structure information, Stand Exams were conducted in 2008 and BLM personnel gathered additional stand information.
- The BLM analyzed and incorporated data from the ORGANON Program (Hann, et. al.,2006) into the description of existing vegetation and forest stand characteristics and for developing the prescriptions that would be implemented under the proposed project (EA Table 9, Silvicultural Report pp. 6-7).
- Threatened/Endangered/Special Status/Special Attention Botanical Species: The BLM botanist for Cascades Resource Area conducted two types of surveys within the project area and vicinities; Known Site Surveys (Data Search) and Field Surveys (Botanical Inventory).

Affected Environment

Stand Structure and Development

Most of the stands proposed for thinning, including that portion of the stands within what is now the Riparian LUA, were logged between 1929 and 1951.[7] Stands in section 17 were logged between 1961 and 1965. The forest stands on BLM lands throughout the Power Mill Thinning project area are currently second-growth, managed conifer forest.

The stands range from 45-78 years old[8] and are dense, single storied stands of Douglas-fir, hardwood trees and scattered other conifers. Many of the riparian areas have a hardwood component of red alder. These stands are crowded and suppression mortality is occurring. There are few large residual snags but there are some smaller recent snags from self -thinning. Table 9 shows stand characteristics from collected stand exam data.

The BLM wildlife specialists for the Power Mill Thinning project evaluated Riparian Reserve stands in the project area and determined that selected portions of those stands are lacking vertical and horizontal canopy structure.

Within these stands there are some areas where understory trees and/or shrubs are present but their growth is severely hindered by the shade of the dense overstory canopy. The wildlife biologist and silviculturist on the IDT determined that density management thinning in these selected areas would accelerate key elements of late successional habitat development. Stands in the Riparian Reserve that are naturally developing structural complexity are not proposed for treatment and are not in the treatment area. The Riparian Reserve LUA stands proposed for density management adjoin the Matrix stands proposed for thinning and have similar stand characteristics. Descriptions of the stands in each section follow:

Little North Santiam Watershed:

T8S-R3E Section 29, (Units 29 A&B): BLM records show that this area was logged between 1943 and 1951 and regenerated naturally[9]. These stands are approximately 53 years old[10] and are dominated by Douglas-fir and western hemlock with some red alder. These stands are dense single story stands with no large remnant old-growth trees. The Riparian Reserves outside the proposed units have a major hardwood component consisting of big-leaf maple and red alder.

T9S-R2E Section 11, (Units 11A,B,C,D,E): BLM records show that this section was logged between 1936 and 1944 and naturally regenerated. These stands are approximately 71 years old, and are dominated by Douglas-fir with a minor component of red alder.

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[7] BLM archival timber sale records generally show timber sale contract areas in 40 acre ($^{1}/_{16}$ section) increments with sale and termination dates, volumes of timber sold, and the purchaser.

[8] Stand ages are determined from counting growth rings in core samples taken during stand exams. Stand age is calculated as a weighted average for the stand as a whole.

[9] Archival records of reforestation treatments are incomplete. Lack of a specific record usually means that the stands were regenerated naturally from seed trees left in the harvest area and from trees in adjacent stands.

[10] There is commonly a 3-10 year lag time, sometimes longer, from logging to the birthdate of the new forest stand. This lag time is usually longer for natural regeneration than for planted seedlings. Soil conditions, local microclimate, large scale weather cycles, fire and vegetation treatments also affect reforestation lag times.

The proposed units are dense single story stands with no large remnant old-growth trees. The Riparian Reserves outside the proposed units have a major hardwood component.

T9S-R2E Section 13, (Unit 13A): Based on the age of the stand, the BLM silviculturist estimates that this section was logged in 1940 and naturally regenerated. This stand is approximately 69 years old, is dominated by Douglas-fir. There are no remnant old-growth trees present from the previous stand.

T9S-R3E Section 17, (Units 17A,B): BLM records show that this stand was logged between 1962 and 1965. This stand is approximately 45 years old, with a Douglas-fir overstory and with no old-growth remnants in the proposed units. These units were planted in 1965, and have an understory component of red alder.

Middle North Santiam Watershed:

T9S-T2E Section 25, (Units 25A,B,C): BLM records show that this area was logged in 1929 and naturally regenerated. In 1983 this unit was commercially thinned. This single story stand is approximately 78 years old, largely Douglas-fir, with a few (estimated less than five) large remnant old-growth trees in 25C. Vegetation in the Riparian Reserves is very similar to the adjacent GFMA upland portions.

T9S-R3E Section 19, (Units 19A,B,J): BLM records show that this area was logged in 1934. This stand is approximately 68 years old with a Douglas-fir overstory, and no old-growth remnants in these proposed units. Suppression mortality is occurring. These stands have pockets of laminated root rot.

T9S-R3E Section 21, (Unit 21A): BLM records show that this area was logged in 1938 and in 1956. The second entry may have been salvage logging or somewhere else in the 40 acre $^{1}/_{16}$ section. This stand is approximately 64 years old.

Survey Results for Both Land Use Allocations

Threatened or Endangered /Special Status Plant Species

No Threatened & Endangered or Special Status vascular plant, lichen, bryophytes or fungi species were found during field surveys and there are no known sites within the proposed harvest areas as determined by a known site data search.

Table 9: Stand Characteristics

T-R-Sec Unit	Stand Acres	Seral Stage	CWD** (Linear feet/acre)	Snags per 100 acres >15" diameter & >15'Tall	Stand Age*	Stand birth date	Current Condition			Average Diameter, Year 20 No Thin	After Proposed Treatment			
			Hard/Soft	Hard/Soft			Trees per Acre	Average Diameter	Curtis RD		Trees per Acre	Average Diameter Year 1	Average Diameter Year 20***	Curtis RD
8S-3E-29A	136	Mid	0'/240'	0+/0+	53	1959	173	14	49	18	108	15	20	34
8S-3E-29B	28	Mid	0'/240'	0+/0+	53	1959	267	13	67	17	120	14.5	19.3	37
9S-2E-11A	15	Mid	0+'/240'	0/0+	71	1941	178	15	56	19	93	17	21	35
9S-2E-11B	156	Mid	0+'/240'	0/0+	71	1941	178	15	56	19	93	17	21	35
9S-2E-11C	28	Mid	0+'/240'	0/0+	71	1941	178	15	56	19	93	17	21	35
9S-2E-11D	10	Mid	0+'/240'	0/0+	71	1941	178	15	56	19	93	17	21	35
9S-2E-11E	36	Mid	0+'/240'	0/0+	71	1941	178	15	56	19	93	17	21	35
9S-2E-13	28	Late Mid	100'/50'	0/0	69	1943	135	16.5	49	21	82	18	23	35
9S-2E-25A	13	Late Mid	0'/0'	0+/0+	78	1934	114	18	46	21.5	82	19.5	23	39
9S-2E-25B	10	Late Mid	0'/0'	0+/0+	78	1934	114	18	46	21.5	82	19.5	23	39
9S-2E-25C	10	Late Mid	0'/0'	0+/0+	78	1934	114	18	46	21.5	82	19.5	23	39
9S-3E-17A	10	Mid	0'/80'	0/0	45	1967	195	13	52	18	120	14	19.5	36
9S-3E-17B	8	Mid	0'/80'	0/0	45	1967	195	13	52	18	120	14	19.5	36
9S-3E-19A	21	Late Mid	60'/480'	240/100	68	1944	141	17	55	21	70	20	24	34
9S-3E-19B	20	Late Mid	60'/480'	240/100	68	1944	141	17	55	21	70	20	24	34
9S-3E-19J	9	Late Mid	0'/0'	240/100	64	1948	212	13	55	17	123	14.5	19.5	37
9S-3E-21A	77	Late Mid	120'/200'	0/0+	64	1948	119	19	49	21	81	19	23	36
Total	615													

**As of March 2012. Calculated from Stand "birthdate" (Silvicultural Report pp. 3-7)*
*** RMP requirements for CWD are minimum 20 inches diameter large end x 20 feet long.*
**** Average basal area (cross sectional area) is approximately 23 percent larger for average size thinned trees in 20 years compared to unthinned.*

Invasive / Non-native Plant Species

BLM field surveys found the following BLM Manual 9015 Class C and/or Oregon Department of Agriculture (ODA) List B invasive/non-native species to occur adjacent to the proposed harvest areas within road corridors and neighboring harvest units: tansy ragwort (Senecio jacobaea), bull thistle (Cirsium vulgare), Canadian thistle (Cirsium arvense), St. John's wort (Hypericum perforatum), meadow knapweed (Centaurea pratensis), and scotch broom (Cytisus scoparius). All of these invasive/non-native species were found to inhabit areas of high light and soil disturbance (such as maintained road rights-of-way) and none were found within the proposed harvest units.

All of the identified species are regionally abundant and well distributed throughout northwest Oregon. Eradication of these invasive/non-native species is not practical due to the widespread ubiquitous nature of their infestations. Class C species receives the lowest priority (BLM Manual 9015) and management direction and emphasis is to contain spread to present population size or decrease population to a manageable size.

The BLM botanist conducted a Noxious Weed Risk Assessment of the project area and determined that the area has a risk rating of "moderate" (Botany Report, p. 8). A moderate rating indicates the proposed project could proceed as planned with Project Design Features in place to control and/or prevent the establishment of invasive/non-native plant species in areas of ground disturbance (EA section 2.2.3).

Environmental Effects

3.2.1.1 Proposed Action

Within the Matrix (GFMA) LUA

<u>Stand Structure and Development</u>

Observed Characteristics and Direct Effects Immediately after Thinning to 10 Years

The stands should appear healthy with uniform spacing and tree size. Tree crowns would be more widely spaced than prior to treatment, allowing more light to reach the forest floor. The average diameter of the forest stand would be larger than prior to thinning because "thinning from below" primarily removes the smaller and less healthy trees from the stand.

There would be some visible damage to retained trees, but contract requirements and administration would prevent more than two trees per acre being damaged for more than half the circumference as defined in the project design features. Some felled trees larger than 20 inches diameter would remain on site as CWD.

Skyline corridors would create linear gaps in the canopy as cables and the carriage break limbs. Soil in road rights-of-way, at landings and in skid trails and yarding corridors would be disturbed, and some of that soil (less than 10 percent of the area) would be compacted by logging operations. Logging slash and debris, consisting primarily of limbs and broken boles generally less than six inches diameter would cover much of the ground surface.

The width (12 feet) of skid trails and skyline corridors is less than the average spacing of retained trees (21-25 feet), so the overall stocking density of the stand would be within the levels analyzed in this EA.

Observed Characteristics and Trends in the Long Term (10-30 Years)

Tree crowns would continue to grow as limbs grow longer and lower limbs continue to grow instead of dying and self-pruning. As crown closure increases (limbs grow and fill in the open space in the tree canopy) the amount of light reaching the forest floor would slowly diminish. Understory brush and conifer seedlings, and ground cover species would grow rapidly in response to increased light reaching the forest floor then begin to decline in vigor in the second decade as crown closure increases.

Most areas of damaged bark and cambium on retained trees would heal while some of the trees with more than 50 percent of the circumference damaged would be expected to develop decay pockets or die and become snags. Some individual tree and small group windthrow would be expected, based on BLM experience with similar projects.

Disturbed soil would become fully revegetated with herbaceous species (especially the native species used for seeding) within two years and woody species would be expected to become established on some of the disturbed soils over a five year period. Logging slash would lose its needles within one year and decay over a three to seven year period to become a mat of duff and litter.

Indirect Effects

Diameter growth rates on retained trees would increase because of decreased competition for site resources (light, water, nutrients) resulting in larger trees available for future harvest or other management options (See Table 9). Crown ratios would increase because lower limbs would not self-prune for a decade or more, resulting in healthier trees with larger crowns and larger limbs compared to trees in an overstocked stand. Stand structure would become more complex as understory and ground cover develops, compared to an overstocked stand with limited light reaching the forest floor. Tree mortality, windthrow and decay that began as a result of injury to some trees would add snags, CWD and "cull tree" elements of structural complexity to the stands. Growth models predict that Culmination of Mean Annual Increment (CMAI) would occur within 25-30 years of thinning and the need for additional treatment would be evaluated at that time.

Threatened, Endangered, Special Status and Survey and Manage Plant Species

Since no T&E, SSS or S&M species were found within proposed project area boundaries, no direct or indirect impacts would be expected. Suitable habitat will remain in both the thinned area and reserves, and the BLM anticipates no adverse impact to suitable habitat or any undiscovered SSS or S&M species. The proposed project would not contribute to the need to list any species as T&E.

Invasive/Non-native Plant Species

A slight increase in the number of individual invasive/non-native plants is likely to occur where they are currently present in and near the project area as a result of project activities. When considering the widespread and ubiquitous nature of the invasive species identified in the proposed project area, any increase that might occur would be difficult to quantify, but would not contribute immediately or cumulatively to the impact these species have in western Oregon or in the Power Mill Thinning project area for the following reasons:

Based on observations of the location and abundance of invasive species made during field surveys, invasive species are not strong competitors with native species.[11] In the professional opinion of the BLM botanist, these invasive species will continue to be present along roads in and adjacent to the proposed Power Mill Thinning area, but they are not expected to become strong competitors with native species. Washing of earth moving and logging equipment before entering BLM land, visual inspection of that equipment by BLM personnel, and monitoring invasive species after logging, have been proven over the last decade to reduce the risk of spreading invasive species to a very low level.

Seeding native species on exposed soil associated with roads has been demonstrated on BLM land for more than a decade to consistently abate the establishment of invasive/non-native species on disturbed soil associated with roads where significant sunlight reaches the ground.

Native species have historically established themselves on disturbed soil in the forest interior, abating establishment of invasive/non-native species in these locations.

This trend has been observed during post-harvest monitoring of BLM thinning projects for more than a decade.

Within the Riparian Reserve LUA:

Stand Structure and Development

Observed Characteristics and Direct Effects Immediately after Thinning:

The thinning prescription and logging methods are essentially the same in the Riparian Reserves as they are in the adjacent Matrix portions of the treatment area. Therefore, the environmental effects would be the same as thinning in the Matrix, and only differences in emphasis and objectives will be described below.

Thinning to the same average relative density in the Riparian Reserves as Matrix and retaining the largest trees and less common species regardless of spacing would aid in developing older stand characteristics. The small clumps and gaps created by spacing variation would also introduce variation in the density, distribution and species mix of ground cover plants and brush and conifer understory. Tree species that are less common than the Douglas-fir which dominates these stands would be expected to have higher survival and growth rates than would be expected if the stands were not thinned.

[11]When invasive species are not strong competitors with native species in a particular setting they are not likely to weaken or displace the native species population.

Skyline corridors would create linear openings in the canopy oriented up and down slopes. These openings would not change the character of the stand at ground level because the width of the corridor (12 feet) is less than the average leave tree spacing (average 21-25 feet, ± 25 percent). Skid trails would be visible on the ground and take one to two decades longer to grow ground cover and understory than the adjacent area that is not compacted by skid trails.

Figure 1: Typical dense stand with complete canopy closure proposed for treatment. 9S-2E-sec. 11 BLM file photo, 2010.

Figure 2: Typical Stand resulting after treatment approximately one year after thinning. T9S-R2E-section 5. C. Papen 9/2010

Figure 3: Thinned stand with retained snags approximately one year after thinning: T9S-R2E-section 5. C. Papen 9/2010

Observed Characteristics and Trends in the Long Term:

In the next 20 years, growth on the retained trees should continue at a steady rate, which would be greater than the growth rate if the area remained unthinned. The crowns would expand and fill the spaces created by the thinning and the site should be fully occupied so that the growth rate begins to slow by the end of the second decade after thinning.

The understory vegetation in the thinned area should be well established and vigorous by year five, but start to become less vigorous after about 15 years as the conifer crowns grow and less light reaches the forest floor.

Indirect Effects:

When an overstocked forest stand is thinned and fewer trees compete for site resources (light, nutrients and water), the retained trees respond in predictable ways:

- Within one to two years diameter growth rate increases noticeably, as can be seen in the width of annual rings. This faster growth rate is maintained for several years (5-20 or more years depending on how widely spaced the trees are and other site specific factors) until the crowns close again and start shading out the lower limbs in a process called "self pruning". Even when growth slows, growth is usually still faster than it would have been without thinning because the crowns are wider and deeper (more needles for photosynthesis) than in an overstocked stand. This develops larger diameter trees faster than they would develop in an overstocked stand. Large diameter trees are one characteristic of late-successional forests.
- Branches grow larger and longer as they grow into open space instead of competing directly for space with branches from neighboring trees. Since these branches still have enough light to continue growth, they do not die and "self prune". Larger diameter branches are one of the characteristics associated with late-successional Douglas-fir forests.
- When branches live longer before self pruning, the crowns are "deeper", they comprise a larger percentage of the total height of the tree. This also contributes to increased photosynthetic surface area. Deeper crowns are another characteristic of late-successional Douglas-fir forests.

Thinning the Douglas-fir component while retaining and releasing locally underrepresented conifer species and hardwoods would move the composition of these managed Douglas-fir stands toward a more natural species mix. Thinning opens the canopy so more light reaches the interior of the forest stand and stimulates growth in the understories to contribute toward meeting the management objective for multi-layered stands.

Riparian Reserve stands tend to be located on stream canyon slopes rather than on exposed upland ridges so they tend to be more sheltered from high winds than Matrix stands on exposed ridges. The BLM expects, based on experience with similar projects, even less windthrow in Riparian Reserves than in Matrix stands.

Trees that are damaged from breakage during felling, log movement, and logging equipment would add to habitat for cavity excavating/nesting wildlife species through the natural decay process, and eventually become snags or woody debris.

Long Term Management Objectives:

Riparian objectives include recruiting large snags and coarse woody debris. The trees retained when thinning would continue to grow and develop large diameters over time.

Large diameter dead wood (snags and CWD) is another feature of late-successional forest. Large diameter dead wood is considered to be more valuable than smaller diameter dead wood because it lasts longer, does not change moisture content as quickly or as drastically as smaller dead wood, and is used by more species than smaller diameter dead wood. It is axiomatic that it takes a large live tree to be source material for large dead wood. Disease, lightning and windthrow will probably create some snags and CWD over time.

These trees would generally be healthy for the next several decades, with some natural mortality and windthrow. If there is not enough natural mortality and windthrow to meet snag and CWD objectives, it may be necessary after two or three decades to create more snags from these larger healthy trees or fall some of them to create more CWD. If management intervention is needed to cause mortality, large green trees would be available as source material sooner in a thinned stand than in an overstocked stand. Under current management plans, these treatments would be done in 20-30 years along with the next management entry into the adjacent Matrix/GFMA stands.

At that time the treatments and stand development between the two land use allocations would diverge into different treatment prescriptions. Riparian Reserve stands would be managed to enhance late successional characteristics and/or develop uneven aged stand structure while Matrix/GFMA stands would be managed primarily for timber production.

Spatial and Horizontal Complexity:

Immediately after thinning the Power Mill Thinning project area would have a higher degree of complexity on a landscape level than it currently has due to spacing variation within thinned stands, and the untreated areas adjacent to the thinned stands. The untreated areas include stands of almost pure hardwoods and brush, mixed conifers and hardwoods, and high-density conifer stands. As each of these stands continue to mature and be influenced by natural forces over the next 20 years and beyond, the different niche habitats provided by each stand type should continue to develop increasing complexity and diversity.

Future silvicultural treatments may be done in 20-30 years to further develop this variation and complexity. Figures 1, 2 and 3 (previous pages) show some of the visual differences in stand characteristics that typically result from thinning prescriptions proposed in the Matrix LUA.

3.2.1.2 Cumulative Effects

No adverse cumulative effects are expected with regard to stand structure and development because the proposed thinning would maintain a forested setting in the same age class as before thinning. Positive cumulative effects at a landscape level include increased habitat diversity as treated stands develop differently from untreated stands and from recent plantations on private land.

No adverse cumulative effects to Threatened, Endangered (T/E) and Special Status Species (SSS) are expected because no suitable habitat to support T/E species was identified within the proposed project boundaries and no SSS were found.

Suitable habitat for SSS will remain in the proposed thinning area because thinning will not remove such habitat, and suitable habitat for SSS will remain undisturbed adjacent to the proposed thinning areas. The proposed project will not contribute to the need to list any SSS as Threatened or Endangered. Positive cumulative effects for these species would be expected as a wider variety of habitat types develop as described above.

In addition, no cumulative effects are expected with regard to invasive/non-native plants because the project would not contribute to the spread of invasive species populations or to the introduction of new species. When similar projects have been implemented on BLM lands in the vicinity, there has been little or no difference in the composition or numbers of invasive/non-native species populations.

3.2.1.3 No Action Alternative

Stand Structure and Development (all land use allocations)

The forest stands would continue to grow, but at a reduced rate. In the Matrix/GFMA LUA, at rotation age there would be smaller diameter trees to harvest and total net yield could be reduced below the potential for the site.

Especially important to the Riparian Reserves, crowns would continue to close together and there would be more suppression mortality (smaller trees would be shaded and die) resulting in more snags and down wood.

Because the smaller trees in the stands are generally the ones that die from suppression mortality, the snags and down wood created would generally be smaller than average stand diameter and would generally not meet desired criteria for large snags (>15 inches diameter and >15 feet tall) or RMP standards for CWD (>20” diameter and >20 feet long).

Within the Riparian Reserve LUA especially, there would be slower development of the 15+ inch DBH trees desirable for future snags and 20+ inch diameter trees desirable for future coarse woody debris recruitment. Fewer of them would reach these sizes within the next 20 years. Crown closure would further reduce the amount of light reaching the forest floor so understory vegetation would be reduced in quantity, size and diversity compared to current levels. Shading and self-pruning of the lower limbs would result in more clean bole (no live limbs), reduced crown ratios (height of the live crown relative to total tree height) and less potential for large diameter limbs to develop.

Threatened/Endangered/Special Status/Special Attention/ Survey & Manage Plant Species

With no human caused changes and excluding natural disturbances to the habitat that currently exists at the proposed project sites, no impact to any known or undiscovered Threatened, Endangered, Special Status, or Survey and Manage botanical species would be expected to occur.

However, as the habitat in the proposed project area naturally changes over time, species composition for the different botanical groups would constantly change (some species would increase and others decrease) during different stages of succession as suitable environmental conditions and substrates become available.

Invasive / Non-native Plant Species (including Noxious Weeds)

Without new disturbance, existing populations of invasive/non-native plants would likely decline due to competition with native species. Invasive/non-native species would likely maintain a small population along roads and in natural openings. Population size may increase in areas where natural disturbances occur. Management activities on land not managed by the BLM and public access into the area may result in introducing additional species, or increasing populations of species that are currently in the area. Natural events that disturb soil may result in new or expanded populations of these plants that would then decline because of competition with native species.

3.2.2 Hydrology

Sources Incorporated by Reference: *Hydrology/Channels/Water Quality: Specialist Report for the Proposed Power Mill Thinning Project, (Hawe, 2010) (Hydro Report), WEPP (Water Erosion Prediction Project) Report for Power Mill Thinning (Hawe, 2010) (WEPP Report)*
Methodology: The Water Erosion Prediction Project (WEPP) soil erosion model was used to predict potential changes in erosion and sediment yield from actions proposed in this EA. Documentation of the WEPP model is available at the following web site: http://fsweb.moscow.rmrs.fs.fed.us/fswepp (Hydrology Report pp. 25-27). The BLM Hydrologist used criteria provided in the BLM publication *Riparian Area Management. A User Guide to Assessing Proper Functional Condition and the Supporting Science for Lotic Areas* (USDI., 1998); and compared conditions here to similar channels in the Western Cascades to assess project area channel conditions.

Affected Environment

Project Area Setting

The project area is located in the Oregon Western Cascades range at elevations between 750-3,200 feet[12]. Most of the project units are at a lower elevation below the transient snow zone (TSZ), an elevation zone subject to rain-on-snow events (ROS) that have the potential to increase peak flows during winter or spring storms. This zone varies with temperature during winter storms but is assumed to lie between 1,500 - 3,000 feet in elevation. The project area receives approximately 70-100 inches of rain annually and has a mean 2-year precipitation event of 3.5 inches in a 24-hour period (estimated at: http://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm).

The project area drains to four separate 6th field sub-watersheds (Lower and Middle Little North Santiam and the North Santiam River-Walker Creek and Mad Creek) with approximately 24,000 acres (36.8 miles^2) in combined drainage area. All of these are tributary to the North Santiam River 4th field watershed #17090005.

[12] Unless otherwise indicated, geographic information is an estimate derived from the BLM's GIS database.

The North Santiam River is part of the municipal water source for the Cities of Salem, Mill City, Gates, Lyons/Mehama and Stayton and the project lies within the municipal watershed of most of these communities (Gates is upstream of the project area). The Little North Fork Santiam is a Tier 1 key watershed, as defined in the Northwest Forest Plan.

Channel and Wetland Morphology (ACS Objective 3)

Intermittent Stream Channels

The project area is situated in the Western Cascades physical province and streams reflect the geologic origin of the area.[13] Most of the terrain around the units to the south is composed of undifferentiated tuffaceous rock, tuffs, and basalt of volcanic origin dating from between 18-35 million years ago (Walker, 1991). There is a mapped fault line running north-west along the ridgeline across T9S, R2E, section 23. In the northern units, the rock is predominately composed of more recent basaltic-andesitic lava flows (17 million years ago).

The eastern half of T8S, R3E, section 29, and T9S, R2E, section 11 are composed of recent landslide and debris-flow deposits (Holocene and Pleistocene ages) which are still potentially active.

Stream channels immediately adjacent to the proposed treatment units are a mix of first order headwater channels with intermittent or ephemeral flow and 3rd- 4th order perennial channels.

Stream channels in the project area were field reviewed by the area hydrologist in 2009 and 2010. The small headwater tributary channels formed in the deep soils of the benches and ridges in the project area flow intermittently on the surface before disappearing underground, only to pop out again down-slope. It's likely that ground water and intricate patterns of subsurface flow, as opposed to surface run-off, is the primary system of water delivery to these channels. Most are moderate gradient (4-10 percent) with small substrates reflecting the adjacent soils.

Utilizing the Montgomery-Buffington typology (Montgomery & Buffington, 1997), these channels would be classified as colluvial: "small, headwater streams at the tips of a channel network that flow over a colluvial valley fill and exhibit weak or ephemeral fluvial transport." Most have too low of a gradient to be subject to debris torrents or landsliding.

Project area channel reaches observed on BLM are currently in proper functioning condition (PFC) because there is adequate vegetation, landform, or large woody debris present to: dissipate stream energy, filter sediment, aid ground-water recharge, aid floodplain development, stabilize streambanks and maintain channel characteristics.

A determination of "proper functioning condition" means that the channel elements and physical processes are in working order relative to an area's capability and potential. It does not mean that the channel is functioning at full biological potential or that nothing could be improved by human intervention (i.e., placing additional wood structure, repairing infrastructure, thinning adjacent forest, etc.).

[13]For a more detailed description of stream channel formation and geomorphology the reader is referred to ***Geomorphology of Steepland Headwaters: The Transition From Hillslopes to Channels*** (Benda et al., 2005).

Perennial Stream Channels

The small headwater tributaries adjacent to the proposed treatment units eventually reach the larger, perennial streams such as Big Creek or Kiel Creek. These larger 3rd and 4th order streams have entrenched into valleys with moderately steep adjacent slopes (average 50-60 percent). There is a low to moderate supply of gravel and cobble sized material actively transported in these Rosgen "B3" channels (Rosgen 1994, 1996). Utilizing the Montgomery-Buffington typology, these perennial streams would be classified as step-pool channels: "Step-pool morphology generally is associated with steep gradients, small width to depth ratios, and pronounced confinement by valley walls."

Some of these channels are shaded by diverse stands of hardwoods and second growth conifer with a well developed shrub and herbaceous understory. Shade is in abundant supply, banks are stable and channel morphology is controlled by bedrock features with a cobble-boulder bed. Wood supply in project area channels is low. These channel types are highly resilient and unlikely to be altered substantially by disturbance. Utilizing the same PFC criteria described earlier, all of the perennial channels on BLM viewed in the field by the area hydrologist are currently in "proper functioning condition."

Existing roads and Stream Channels

Where roads cross streams, channel morphology is generally altered in a predictable manner that affect channel equilibrium (the relationship between the channel's morphology and its ability to transport materials and water)[14]. Within the area occupied by the road prism vegetation is removed, the channel surface, banks and bed are compacted, the original channel is buried by road fill, and the channel morphology is reduced to the dimensions of the culvert.

In most locations culvert dimensions (shape, area and slope) are adequate to allow for the transport of most or all of the water, sediment and organic materials from upstream and the stream is said to be "at grade" and channel morphology upstream of the road fill is not affected. However, in other cases, the reduced area imposed by culverts and/or collapsed road beds have restricted the passage of water, sediment and organic materials from upstream resulting in the deposition of sediment above the crossing and the stream is said to be "aggraded". This condition occurs at approximately 13 existing stream crossings on the proposed haul route.

The length of aggraded channel upstream of culverts varies with channel morphology and the supply of material and water, but (based on professional judgment and observation) is generally restricted to less than 100 feet on the small streams in the project area. Occasionally, deposition upstream from culverts completely blocks stream flow through the culvert and high water actively erodes the road fill, as was observed at one of these culverts on road 9-3-19.

Project Area Wetlands

There are no wetlands in the project area identified on National Wetlands Inventory maps, the BLM GIS wet areas theme (for wetlands, ponds and lakes), or the BLM GIS Timber Production Capability Classification (TPCC) theme which has a category for sites with high water tables.

[14] See: http://www.krisweb.com/hydrol/channel.htm for a discussion of factors in channel equilibrium.

Field review of the project area identified some small ponds and wetlands, and areas with high water tables. GIS and TPCC data bases have now been updated to show these features. These areas would be excluded from the proposed treatment units.

Project Area Hydrology (ACS Objective 6)

There are two U.S.G.S. gaging stations several miles downstream of the project area on the Little North Fork Santiam near Mehama (http://waterdata.usgs.gov/nwis/uv?14182500) and on the North Fork Santiam River in Mehama (http://waterdata.usgs.gov/nwis/uv?14183000). Stream-flow is assumed to be typical of western Cascades streams where most runoff occurs during winter storm events[15].

Base Flow

Base-flow or low-flow occurs during late summer and early fall when mean stream discharge drops below 20 percent of the mean winter flow. Many small headwater channels dry up completely during this period.

Peak Flow

Peak flows occur following a rapid and substantial depletion of the snow-pack during prolonged rain-on-snow periods (ROS) in the transient snow zone (TSZ) estimated to lie between 1,500 feet and 3,000 feet elevation.

The two largest peak flow events in the last century took place in December of 1964 and in February of 1996. The ’64 event was estimated at or above a 100 year flood return interval while the ’96 was approximately a 50 year event; both were in response to substantial snow pack melt-off. The State of Oregon has estimated peak flows for most watersheds in Western Oregon, including project area watersheds. These estimates may be viewed at the following web site http://map.wrd.state.or.us/apps/wr/wr_mapping/. Project area stream flow (including peak flow) was analyzed for the Power Mill project. (Hydro Report pp. 10-12)

Potential for Peak Flow Augmentation Due to Forest Harvest: Current Condition

A preliminary analysis for the risk of increases in peak flow as a result of forest harvest was conducted using the Oregon Watershed Assessment Manual watershed analysis methods for forest hydrology (OWEB, 1997 located at http://www.oweb.state.or.us/publications/wa_manual99.shtml).

[3] For a more detailed description of watershed hydrology in forested regions of the Pacific Northwest the reader is referred to ***Physical Hydrology and the Effects of Forest Harvesting in the Pacific Northwest: A Review*** (Moore *et al*., 2005).

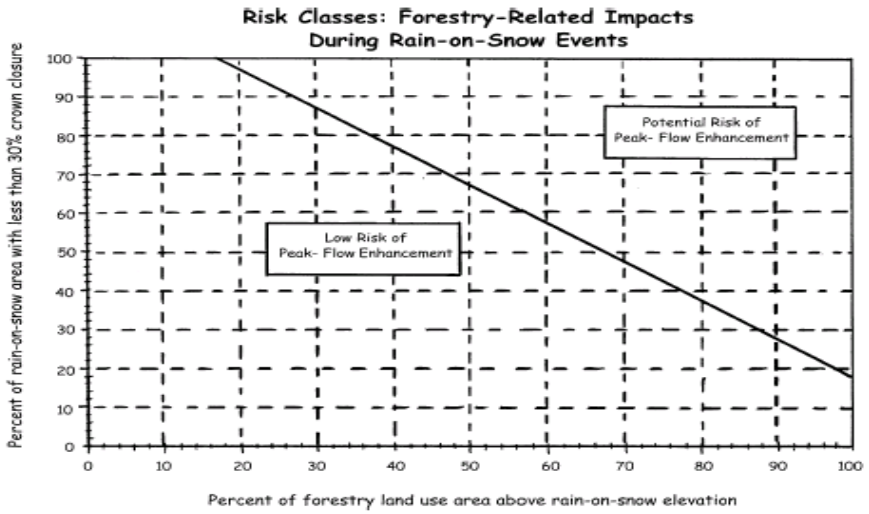


Figure 3. This graph is used to help you estimate the risk of peak-flow enhancement to subwatersheds from forestry-related impacts during rain-on-snow events.

Figure 4: (OWEB Figure 3, 1997) - Graph for determining risk of peak flow augmentation[16].

Analysis indicates that the risk is low that peak-flows have been increased as a result of openings in the forest canopy in all of the project sixth field watersheds. The proportion of the 6th field watersheds in the project area within ROS varies from a high of 55 percent in Mad Creek to a low of 27 percent in Walker Creek.

The risk of peak flow enhancement within each 6th field varies with the proportion of this area that has been recently harvested. The proportion of ROS area with current crown closure <35 percent ranges from a high of 45 percent in Mad Creek to a low of 26 percent in Lower Little North Santiam River. See Table 10. These numbers applied to the graph in Figure 4 shows that all sub-watersheds affected by the Power Mill project have a low risk of peak flow enhancement.

Table 10: Risk of Peak Flow Enhancement by 6th Field Watershed in Power Mill Thinning Project

6th Field Subwatershed Name	Watershed Area (acres)	Percent of Watershed in ROS Areas (Horizontal Axis – Figure4)	Percent of ROS area with <35% Current Crown Closure (Vertical Axis – Figure 4)	Peak-Flow Enhancement Risk
North Santiam – Walker Creek	17,872	27% (4,770 acres)	28% (1,155/4087 acres)	Low
North Santiam – Mad Creek	13,629	55% (7,428 acres)	45% (1,834/4,057 acres)	Low
Lower Little North Santiam	9,944	41% (4,072 acres)	26% (1,274/4,880 acres)	Low
Middle Little North Santiam	14,005	52% (7,308 acres)	41% (1,995/4,880 acres)	Low
Total	55,450			

[16] OWEB, 1997 located at http://www.oweb.state.or.us/publications/wa_manual99.shtml

Roads and Peak Flow/Water Quality

Based on the analysis of road proximity to streams documented in the Hydro Report (pp. 10-11), none of the sixth field watersheds in the project area are currently at risk for augmentation of peak flows due to the road network in the watershed. Figure 5 displays channel network expansion at road-stream intersections for project watersheds.

Channel network expansion values from roads in the project area 6th field watersheds range from a low of 7 percent in the Little North Fork Santiam to 10 percent in North Santiam/Walker Creek. The Wemple study concludes that drainage density increases due to road stream intersections of approximately 20 percent or greater (indicated by the line on the chart) have the capacity to alter both the timing and quantity of peak flows. Channel network expansion in these four 6th field watersheds is less than $^{1}/_{6}$ of the extent that this study indicates would potentially alter flows.

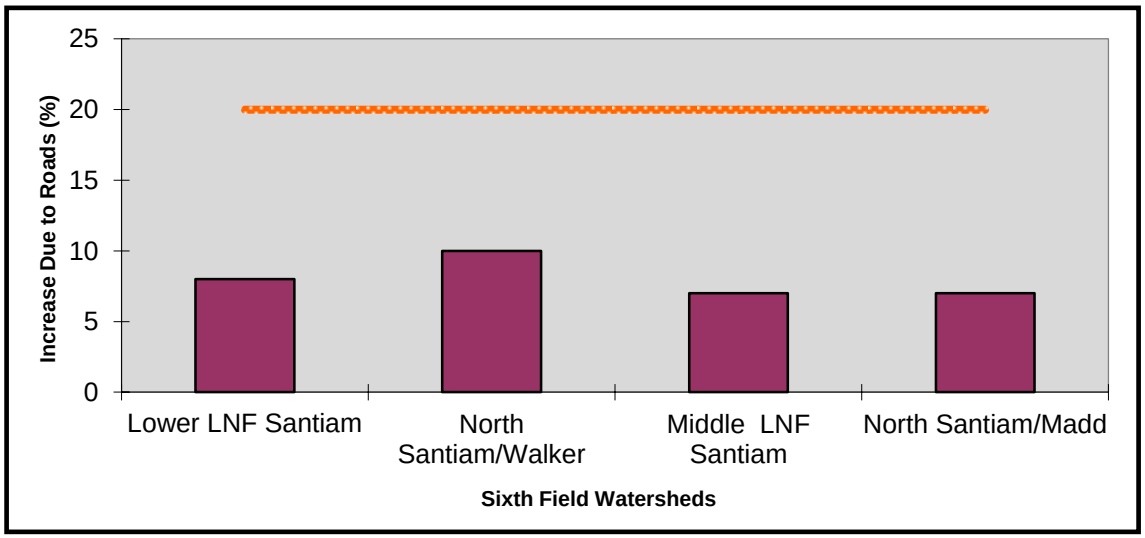


Figure 5: Estimated channel network expansion at road-stream intersections for project watersheds. Data estimated from Salem District ARC-GIS

Project Area Ground Water

The Oregon Department of Environmental Quality (ODEQ) has not identified any groundwater pollution problems within project watersheds. The Oregon Water Resources Department (OWRD), together with the ODEQ, is responsible for the regulation and protection of ground water quality and quantity. See http://www.deq.state.or.us/wq/groundwa/wqgw.htm. Local conditions of groundwater relative to quantity, location, flow and quality is understood only in a general sense.

Interaction between surface flow and subsurface flow is intricate and varies across the landscape in response to conditions in soils, topography and lithology. The moderately deep soils in the project area uplands are well drained and generally lack horizons, which impede water infiltration. Precipitation is free to saturate soil surface horizons and flow deep into the subsurface, as well as down-slope, under the influence of gravity.

Soils in the project area have relatively high rates of water movement as indicated by infiltration rates between 0.25 – 2 inches/hour. As a result, under natural conditions, most precipitation either drains through the soil profile or is evapo-transpired.

Soil surfaces which have been deeply compacted have reduced rates of water infiltration therefore, less precipitation can reach the subsurface and a larger proportion of the water puddles near the soil surface, where it either runs-off, transpires or evaporates. In deeply compacted surfaces we can expect a proportionate reduction in ground water storage and flow. In urban areas, where large proportions of the surface prevent infiltration, this effect is significant, and alterations in flow and ground water storage may be measurable. In the project area however, steep topography and the high spatial and temporal variability of compacted surfaces tend to nullify this effect. Forest roads and landings are an exception to this. By intersecting ground water and rerouting it to surface streams, roads can alter patterns of subsurface flow. This conversion of ground water to surface run-off can alter the timing and size of peak flows and result in a proportionate reduction in water available for ground water storage (see the previous discussion "*Peak Flow/Water Quality Effects from Roads").*

Water Quality and Beneficial Uses (ACS Objectives 4, 5)

Oregon Department of Environmental Quality (ODEQ)

The ODEQ, under the Clean Water Act, has been delegated authority to protect the quality of all waters in the State of Oregon. Established water quality standards "not to be exceeded" for all waters of the state are published in the Oregon Administrative Rules, Chapter 340, Division 41 (Willamette Basis standards begin with 442). In addition, updated water quality standards have recently been approved by the US EPA. These standards may be reviewed at http://www.deq.state.or.us/wq/standards/Temperature/FinalRules340-041.pdf.

Designated Beneficial Uses

The State of Oregon designates the beneficial uses for which all waters of the state are utilized. Water quality standards are ultimately meant to protect these uses. Both resident and anadromous fish are downstream from several of the proposed units (see Table 11).

Several municipal water providers withdraw water from the Lower North Santiam to treat and provide city residents with drinking water.

The City of Salem Public Works (PWS# 4100731), Mill City Water Department (PWS #4100520), City of Gates (PWS# 4100317), the Lyons Mehama Water District (PWS# 4100493), and Stayton Water Supply (PWS# 4100843) have withdrawals downstream of the project area. Additional beneficial uses include: Industrial Water Supply, Wildlife & Hunting, Fishing, Boating, Anadromous Fish Passage, Water Contact Recreation, and Aesthetic Quality. Designated beneficial uses for the Willamette may be viewed on-line at: http://www.deq.state.or.us/wq/standards/uses.htm.

Willamette Basin TMDL: Effective Shade and Stream Temperature

The existing riparian vegetation in the project area is adequate to maintain perennial streams in the temperature range required by the ODEQ under the Clean Water Act because the shade produced does not allow sufficient light to penetrate and increase summer stream temperatures above standards.

Based on field surveys of streams and riparian zones in the project area, review of aerial photographs and IVMP data, the area hydrologist concluded that effective shade is near to full potential along most of the perennial streams on BLM ownership in the project area with effective shade exceeding 80 percent along most reaches.

The DEQ's 2006 303d List of Water Quality Limited Streams is a compilation of streams which do not meet the state's water quality standards (http://www.deq.state.or.us/wq/assessment/rpt0406). The North Santiam and Little North Fork Santiam Rivers did not meet the State of Oregon's standards for stream temperature. In response, the ODEQ completed the Willamette Basin Total Maximum Daily Load assessment (TMDL) in 2005 (http://www.deq.state.or.us/wq/TMDLs/docs). Essentially, the TMDL requires the recovery or maintenance of full potential shade along all perennial streams in the Willamette basin.

According to the TMDL, effective shade is a surrogate measure for the heat load a stream receives when it is exposed to direct sunlight. Maintaining or recovering site potential levels of effective shade should result in reductions in stream temperatures to levels that achieve state standards. The BLM had access to limited stream temperature data in the project watersheds. The Little North Santiam Watershed Analysis indicated that summer stream temperatures on the main channel of Little North Fork Santiam downstream of the project area were found to be above the State of Oregon's threshold of 17.8 C.

Dissolved Oxygen, pH, and Conductivity

No data for these variables in the immediate project area was located for this assessment. Considering the low stream temperatures in the immediate project area (temperature limited streams are outside of the project area), together with full forest cover, it is likely that DO and pH levels are within the range of natural variation and meet state standards.

Sediment Supply, Transport and Turbidity[17]

Limited data for stream turbidity or sediment delivery in the project area was located for this assessment. Some storm turbidity data was collected throughout the Little North Fork Santiam by the BLM in 1996. Kiel Creek was identified as exhibiting "high" turbidity values during large storm events.

Field surveys of the channel also noted moderate to high "embeddedness" (fine sediment packed in between larger sediment on the channel bed) and evidence of large supplies of fine sediments.

[17] Turbidity is a measurement of water clarity and is not convertible into a volume measurement of sediment yield unless correlated to suspended sediment data. For a description of sediment supply and transport processes in forested watersheds and the effects of forest management on these processes the reader is referred to Suspended Sediment Dynamics in Small Forest Streams of the Pacific Northwest (Takashi *et al*, 2005).

Source areas for fine sediment are likely channel adjacent slopes that are steep and, in some cases unstable, often due to the geology of the Kiel Creek drainage (i.e., ancient landslide terrain) as well as forest management disturbance including poorly maintained roads and logging.

Environmental Effects

3.2.2.1 Proposed Action

Channel and Wetland Morphology (ACS Objective 3)

Direct and Indirect Effects - Channel and Wetland Morphology

In general, there would be no direct alteration of the physical features of the project area stream channels or wetlands under this proposal. Stream protection zones (no-cut buffers) protect stream banks, wetlands and channel beds from direct physical alteration or disturbance by harvesting equipment.

With the exception of the normal cycle of road repairs at stream crossings, disturbances are kept a minimum of 85 feet from all wetlands and perennial stream channels and 30 feet from intermittent channels.

The Proposed Action would not affect stream flow in a measurable manner therefore, any indirect effects to stream channels as a result of increases in peak flows is unlikely. As a result, the Proposed Action would not result in any measurable effects to channel morphology, such as increases in bank erosion, channel incision, loss of floodplain connectivity or alteration of local wetland hydrology that could result from augmented peak flows or altered watershed hydrology.

There would be no effect to perennial channels from new construction because none of the new roads proposed would cross any perennial stream channels or wetlands. However, renovation of some stream crossings on roads that have not been maintained is proposed. In general, installing larger culverts and more stable fills to replace undersized or failing culverts and fills would allow for improved channel morphology over the long term; increasing the culvert's capacity to provide adequate passage for water and wood debris during peak flows. Following culvert replacement some slight channel adjustment to grade or width may occur within the first year (varies with the timing and magnitude of storm events) following disturbance as the channel bed and banks reach equilibrium with flow and sediment transport.

Based on the field hydrologist's previous experience with these types of channel crossings, long-term effects to channel function or morphology from disturbance at stream crossings would be unlikely because the channels are resilient, and would adjust to accommodate the new structures without creating bed or bank instability. Channel morphology adjustments would not extend more than 100 feet upstream or downstream from the site of disturbance.

Effects from maintenance and repair of stream crossings (road renovation) would be limited to the site of disturbance, and would not result in any alterations to channels or floodplains downstream or elsewhere in the watershed.

Indirect effects, such as increases in bank erosion, channel incision, loss of floodplain connectivity or alteration of local wetland hydrology, to stream channel or wetland morphology or function would be unlikely because of the stability and resiliency of channels in the project area.

Project Area Hydrology (ACS Objective 6)

Direct and Indirect Effects – Watershed Hydrology

Water Yield, Base Flow, Fog-Drip, and Peak Flow

Implementation of the Proposed Action would result in some incremental increase in annual water yield correlated to the partial removal of the conifer over-story. However, "the increase in fall and winter discharge from forest activities is likely to have little biological or physical significance" (US EPA. 1991). The BLM is confident that the proposed action would not have a detectable effect on fog drip or a detectable effect on the base flow in project area streams because no studies have documented reductions in fog drip where less than 20 percent of the watershed is in an open condition, as in this case.

Approximately 90 acres of the proposed treatment units lay in a zone subject to transient snow accumulations (TSZ) in the winter.

The reduction in stand density would result in some increase in snow accumulation on the ground in these areas because there would be less canopy interception and sublimation.[18] The State of Oregon method for determining risk of peak flow augmentation does not consider forest with a canopy cover greater than 30 percent to be a contributing factor in rain-on-snow (ROS) events. Consequently, since all of the units to be treated would have a final canopy cover of greater than 50 percent it is expected that any increase in snow accumulation and melt-off during ROS events would remain low.

Openings would only affect tributary channels in these watersheds, not the main Little North Fork Santiam or the North Fork Santiam main-stem. In addition, the North Santiam is flood controlled upstream of the project area so that any increases in peak flows in tributary channels from the project area are unlikely to translate into cumulative changes in the main North Santiam channel.

The project would maintain the current condition and trends relative to hydrology and stream flow, and would not reduce or increase the effects to peak flows attributable to the current road network. The 3.9 miles of new road construction would be designed so that they would not connect to the stream network, so there would be no additional pathway for runoff to reach streams compared to the current road network.

The Power Mill Thinning project would therefore maintain the current condition and trends relative to hydrology and stream flow. Currently, the risk of hydrologic change that would be caused by the road system is low (see discussion in Affected Environment).

[18] Montesi et al, 2004. As much as 30% of the snow-pack may return to the atmosphere in the sublimation process alone.

Additionally, area specialists inventoried existing roads and their recommendations for improvement and repair of road surfaces would be implemented under the Proposed Action. These actions would divert almost all of the intercepted rainfall on these roads to vegetated soil surfaces where it can re-infiltrate before reaching streams.

All of the proposed new road construction is temporary, is located on slopes generally under 20 percent, and would not require full bench or extensive cut and fill construction. Cuts and fills would generally be less than two feet. Roads constructed on these surfaces result in little or no sub-surface disturbance. These roads would have no discernible effect on sub-surface or groundwater flow and thus have no effect on the timing or volume of stream flow in the watershed (Wemple et al, 2003).

Since no additional permanent stream crossings are proposed, there would be no additional routes for water intercepted by road surfaces to reach streams. Intercepted rainfall on these roads would be drained to the adjacent undisturbed forest floor where, because of the high permeability of forest soils, it quickly infiltrates into the ground. Under these circumstances, road construction has a low risk of altering watershed hydrology or peak flows because intercepted water does not reach stream channels any faster than precipitation, which falls on the forest floor.

Ground Water

The Proposed Action is unlikely to affect the flow, quantity or quality of watershed groundwater because the action would not alter in a measurable manner patterns of surface flow and runoff, so there is little capacity to affect groundwater patterns, which are intimately linked to the surface.

The proposed project would have no potential effect on ground water quality because no BLM action on this project would affect nitrate, pesticide, volatile organic compounds or bacteria levels analyzed by DEQ. The proposed project would not affect ground water quantity because it would not affect the total infiltration capability of the project area, nor would it displace infiltration in any area by more than a few feet (half the width of skid trails, roads or landings).

Water Quality (ACS Objective 4)

Direct and Indirect Effects - Water Quality

Summer Stream Temperature Maximums in Perennial Streams

Summer temperature maximums in perennial streams adjacent to the proposed thinning areas would not increase because vegetation providing shade would not be cut or removed in the SPZ. The average canopy closure in the secondary shade zone that contributes to effective shade would be maintained above 50 percent, which would not allow enough light to strike the water surface to increase the heat load.

These measures are described in the Northwest Forest Plan Temperature TMDL Implementation Strategies (USFS and BLM, 2005). By implementing them, the proposal would maintain stream temperatures in their current range, and protect current beneficial uses.

Dissolved Oxygen, pH and Conductivity

The Proposed Action would not have any measurable effect on dissolved oxygen (DO) levels in project area streams because the project would not measurably change the factors that contribute to reduced DO. The Proposed Action would not place large amounts of fine organic material in the stream, would not alter re-aeration, and would be unlikely to result in any measurable increase in stream temperature or sedimentation. Available data indicates that most forest management activities have little effect on pH or conductivity (US EPA, 1991).

Turbidity (Hydrology Report 20-24)

In most cases, management practices with the potential to accelerate erosion fall into three categories: road construction/maintenance, timber harvest or "yarding," and site preparation for reforestation (particularly prescribed burning).

The project is unlikely to be affected by mass wasting because all proposed treatment units are outside of any areas that are identified as unstable or prone to mass wasting in the TPCC and/or identified in the field. Areas with potential for slope instability and mass wasting were identified and verified by BLM personnel during work for the project proposal.

Tree removal is not proposed on steep, unstable slopes where the potential for mass wasting adjacent to stream reaches is high as defined by the TPCC. Continuous forest cover and its root structure would be maintained. Therefore, increases in sediment delivery to streams due to mass wasting induced by loss of root strength and increases in soil pore pressure are unlikely to result.

Due to the high infiltration capacity of native soils, heavy vegetative growth, and deep soil-duff layer the Proposed Action is unlikely to increase surface erosion. The Proposed Action would not lead to a measurable long-term alteration in sediment delivered to streams, stream turbidity, stream substrate composition, or sediment transport regime because project design features would eliminate and/or limit acceleration of sediment delivery to streams in the project area.

New roads would not be connected to the stream system and therefore no pathway would exist for delivery of any sediment to streams generated by their construction or use. All new road construction would occur on low to moderate slopes emanating from the existing road network, on stable surfaces (i.e., surfaces that are not contributing to landsliding or mass wasting) and therefore road related landslides in these locations are also unlikely.

All road construction would utilize the BMPs required by the Federal Clean Water Act (as amended by the Water Quality Act of 1987) to reduce non-point source pollution to the maximum extent practicable[19]. Since new road construction would occur on stable surfaces outside of stream protection zones and incorporate appropriate BMPs, there would be no opportunity for these roads to deliver sediment to the stream system.

Road renovation, maintenance and improvements of existing roads (i.e., added rock and blading of road surfaces), replacement of stream crossing culverts and removal of the blocked and eroding culverts in Sections 11 and 29 may increase turbidity (i.e., a visible reduction in water clarity) relative to background or upstream water clarity during this activity.

[19] See http://www.epa.gov/owow/nps/forestrymgmt/ for a review of applicable BMPs.

Turbidity may also increase slightly in the first winter following the project if storm events wash some of the fines off disturbed surfaces and deliver them to the stream.

The BLM hydrologist has determined this road work would maintain water quality standards and protect beneficial uses for the following reasons:

- Road renovation work, including replacing stream culverts, would occur during the driest period of the year, the "in-water work period," to avoid increasing turbidity of local streams during periods of higher flow.
- Based on research (see Foltz and Yanosek, 2005) conducted at culvert replacement projects in forested watersheds, turbidity levels at the sites of disturbance would be unlikely to exceed the State of Oregon WQ standards (>10 percent increase relative to background levels) beyond the mixing zone downstream (about 100 meters) and would decrease as disturbed surfaces (and the channel bed) become "armored" (i.e., fines are removed). A turbidity plume downstream from the disturbance may be visible during the actual project (such as the installation and removal of the temporary crossings) and would likely decrease by an order of magnitude within two hours after disturbance ceases. In-stream disturbance at these sites would probably be completed during one work day so any increase in turbidity would be unlikely to exceed eight hours.
- To further reduce potential increases in turbidity, flow in perennial channels would be captured and piped around the worksite. BLM staff would monitor turbidity as required by the State of Oregon, both visually and with a portable turbidity meter, during in-channel work at these sites. If Oregon State Standards were exceeded at anytime, BLM would stop all in-stream activities and require the contractor to take appropriate steps to reduce turbidity to acceptable levels.
- Foltz and Yanosek research further shows that increased turbidity produced by this project is unlikely to be visible or detectable beyond 800 meters below the site of the disturbance (see Foltz and Yanosek, 2005). No turbidity produced with this project is expected to reach the main channel North Santiam and Little North Santiam Rivers because this project is greater than 800 meters (0.5 mile) upstream from these channels.

Sediment Regime (ACS Objectives 5)

Tree harvest, including ground based logging, would not increase sediment supply to streams because of factors discussed previously, including: forest cover would be retained with at least 50 percent canopy closure, water would normally infiltrate rather than runoff and erode soil, untreated SPZ would further filter any runoff or subsurface flow during high rainfall events, and design features would prevent concentrating runoff from roads and areas compacted by logging operations.

It is unlikely that skyline yarding would increase sediment supply to streams because of the above factors and because BLM monitoring (Hawe, 2012) has demonstrated that there is no sediment-laden runoff from skyline yarding areas even during high rainfall events.

Water Erosion Prediction Project (WEPP) modeling demonstrates that thinning and skyline yarding done with the proposed project design features would result in surface erosion sediment yields that would not be detectable relative to background sediment transport in the main channels of the project area watersheds. Research in the Pacific Northwest has demonstrated over time that WEPP over-estimates sediment yields (Geren, 2006).

The Cascades Resource Area Hydrologist has conducted field reviews of skyline logging on similar sites in the Cascades Resource during multi-day rain storms and found no evidence of overland flow or sediment transport where WEPP had predicted sediment transport under similar conditions (Hydro Report pp. 25-26; Hawe, 2010; Hawe, 2012; WEPP (Water Erosion Prediction Project) Report for Power Mill Thinning.

The proposal would not increase bank erosion or channel cutting by altering channel roughness, redirecting flows or altering bank-stabilizing vegetation because project design features, including the SPZ around all streams, would eliminate most disturbance of stream-side vegetation and protect stream banks, wetlands and channel beds from direct physical alteration or disturbance by harvesting equipment.

Pile burning would not have any influence over water quality, stream channels or watershed hydrology and any effects to soils and hydrology would be short term and limited to the immediate site because the piles to be burned would be located on level ground outside of riparian areas so there is no delivery mechanism by which ash or soil from the pile locations could reach stream channels. Other fuel treatment methods (e.g. lop and scatter, mastication) do not create ash or erosion, so none could be introduced into streams.

3.2.2.2 Cumulative Effects

Channel and Wetland Morphology/Physcial Integrity (ACS Objective 3)

With the exception of road maintenance sites at stream crossings and the replacement of some culverts, this proposal would not result in any measurable direct effects to channel morphology.

At stream crossings, the proposal is not likely to result in effects that extend beyond the site of disturbance, these effects would be of relatively short duration (channel adjustment within one to three years) and occur at sites already altered by stream crossings and therefore the proposal would be unlikely to contribute to any cumulative morphological effects in these watersheds.

Water Quality (ACS Objective 4)

Overall, this proposal would not have any measurable direct or indirect effect on stream temperatures, pH, or dissolved oxygen. Current conditions and trends in water quality would likely be maintained under the Proposed Action. Therefore, the proposal has little or no potential for contributing to any cumulative effects to these water quality attributes in these watersheds.

The risk of short term (during the action and the first winter following) increases in stream turbidity as a result of road repair may contribute to increased turbidity levels directly below road/stream intersections (i.e., direct effect) but the BLM does not expect this to contribute to discernible negative impacts because:

- Magnitude of Effect (affected area): Increased turbidity produced by this project would not be visible or detectable beyond 800 meters below the site of the disturbance (see Foltz and Yanosek, 2005);
- Duration of Effect: Turbidity would be visible during the first winter following road repairs;
- Cumulative Actions:
  - Road repair and timber haul associated with harvest on private lands using the same haul route at the same time as the proposed action within the 800 meter affected area;
  - Cascade Crossing power line: Road repair and timber haul associated with harvest within the powerline right-of-way using the same haul route at the same time as the proposed action within the 800 meter affected area; and
- Turbidity levels would be maintained below the limits required by the Oregon State DEQ. Cumulatively the limited magnitude and duration of this effect would be non-detectable on the scale of the seventh field watershed and would be unlikely to contribute cumulatively to turbidity levels in the watershed.

Sediment Regime (ACS Objectives 5)

According to watershed analysis, past harvest activities and road building have likely increased sediment yields in the North Santiam relative to an undisturbed condition. Future harvesting on private lands will occur and this could also contribute to an increase in sediment yields which, combined with the current proposed action, could result in a cumulative effect.

However, given the high variability in logging methods, timing and spacial distribution across the landscape, it is not feasible to predict how much additional sediment *hypothetical* logging on private lands would produce. Therefore, it is assumed that quantities of sediment reported in the scientific literature represent a meaningful "average" that provides a basis for comparison.

Average annual suspended sediment yield was estimated at 0.227 t ac^{-1} for the Little North Fork Santiam for the years 2002-04 (see The North Santiam River Basin Turbidity and Suspended-Sediment Study at http://or.water.usgs.gov/proj/or00311/index.html).

Assuming an "average yield" of 0.227 t ac^{-1} in the Little North Fork Santiam (18,002 acres), total sediment yield would be approximately 4,086 tons/year. In the Walker creek sixth field of the North Santiam (10,117 acres) yield would be 2,297 tons/year. This average is assumed to be a result of all activities in the watershed, including harvest on private lands, and is therefore an estimate of the "cumulative" sediment yield in the watershed.

The proposed alternative would likely maintain sediment yield from the treatment units at the lower end of the range in sediment yields. The estimated average increase to 0.36 tons/acre/year of sediment yield directly attributable to the Proposed Action would be an increase of 31 tons/year. Accounting for the 50 percent estimated precision of the WEPP model, this represents between 0.25 and 1 percent of mean annual yield in the two watersheds. (As previously described, WEPP overestimates actual sediment yields.)

Given the inherent variability and error in sediment yield measurements[20], an increase of such small magnitude is not detectable with current technology. Typically, sediment yields from forest harvest decrease over time as a negative exponential (Dissmeyer, 2000). The quantity of surface erosion with delivery of sediment during large storm events would likely drop back to current levels within three to five years as the remaining forest stand fills out. Therefore, the incremental increase in sediment yield that could be attributable to the Proposed Action is of such a small magnitude and duration that it is unlikely to be detectable.

Watershed Hydrology (ACS Objective 6)

Since the proposal would not result in measurable direct or indirect effects to peak flow the proposal would not contribute to any potential cumulative effects to peak flows in these watersheds. Current condition of the watersheds in the project area indicates low risk for augmentation of peak flows due to forest openings.

This proposal would result in no net increase in forest openings in ROS areas with crown closure less than 35 percent and would not contribute cumulatively to the augmentation of peak flows even if they were occurring in these watersheds as a result of past forest harvest. Proposed road use and construction would not alter surface or subsurface hydrology or to contribute cumulatively to any change from current conditions in the watershed.

As there is unlikely to be any measurable direct or indirect effect to the watershed's ground water, the Proposed Action carries low risk for contributing cumulatively to effects either in the uplands or in lower valley positions.

3.2.2.3 No Action Alternative

The No Action alternative would result in the continuation of current conditions and trends at this site as described in the Affected Environment, above. Any existing effects in the watershed would continue to occur from the development and use of private and other agency lands (primarily agriculture, timber harvesting and road building).

3.2.3 Fisheries and Aquatic Habitat

Sources Incorporated by Reference: *Power Mill Fisheries Specialist Report, Zoellick, 2010) (Fisheries Report), Hydrology/Channels/Water Quality: Specialist Report for the Proposed Power Mill Thinning Project, (Hawe, 2010) (Hydro Report), Additional Sources Referenced: Logging Systems Report*

Methodology: BLM Fisheries Biologists conducted surveys of project area streams during the 2010 field season.

Affected Environment

Fish Presence and Aquatic Habitat in the Project Area

Coastal cutthroat trout (*Oncorhynchus clarki clarki)* (Behnke 1992) are fairly common on the project area.

[20] Accurate estimates of sediment yield are difficult to measure and may vary by two or more orders of magnitude (Morris and Fan, 1998).

They inhabit several larger tributary streams to the Little North Fork Santiam and North Fork Santiam Rivers, in and adjacent to units 11, 19, 21, 25 and 29, including Horse, Jeeter, Kiel and Anderson Creeks.

Additionally, cutthroat trout inhabit several smaller 2nd order headwater streams in Units 11, 19, and 25 (BLM Fish Inventories 2010). Other 1st and 2nd order tributary streams in the project area are too small and or steep to support fish populations. Cutthroat trout are also common in the Little North Fork and North Fork Santiam Rivers.

Other resident fish known to inhabit the North Fork Santiam River include speckled dace (*Rhinichthys osculus*), Pacific lamprey (*Lampetra tridentatus*), resident rainbow trout (*O. mykiss*), largescale sucker (*Catostomus macrocheilus*), and mountain whitefish (*Prosopium williamsoni*; North Fork Santiam Watershed Assessment, E & S Environmental Chemistry, Inc. 2002).

Threatened / Endangered Species

Upper Willamette River (UWR) winter run steelhead trout (*O. mykiss*), and UWR spring Chinook salmon (*O. tshawytscha*) are listed as 'threatened' under the Endangered Species Act of 1973 (ESA). Salmon and steelhead populations in the Upper Willamette River evolutionary significant unit (ESU) are substantially reproductively isolated from other populations and are an important component in the evolutionary legacy of those species (NOAA 2005). The Little North Fork Santiam River and the North Fork Santiam River provide habitat for these species, and are in the Santiam River sub-basin of the Upper Willamette River ESU. The Little North Fork Santiam River is managed as a wild steelhead fishery by the Oregon Department of Fish and Wildlife (ODFW), and is a key area for winter steelhead spawning and rearing (USBLM 1997).

Spring Chinook salmon and winter steelhead trout are distributed in the Little North Fork Santiam River from the confluence with the North Fork Santiam River upstream past the eastern boundary of Unit 29 (T.8S, R.3E; Streamnet 2006[21]).

Chinook salmon and winter steelhead trout are distributed the length of the North Fork Santiam River upstream to Big Cliff Dam. Additionally, ODFW has recently begun transporting hatchery Chinook salmon in excess of that needed for hatchery operations to the Breitenbush and North Santiam rivers upstream of Detroit Dam.

Table 11 shows the approximate distances downstream from proposed project units to resident cutthroat trout and potential ESA listed fish habitat Distances to Cutthroat trout habitat are in feet from treatment area (thinning) boundary to the stream bank. Distances to ESA Listed Fish are in miles from the treatment area downstream to recognized habitat.

[21] Upstream limits of anadromous fish distribution are obtained from streamnet.org or ODFW (1993) inventories. Stream distances were measured using ArcGIS software.

Table 11: Distance to Fish Habitat

Unit Number	Stream	Distance to Cutthroat trout habitat	ESA Listed Fish Species	
			Distance to Steelhead trout habitat	Distance to Chinook salmon habitat
11A	Jeeter Creek	100 ft	0.5	0.5
11B	Kiel Creek	≥70 ft	1.0	1.0
13A	Little North Fork Santiam River	0.5	0.5	0.5
17A/B	Little North Fork Santiam River	0.7	1.0	1.0
19A	Unnamed tributary to North Santiam River	0.2	2.4	2.4
19B/J	Unnamed tributary to North Santiam River	≥70 ft	2.2	2.2
19C-19I	Unnamed tributary to North Santiam River	0.5	2.1	2.1
21A	Anderson Creek	≥70 ft	1.2	1.2
25	Unnamed tributary to North Santiam River	≥70 ft	1.1	1.1
29	Big Creek	1.2	3.3	3.3

[a] *Upstream limits of anadromous fish distribution were obtained from Streamnet (2006) or Oregon Department of Fish and Wildlife (ODFW) data, if ODFW data indicated fish were distributed further upstream than delineated by Streamnet. Stream distances were measured using ArcGIS software.*

Stream Habitat Conditions

Stream channels on the project area are stable (generally gravel, cobble, or boulder dominated) and streambanks are well vegetated (>90 percent vegetated with riparian and streamside vegetation; BLM Fish Inventories 2010). Larger tributary streams on or adjacent to project units, including Jeeter, Kiel, and Anderson creeks, drop steeply to the North Fork Santiam and Little North Fork Santiam Rivers with gradients of 5 to 20 percent (USBLM 1997).

In-stream habitats of the Little North Fork Santiam River are rated in fair to good condition (USBLM 1997).

Pool frequency and area is generally good, but large woody debris (LWD) levels are low. In-stream habitat conditions (pool frequency, area, and quality) and LWD availability in Kiel and Jeeter creeks are generally rated as poor (USBLM 1997). LWD levels were also visually estimated to be low in Jeeter Creek (BLM Fish Inventories 2010).

Channel shape and form of Kiel Creek is degraded adjacent to the eastern boundary of Unit 11 where the stream was previously crossed by road 9-2E-12.1. When the culvert for this road crossing was removed, the channel was not restored to its original condition. About a half dozen large boulders that were placed at the former culvert outlet form about a 10 feet drop that is likely impassable to fish at most flows.

Proposed haul routes from Units 11, 13, 17, 19, and 29 cross perennial and/or intermittent channels within 0.5 mile of listed fish habitat in the two rivers, but roads are well graveled with proper drainage such that they would not deliver sediment to listed fish habitat when haul is limited to dry conditions during summer and early fall.

Haul routes from units 21 and 25 also travel gravel roads in good condition with the nearest crossing of perennial or intermittent channels greater than 0.6 mile upstream of listed fish habitat, such that no sediment would be delivered to listed fish habitat.

Environmental Effects

3.2.3.1 Proposed Action

Fish and Aquatic Habitat (ACS Objectives 2, 3, 8)

The proposed tree thinning would not impact channel conditions and fish habitat due to minimum no-harvest buffers (Stream Protection Zones [SPZs] of 100 feet on perennial streams, and 50 feet on intermittent 1st and 2nd order tributaries within one mile of the Little North Fork Santiam and North Santiam Rivers).

Stream buffers would be ≥ 85 feet on perennial streams and ≥ 30 feet on intermittent streams at distances >1 mile from the Little North Fork and North Santiam Rivers. These SPZs widths are adequate to intercept and infiltrate water carrying sediment preventing its delivery to streams and aquatic habitats (Olson and Rugger 2007, Rashin et al. 2006, CH2MHILL et al. 1999, and Hydrology Report), and prevent increases in stream temperature (BLM TMDL Implementation Strategy, Groom et al. 2011, Wilkerson et al. 2006).

Approximately 3.9 miles of new road would be constructed and about 8.4 miles of road would be renovated. Because the new roads are located on stable ground at distances of more than 200 feet from streams, and are designed to not increase the size of the stream network (Wemple et al. 1996), runoff from the roads would infiltrate into the soil before reaching stream channels. Thus, sediment from road surfaces would not reach stream channels and would not impact fish populations or aquatic habitats.

Road surfaces of renovated roads would also be constructed to drain surface water to adjacent gentle slopes where it would infiltrate into the soil and groundwater and not impact aquatic habitats or fish populations.

Renovated roads are located >200 feet from stream channels with the exception of 13 existing road crossings on 1st and 2nd order tributaries in units 11, 13, 19, and 29. Culverts would be installed or replaced at these crossings. Sediment transport and turbidity would increase for several days during the culvert installations and for 1-2 days after flows increase in the fall. Sediment impacts from culvert installations would extend <800 meters (0.5 mile) downstream of crossings (Foltz and Yanosek 2005).

Cutthroat trout in an up to 0.4 mile long reach of Jeeter Creek would be temporarily displaced (and have to compete with greater numbers of fish for food) or their feeding disrupted (unable to see prey items) by short term increases in turbidity associated with the culvert installations (Bjornn and Reiser 1991).

Fish populations and aquatic habitat would not be impacted by timber haul because all hauling on both rocked and natural surface roads would be done during the dry season and dry road conditions, so no sediment-laden runoff would be generated by timber hauling.

Special Status Species – Aquatic

The Proposed Action would not result in adverse effects to BLM Special Status Species, Survey and Manage, or Bureau Assessment Species because no suitable habitat for any species known or likely to be present would be lost or altered to a degree that may impact existing populations. Therefore, the project would not contribute to the need to list any BLM Special Status Species.

Threatened/Endangered Species

Most areas being thinned are located one to three miles upstream of listed fish habitat in the Little North Fork and North Santiam Rivers (Table 11).

Thinning in these units would not affect listed fish or their habitat because of both the distance from listed fish habitat (>1 mile upstream) and the width of stream protection zones (no-disturbance buffers ≥ 85 feet on perennial streams, and 30 feet on intermittent streams on tributary streams. Units 11 and 13 are located about 0.5 mile upstream of listed fish habitat. The proposed thinning in these units would not impact listed fish habitat due to minimum stream protection zones of 50 feet on intermittent 1st and 2nd order tributaries, and 100 feet on perennial tributaries within one mile of the Little North Fork and North Santiam Rivers. These buffer widths are adequate to intercept and infiltrate water carrying sediment preventing its delivery to streams and aquatic habitats (Olson and Rugger 2007, Rashin et al. 2006, CH2MHILL et al. 1999). No disturbance to primary shade zones (70-85 feet widths), and retaining >50 percent canopy closure in the secondary shade zone, would result in no change in stream temperatures of perennial headwater tributaries and of the North Santiam and Little North Fork Santiam Rivers (Groom et al. 2011, Wilkerson et al. 2006, USFS and BLM, 2005).

Sediment produced by new roads would not reach stream channels and would not impact listed fish habitats or fish populations because:

- New roads would be located on gentle slopes slopes of generally less than 20 percent slope and >200 feet from stream channels so they would not increase the size of the stream network (Wemple et al. 1996); and
- New and renovated roads would be constructed to drain surface water to adjacent gentle slopes where it would infiltrate into the soil and groundwater.

Turbidity from the culvert installation would not reach steelhead and salmon habitat in the river because:

- The culverts at seven existing road crossings of 1st and 2nd order tributaries in Unit 11 (the only ones within one mile of listed fish habitat) would be re-installed or replaced during the in-stream work period when flows are low or absent;
- Sediment transport and turbidity would increase for only a few days during the culvert installations and for 1-2 days after flows increase in the fall;
- Turbidity plumes would only extend <800 meters (0.5 mile) downstream of crossings (Foltz and Yanosek 2005); and
- The closest culvert installations are located approximately 1100 meters (0.65 to 0.7 mile) upstream of the Little North Fork Santiam River.

Large wood (LW) supplies in North Santiam and Little North Fork Santiam Rivers would not be impacted by thinning adjacent to tributary streams, both because of the width of the no-disturbance buffers (stream protection zones) on the tributaries, and because tributary flows are too small to deliver LW to the rivers from the areas being thinned.

Steelhead trout and salmon habitat in North Fork Santiam and Little North Fork Santiam Rivers would not be impacted by log hauling as hauling would be restricted to dry weather periods during summer and early fall, when no water would be present on road surfaces to transport sediment to stream channels. All the haul routes travel gravel roads before reaching either the paved Little North Fork Road along the Little North Fork Santiam River, or Highway 22 along the North Santiam River.

3.2.3.2 Cumulative Effects

There would be no cumulative effects to fish and aquatic species populations because there would be no cumulative impacts to aquatic habitats (ie. no cumulative changes to channel shape and morphology, peak flows, or sediment and turbidity levels, Hydrology Report, p. 12, EA section 3.2.2). Changes in channel shape and morphology, peak flows, and sediment and turbidity levels are the primary mechanisms through which aquatic habitats and consequently fish and aquatic species populations would potentially be impacted by a Proposed Action.

Cumulatively, the limited magnitude and duration of sediment effects in the project area would be unlikely to affect spawning and rearing success of fish populations.

3.2.3.3 No Action Alternative

The No Action alternative would have little impact on fish and aquatic habitats in the project area. The improvement of tree species composition in Riparian Reserves would be slower under this alternative than under the Proposed Action.

Under the No Action alternative, populations of aquatic species would undergo natural increases and declines related to changes in stream temperature, sediment delivery events, and peak winter flows.

Under the No Action alternative, canopy closure in primary and secondary shade zones along stream channels would remain similar to current levels, except for changes to tree canopy and consequently stream shade levels resulting from snow or ice break, wind storms, and wildfire. Stream temperatures would follow changes in stream shading (Johnson, 2004).

Wood contributions to stream channels would be similar to the Proposed Action because most of it would be recruited from near the streams where no thinning would be done under either alternative. Suppression mortality of smaller trees and windthrow in stands adjacent to stream channels would contribute wood to streams. Natural sediment inputs to streams would vary as sediment contributing events (flooding, landslides and windthrow) occur within the Riparian Reserve.

<u>Threatened and Endangered Species</u>

The no action alternative would have “no effect” on UWR steelhead trout and UWR spring Chinook salmon because current processes would continue.

3.2.4 Soils

Source Incorporated by Reference: *2010 Soils Specialist Report for the Proposed Power Mill Project (Soils Report)*

Assumptions:

- Harvest operations would be done only on lands classified by the BLM as Suitable[22] for timber production (including Suitable Fragile).
- Impacts and potential reductions in growth and yield, are within the standards analyzed in the RMP/FEIS (less than one percent) when no more than 10 percent of the ground surface is compacted (soils are generally considered compacted if there is more than 10 percent increase in density) by logging operations (RMP/FEIS G-2).

Methodology:

- Soil maps and descriptions of project soil characteristics used for the project area are available at the Natural Resource Conservation Service web site: http://www.or.nrcs.usda.gov/pnw_soil/or_data.html.
- Site specific conditions on BLM lands in the project area were mapped and field-verified in the Timber Production Capability Classification (TPCC) database (USDI BLM 1987).
- BLM Resource Specialists for soil and hydrology visited the project area multiple times, performing both formal surveys and informal reconnaissance, including digging small pits, to evaluate site specific conditions.

Affected Environment

Typical soils in these project areas formed in colluvium (i.e., material rolling downhill) from sedimentary, tuffaceous, basalt, and andesite rock and volcanic ash. Soils in river floodplains formed in alluvium (i.e., water transported materials). Soils series mapped in the project area area are primarily McCully clay loams with high clay content in the surface horizon and low erosion hazard on slopes under 30 percent. In the steeper forested slopes near the ridgeline, soils tend toward stony clay loams on 30-50 percent slopes with slightly higher hazard of erosion.

Project soils are well-drained to moderately well-drained and moderately deep to very deep, with some local areas of shallow/stony soils on ridgetops. Project soils are suited for growing *Pseudotsuga menziesii* (Douglas fir) and *Tsuga heterophylla* (western hemlock). Soil maps and descriptions of project soil characteristics are available at the Natural Resource Conservation Service web site: http://www.or.nrcs.usda.gov/pnw_soil/or_data.html.

All of the proposed treatments are within areas classified as suitable or suitable but fragile in the TPCC system. Areas that are suitable but fragile would utilize design features listed in the TPCC to mitigate potential effects to soils. All lands on BLM are classified as either, suitable for timber production, suitable but fragile for a variety of reasons (e.g., nutrient status, compacted surfaces, slope gradient, etc.) or non-suitable.

Wet areas in the project vicinity are associated with streams and wetlands. Steep slopes in a portion of unit 13A and along portions of Jeeter Creek in Section 11 are excluded from the proposed treatment area.

[22] All lands on BLM are classified as, *Suitable* for timber production, *Suitable [but] Fragile* for a variety of reasons (e.g., nutrient status, compacted surfaces, slope gradient, etc.) or *Non-suitable*. BLM practice is to locate proposed timber harvest unit boundaries to avoid areas that are Non-suitable.

The TPCC did not identify compaction as a limiting factor in the project area. Field review by the Cascades Resource Area soils specialist found that soil surfaces generally appear to be in a non-compacted state and are covered with a moderately deep layer of surface duff (partially decomposed organic material that protects the mineral soil surface). Some slight compaction (increase in bulk density of less than 10 percent relative to un-compacted soils) may persist in the area outside of the visible skid trails and roads as a result of previous logging which was accomplished with heavy ground based equipment. However, it is difficult to assess how much if any of this disturbance remains because it is obscured by tree growth and the surface duff layer.

It is reasonable to conclude that compaction outside of road and skid trail surfaces, if it remains at all, is discontinuous and of no consequence to soil properties or fertility because random small pits dug by area specialists did not reveal any compacted soil surfaces beneath the duff.

Roads account for an average of approximately 2.7 percent of the surface area in these watersheds. There are approximately 494 miles of existing roads within the four 6th field watersheds containing the Power Mill Thinning project. These roads range from barely discernible natural surface to paved highways.

Based on field observations, approximately two percent of the soils in the project area are slightly to moderately compacted. A few areas of moderately compacted soil (soil bulk density increased 10-20 percent compared to natural soil conditions) have visibly persisted in some of the skid trails. Moderately compacted soils are primarily old skid trails generally less than ten feet wide and are often discontinuous since portions of them are obscured by vegetation and a duff layer.

Based on this analysis and the road density estimates from the watershed analyses, total highly compacted surfaces is estimated at 5 percent of the watersheds as a whole (outside of urban areas).

Environmental Effects

3.2.4.1 Proposed Action

Direct and Indirect Effects on Soil Resources

Following completion of the Proposed Action, the majority of vegetation and root systems would remain, along with surface soil litter and slash from harvested trees.

The expected amounts of surface soil displacement and soil compaction from harvest operations would not exceed 10 percent of each project area, consistent with RMP standards and guidelines (p. C-1-2) because less than 10 percent of surface soils would be subject to operations that could result in compaction or soil displacement. The estimated rate of surface erosion, under the worst case scenario, is discussed below (see WEPP analysis below). In addition, the Proposed Action would maintain sufficient mycorrhizae populations because the root systems of most trees would remain undisturbed and there is no evidence that past disturbance of the area has effected mycorrhizae populations.

Direct Effects on Soil Compaction and Disturbance/Displacement

Compaction, displacement and disturbance of surface soils from ground based yarding varies with soil moisture, the quantity and type of organic material on the surface (i.e., duff and slash layer), slope gradient, the type of equipment used and the operator of the equipment.

In ground based yarding areas, skidding would result in moderate to heavy (20-50 percent increase in soil bulk density), fairly continuous compaction generally 10 feet wide within heavily used main skid trails. The total percentage of the ground based yarding area (328 acres) impacted by surface disturbance and soil compaction as a result of skid trails would be approximately 6-8 percent (19 to 26 acres). Some of the potentially impacted acreage listed above includes existing skid trails from previous logging. Where practical, portions of these existing skid trails would be used for this project. As a result, the amount of acreage for harvest impacts would be less than estimated.

Harvester and shovel swing operations using tracked equipment operating on a slash mat between designated skid trails would result in very light (less than 10 percent increase in soil bulk density) compaction in discontinuous, parallel strips less than three feet wide.

In skyline yarding areas, impacts usually consist of light compaction within a narrow strip less than four feet in width. Project design features require that the leading end of logs be lifted free of the ground during yarding (one end suspension), therefore, less than half of the weight of the log would be supported by the ground. The logs tend to ride on top of the slash rather than pushing it aside, distributing the weight over more ground surface area and reducing potential compaction. The area affected would range from 3-7 percent of the area skyline-yarding area (340 acres) or approximately 10-24 acres.

Road construction would displace topsoil and compact subsoil on approximately 5.7 acres, based on an average 12 feet compacted width within a 25 feet wide clearing area. While the road surface would be highly compacted (20-50 percent increase in bulk density), the remaining half of the total right-of-way width would be disturbed but not compacted. Roads to be constructed would be on moderate topography (grades of approximately 3-10 percent, side slopes generally less than 20 percent). The narrow clearing would have a minimal effect on overall tree spacing and stocking.

All of the new road construction would either be blocked and stabilized or decommissioned following harvest and fuel treatments, so recovery back to a forested condition would occur over time. Stabilizing the road surface by techniques such as shaping it for drainage (e.g. water bars), placing slash or other sterile mulch over exposed surfaces, surface tilling or roughening, and blocking vehicle access would prevent surface erosion and runoff. Placing slash and debris on road surfaces dissipates raindrop impact, provides roughness to slow runoff, provides a protected microclimate for germination and growth of vegetation and provides a source of organic material to the disturbed soil.

Road improvements and renovation would result in no change in the amount of current non-forest land. Some encroaching vegetation along these roads would be removed and surface rock would be added where needed.

The improvement work would be expected to result in some minor short term roadside erosion; this would be most likely to occur when the established vegetation in the ditch and culvert catchment areas would be removed in affiliation with the cleaning, reshaping, or culvert installment operations. Litter-fall accumulations and the growth of vegetation generally re-establish within one to two seasons and erosion rates would be expected to return to very low levels thereafter.

Landings

Log landing construction and use would compact the soil and displace top soil at the site. However, about half of the surface area used for landings would be the existing road surface (which is already compacted). Areas where skidders turn to drop logs or turn around adjacent to the constructed portion of the landings are included in the calculated landing area. The additional area adjacent to roads that would be needed for the landing area is estimated to be approximately one percent of the total project area (7 acres) and is included in the 10 percent areal compaction.

The degree of soil disturbance and compaction in areas where logs are sorted or decked would be expected to be low (shallow and relatively quick to recover). Soil disturbance from landings would be local to the landing area and would not affect soil resources on a watershed or landscape scale.

Indirect Effects on Site Productivity due to Soil Compaction and Disturbance

- Since the impacted area is 10 percent or less of the harvest area, there is no reduction in overall yield from that analyzed in the RMP (C-2).
- No measurable reduction in overall yield would be expected as a result of impacts from harvester or shovel swing operations.
- In skyline yarding areas no measurable reduction in overall yield would be expected to result from yarding impacts.
- The compacted surfaces of landings would generally be planned for future use and would not be reforested.
- Understory vegetation would keep soil surfaces stable.

Surface Erosion Potential: Water Erosion Prediction Project (WEPP)

The surface soil erosion under this proposal is unlikely to have any long term deleterious effect on soil productivity because no discernible additional erosion is anticipated from the project area compared to background levels.

No discernible erosion would be expected from ground based yarding areas because the combination of gentle slopes (≤35 percent slope) and project design features would not allow runoff to gain the velocity necessary to erode soil and transport it off site.

No discernible erosion would be expected from skyline yarding areas because BLM monitoring of similar projects has shown no observable erosion or sediment yield during heavy rain events where the WEPP soil erosion model predicts erosion to occur.

The WEPP soil erosion model was used to predict potential erosion and sediment yield from thinning with skyline yarding on 323 acres in the Power Mill project area. WEPP modeling calculates that the current background surface erosion rate in the project area is 0.267 ton/acre/year.

WEPP estimates that the surface erosion rate for thinning with skyline yarding in the project area is estimated to be 0.360 tons/acre/year[23], occurring during large storm events. This remains in the range of soil renewal rates of 0.12-0.8 tons/acre/year (Pimentel, 1987). Estimated background surface erosion rates in the project area are below the assumed rate of soil formation.

Pile Burning

BLM experience with pile burning operations similar to the ones proposed for the Power Mill Thinning project demonstrates that the small area impacted and the low intensity of the effects described above would not result in an observable decrease in site productivity. On the sites where piles are burned on undisturbed soil, surface organic material (O-horizon) would be removed, increasing localized potential for soil detachment. Pile burning and rain impact on burned spots can decrease infiltration capacity until natural re-vegetation occurs within 1-3 years. Displaced soil would be filtered and retained by the intact vegetation immediately surrounding the burn pile spot so that it would not be transported more than a few feet. Since burning would occur during wet soil conditions, heat damage to the upper soil layer (A-horizon) would be moderated and only occur in scattered localized sites.

Skid Trail Stabilization

Blocking entrances to skid trails and stabilizing skid trails by shaping for drainage (such as water bars), covering with logging slash and seeding with native seed would prevent water from accumulating in large quantities, running down the skid trail surface, and eroding soil.

3.2.4.2 Cumulative Effects

The cumulative decrease in site productivity from soil compaction, disturbance and erosion at both local and watershed scales would be insignificant because it would be too small to reliably quantify.

The limited magnitude (maximum area compacted/disturbed by all proposed operations is 72 acres, or 0.1 percent of the total watershed) and duration (maximum effect during the first year following disturbance with rapid recovery approaching existing levels in the first decade) of the cumulative increase in compacted/disturbed soil surfaces would not be expected to result in more than a small risk of measurable decreases in potential site productivity.

3.2.4.3 No Action Alternative

Existing, maintained rocked roads would continue to be part of the transportation system and be maintained according to the Salem District transportation management plan, and would remain as non-forest land and provide access for management activities.

Historic unmaintained roads and landings would be left in their current condition, which range from virtually no evidence of recovery to advanced recovery where understory vegetation is similar to adjacent areas. Vegetation and other natural processes would continue to slowly break up compaction and continue the process of recovering productive capability over time.

[23] For comparison, average surface erosion on croplands in the United States is 44.5 tons/acre/year. (Pimentel, 1987)

3.2.5 Wildlife

Sources incorporated by reference: *Cascades Resource Area EA Wildlife Report, Power House/Power Mill Project, England, 2010 (Wildlife Report)*

Methodology: Cascades Resource Area Wildlife Biologists assessed potential effects to terrestrial species by using the following methodologies:

- Descriptions of stand conditions as they relate to wildlife habitat are based on stand exam data, aerial photo interpretation and field review by BLM resource specialists in wildlife biology and silviculture.
- A list of Wildlife Special Status/species of concern in the Cascades Resource Area was compiled using BLM wildlife databases, BLM Special Status Species lists (BLM IM OR-2008-038), Oregon Natural Heritage Information Center lists (ONHIC 2007), various wildlife field guides, literature, and texts. The Project areas were visited and habitats in and adjacent to proposed Power House/Mill units were examined during the 2009 and 2010 field seasons. From the Cascades Resource Area list, a list of Special Status/species of concern documented or suspected to occur in the Power House/Mill Project Areas was compiled based the proposal's geographic location, elevation, and knowledge of habitats present gained through air photo interpretation, stand exam data, GIS information, and field reconnaissance. For each species, habitat associations and the presence or absence of suitable habitat was determined. The resulting list of special status species which are known or suspected to occur in the Power Mill Project Areas and their habitat preferences are included in Table 6 of the Wildlife Report.
- New Bureau policy requires that BLM address federally listed and Bureau Sensitive species in Environmental Assessments (BLM IM OR-2008-038). The list of special status species documented or likely to occur in the Power House/Mill areas includes one terrestrial federally threatened (northern spotted owl), and four terrestrial Bureau Sensitive species (Oregon slender salamander, bald eagle, peregrine falcon and purple martin), and the effects of the proposal to these species and their habitat are described in this report. A new category, Bureau Strategic, was identified in the July 25, 2007 Instruction Memorandum (BLM IM OR-2007-072). Strategic species are not Special Status for management purposes.
- The only requirement for this group of species is if species sites are located during any survey efforts, the site information must be entered into the BLM corporate database, Geographic Biotic Observations (GeoBOB). There are no terrestrial Bureau Strategic species known to occur in Power House/Mill.
- A number of surveys were conducted for Survey and Manage Species in the Power Mill area. Mollusk and red tree vole surveys were conducted during 1999 and 2000 in the mature/old-growth stands in T.9S., R.2E., sections 13 and 23. Red tree voles and the Oregon Megomphix were confirmed to be present in both sections. No surveys for red tree voles or Survey and Manage mollusks were conducted because all of the stands proposed for thinning are under 80 years of age (Pechman exemption, 2006, 2011 settlement agreement).
- A list of migratory and resident birds was developed according to new interim guidance (BLM IM WO-2008-050). There are approximately 125 bird species that are documented or suspected to nest on BLM lands in the Cascades Resource Area. Of these 125 species, there are 54 species identified as priority species according to at least one of the sources listed in Table 7 of the wildlife report. Of these priority species, 35 have at least a low probability of nesting in the Power House/Mill Project Area (Table 7). Of these 35 species, 16 were noted to be present in the project area. Additional surveys for breeding birds may be conducted in the future.

Affected Environment

General Stand Condition

When these stands were established forest management was designed to maximize timber production, with little or no consideration for habitat issues. Consequently, the forest stands proposed for treatment in the Power Mill project area are typically even-aged stands lacking species diversity, ground cover and deciduous shrub understory layers. These stands lack structural heterogeneity, especially large remnant overstory trees and snags.

Except for scattered concentrations of large CWD and scattered snags in advanced stages of decay, very little evidence of the previous stands is apparent. Canopy cover is generally 70-95 percent, preventing the development of a shrub ground cover component.

Structural and compositional aspects that have been found to be important contributors to habitat diversity and species richness include dead wood in the form of snags and down logs, remnant live trees, and vertical and horizontal variation in tree and understory canopies. Also, hardwood trees and shrubs in particular have been found to be important contributors to forest biodiversity, providing habitat substrate, food sources, foraging substrate, and nesting opportunities. Variation in forest stand conditions within stands and at the landscape level has been identified as a key factor in providing habitat for a diversity of forest organisms (Hayes et.al. 1997; Muir et.al., 2002). Generally, many of these features are lacking in the managed stands proposed for thinning. The aforementioned features would make the stands habitable by a broader range of forest-associated animal species.

Residual Old-Growth Trees, Coarse Woody Debris (CWD), and Special Habitats

There is a small remnant component of large trees and snags in section 25, T. 9 S., R. 2 E. None of the proposed units has CWD that meets RMP management direction (240+ linear feet per acre of material in decay classes 1 or 2, at least 20 inches diameter at the large end and 20 feet long).

The less decayed (class 1 and 2) woody debris in the project area is primarily limited to smaller diameter material, and would not be considered adequate to meet RMP management direction for CWD (>20” diameter and >20’ long). These less-decayed logs in smaller size classes are mostly the result of suppression mortality occurring in crowded stands. These small logs are much less useful to forest floor-associated animal species for cover and other habitat characteristics because they have less volume, and persist for a shorter time period (usually less than two decades) than larger material.

CWD in more advanced stages of decay (classes 3-5) are usually remnants of old-growth “cull” trees that were not removed after harvest, and are often in larger diameter classes. These logs provide valuable habitat for numerous CWD associated wildlife species (O’Neil et.al. 2001), and they persist for many decades before passing through advanced decay classes to become unrecognizable as down logs. An abundance of large CWD in advanced stages of decay is present in 8S-3E-29, 9S-2E-11, 9S-3E-19 and to a lesser extent 9S-3E-21. This material is lacking in 9S-2E-13 and 25; and 9S-3E-17. Table 12 gives a summary of current habitat conditions for the project area.

There are several wet areas with seasonal high water/ponds located in and adjacent to 9S-3E-21. These wet areas are highly diverse and consist of sedges and grasses with *Acer macrophyllum* (big-leaf maple), *Alnus rubra* (red alder), *Fraxinus latifolia* (Oregon ash), and *Populus heterophylla* (black cottonwood) woodlands. There are two wet areas located near proposed units in 8S-3E-29 consisting of non-suitable hardwood woodlands and skunk cabbage. These special habitats are important for a variety of wildlife species, especially amphibians, birds, and big game species.

Table 12: Summary of special habitats, remnants, and coarse woody debris (CWD) present by project unit

T-R-Sec Unit	Seral Stage	Remnant Old Growth	Special Habitats*	CWD**
				Hard / soft
8S-3E-29A	Mid Seral	No	Yes	0'/240'
8S-3E-29B	Mid Seral	No	Yes	0'/240'
9S-2E-11A	Mid Seral	No	No	0+'/240'
9S-2E-11B	Mid Seral	No	No	0+'/240'
9S-2E-11C	Mid Seral	No	No	0+'/240'
9S-2E-13	Late Mid Seral	No	No	100'/50'
9S-2E-25A	Late Mid Seral	Yes	No	0'/0+'
9S-2E-25B	Late Mid Seral	Yes	No	0'/0+'
9S-2E-25C	Late Mid Seral	Yes	No	0'/0+'
9S-3E-17A	Mid Seral	No	No	0'/80'
9S-3E-17B	Mid Seral	No	No	0'/80'
9S-3E-19A	Late Mid Seral	No	No	60'/480'
9S-3E-19B	Late Mid Seral	No	No	60'/480'
9S-3E-19J	Late Mid Seral	No	Yes#	0'/0'
9S-3E-21A	Late Mid Seral	No	Yes	120'+/200'

Seral Stage Age Classes (years) based on Stand Exam data: Early Seral = 0-30; Early Mid Seral = 31-40; Mid Seral = 41 – 60; Late Mid Seral = 61 -80; Early Mature Seral = 81 - 120; Mature = 121 - 200; Old Growth =201+

** Special habitats within the units include wet and dry meadows, wetlands, talus, cliffs & rock outcrops.*

 # Presence of adjacent special habitat, wetland, and pond adequately protected with no treatment buffer.

*** Linear ft/acre >=20" diameter large end & >=20' long, hard (decay classes 1-2)/soft (decay classes 3-5) logs.*

Snags and Snag-Associated and Cavity Nesting Species

Table 13 summarizes the number of snags necessary to meet management direction in the RMP (p. 21) for five cavity-excavating woodpecker species which are referred to in Neitro et al, 1985. Table 14 summarizes the snags present prior to thinning. A diameter of 15+ inches was used because most wildlife species that utilize snags are associated with snags greater than 14.2 inches (Rose et. al., 2001). The presence of snags and standing dead material is based on stand exam data and field review by specialists. Stand exam data is based on a statistical sample from plots. Low numbers of snags may be present, but the sampling may not have picked up any on the plots. The use of 0+ in the table denotes when there are trace numbers of snags present that may not have shown up on the plots.

The hairy woodpecker, red-breasted sapsucker and pileated woodpecker are species associated with conifer stands in the western Cascades Mountains, and are present in the Power Mill Project Area.

Northern Flicker and Downy woodpecker are not typically associated with closed-canopy conifer-dominated stands in the western Cascades, though both species are found in or around the project area.

Snag habitat does not meet the 40 percent of maximum population densities requirement for the five woodpecker species throughout most of the project areas (RMP, p.21). Trees that could have developed into large snags and down logs were removed by past timber management in mid seral stands. In general, stands throughout the project areas are in a condition in which there is a near-term (less than three decades) snag deficit (RMP, p. 21).

Table 13: Snags to Support Cavity Nesting Birds

Diameter class (inches dbh)	Snag Decay Stage		Total by diameter class (per 100 acres)
	Hard 2-3	Soft 4-5	
11+		Downy woodpecker (6)	6
15+	Red-breasted sapsucker (18)	Hairy woodpecker (77)	95
17+		Northern flicker (19)	19
25+	Pileated woodpecker (2)		2
Total – all diameter and decay classes			122

Table 14: Summary of Snags Currently Available By Project Unit

Snags at least 15' tall/100 acres						
Township, Range and Section (all units)	Hard snags 15-25"	Soft snags 15-25"	Hard snags 25"+	Soft snags 25"+	Total hard snags 15"+	Total soft snags 15"+
8S-3E-29	0+	0+	0	0	0+	0+
9S-2E-11	0	0+	0	0+	0	0+
9S-2E-13	0	0	0	0	0	0
9S-2E-25	0+	0	0	0+	0+	0+
9S-3E-17	0	0	0	0	0	0
9S-3E-19	240	70	0	30	240	100
9S-3E-21	0	0+	0	0+	0	0+

0+ denotes when there are trace numbers of snags present that did not show up on Stand Exam plots.

Federally Listed Species: Northern Spotted Owls

The proposed thinning units provide 615 acres of dispersal habitat in the Little North and North Santiam Watersheds. There is one known and one historic spotted owl site in the vicinity of the Power Mill Thinning project area. Both owl sites are considered to be non viable due to the lack of suitable nesting, foraging and roosting habitat in the vicinity.

Unit 9S-2E-13 A is within a 1.2 mile radius (the provincial home range) of the Budlong known spotted owl site, which was established in 1997. Nesting or the presence of a pair has never been confirmed at this site. The site was last occupied by a single male during 2008 and 2009. The site was surveyed to protocol during 2010, and there were no responses. There were barred owl responses at Budlong during 2002, 2004 and 2008.

Portions of 9S-2E-11 are within the provincial home range of the historic Pollystout site, which was established in 1992.

Nesting or the presence of a pair has never been confirmed at this site. The site was last occupied by a resident male in 1996. There were barred owl responses at Pollystout during 1994, 1996, 2002 and 2009.

No suitable nesting, foraging and roosting habitat is proposed for thinning inside or outside the provincial home range of any known spotted owl sites. None of the units are located in Critical Habitat and or unmapped Late Successional Reserves.

Special Status, Survey and Manage, and other Species of Concern

Table 6 of the Wildlife Report lists BLM Special Status/Species of Concern which are documented or suspected to occur in the Power Mill Thinning project area based on field inventories of the habitats present and a review of the existing literature. Vegetation surveys (stand exam data) indicate that most of the stands proposed for thinning are lacking in habitat elements that support diverse populations of wildlife species, especially CWD, snags, deciduous understory and ground cover vegetation, or deep accumulation of leaf litter.

Bureau Sensitive – Peregrine Falcon

There is a known peregrine falcon site on the cliffs associated with House Mountain located in T 8S, R 3E, section 30 which is within 0.5 miles of the proposed Power Mill Thinning project area. There are no suitable cliffs in the areas proposed for treatment.

Bureau Sensitive – Bald Eagle

Bald Eagles have been seen along the North Santiam River, 0.5 to 8 miles from units in the project area. For nesting and perching, bald eagles prefer large old-growth trees near major water bodies and rivers such as the North Santiam River. There are some large old-growth trees suitable for perching and within 0.5 miles of the North Santiam River in 9S-2E-25.

Bald eagles have been observed close by at the Fishermen's Bend Recreation Site. The closest known nest site is located three to eight miles to the east of the project area.

Bureau Sensitive – Purple Martin

The purple martin is a rare summer resident. It typically occurs along rivers and other water bodies, and is known to occur along the North Santiam River. It nests colonially in cavities in old buildings, abandoned woodpecker holes, and nest boxes in open habitats.
Purple martins have been seen in the vicinity in harvest units on adjacent private lands and flying over the Power Mill project area.

Bureau Sensitive – Oregon Slender Salamander

Oregon slender salamander is expected to occur in portions of the project areas where larger CWD in advanced stages of decay is present. Oregon slender salamander has been found throughout the Cascades Resource Area in stands across the full range of seral stages. Its distribution on BLM lands within the Cascades Resource Area appears to be limited by dry conditions at low elevations along the Willamette Valley floor, and by cold conditions at higher elevations (Dowlan, unpublished 2006).

Habitat is generally described as conifer stands dominated by Douglas-fir with large amounts of large rotten (decay class 3 to 5) Douglas-fir down logs. Old logs, stumps and large woody material piles around stumps, and exfoliated tree bark on the ground are used for cover, feeding and breeding. Larger material that can hold moisture through summer drought is generally considered to be most important in maintaining moderate subsurface microclimate conditions. Optimal habitat for these animals is generally described as late-successional forest conditions with cool, moist microclimates and large down wood.

Survey and Manage – Red Tree Vole

The red tree vole is an arboreal vole associated with conifer forests west of the Cascades summit, below about 3,500 to 4,500 feet in elevation. The project area is within the "Northern Mesic Zone" of the range identified for the species, and red tree voles could occur. None of the stands currently proposed for thinning meet the stand-level criteria as described in the Red Tree Vole Protocol (Biswell et. al.,2002) due to a lack of predominant overstory trees and mature (80+ year old) stand conditions. Since these stands do not meet these criteria, habitat for red tree vole is marginal at best.

Bats

Four bat species of concern are suspected to occur in the Power Mill project area (silver-haired bat, long-eared myotis, long-legged myotis, and Yuma myotis). These species are associated with caves and mines, bridges, buildings, cliff habitat, or decadent live trees and large snags with sloughing bark. Decadent live trees and large snags, particularly ones with bark attached that extend above the tree canopy, are used variously as solitary roosts, maternity roosts, and hibernacula by these species, and other bat species associated with Douglas-fir forests (Christy and West 1993, Waldien et.al. 2000). Although roost sites are poorly characterized in Pacific Northwest forests, existing information indicates that old-growth forests provide higher quality roost sites than younger forests and that many species prefer older forests (Thomas and West 1991, Perkins and Cross 1988). Old-growth and tall snags with sloughing bark are rare in the project areas (Tables 12 and 14), and these species are likely to be present in low numbers.

Migratory and Resident Bird Species

Most of the proposed thinning areas are in mid-seral stands in the stem exclusion stage. These forest conditions are structurally simple and characterized by an even-aged, single-layered, closed-canopy with poor understory development, and are low in landbird species richness.

The special habitats located in 8S-3E-29 and particularly in 9S-3E-21 provide seasonal standing water and diversity in the form of riparian vegetation and hardwoods such as Oregon ash and black cottonwood. These diverse areas provide habitat for cassin's, warbling, and Hutton's vireos; yellowthroats; band-tailed pigeons; Wilson's, yellow, black-throated gray, orange-crowned warblers and MacGillivray's warblers; spotted towhee, and song sparrow; in addition to the species typical of even-aged conifer stands listed above.

Approximately 125 bird species are known or suspected to breed in the Cascades Resource Area (Altman and Hagar 2007, Altman 2008, Marshall et. al. 2003, Wildlife Report Appendix A). Of these species, 35 have at least a low probability of breeding in the Power Mill Thinning project area.

There are 54 bird species that nest in the Cascades Resource Area that are priority bird species of conservation concern identified by bird conservation partners (Wildlife Report p.28-29).

The proposed treatment areas are located in the Western Oregon Cascades and the Willamette Valley Physiographic Areas. The Partners in Flight (PIF) conservation plan which addresses the Western Oregon Cascades is the Conservation Strategy for Landbirds in Coniferous Forest of Western Oregon and Washington (Altman 2008). Focal species associated with various habitats, stand types and associated habitat attributes found in the Power Mill Thinning project area are shown the Wildlife Report Appendix A.

Bird species richness at the stand level has been correlated in some recent studies with habitat patchiness, densities of snags, and density by size-class of conifers (Hagar, McComb, and Emmingham 1996, Hansen et al. 1995).

Even-aged conifer stands provide habitat for a relatively high abundance of a few bird species, many of which feed on insects gleaned from conifer foliage. The most common species include chestnut-backed chickadee, Pacific-slope flycatcher, hermit warbler, golden-crowned kinglet, varied thrush, winter wren, red-breasted nuthatch, and Swainson's thrush, however, these species are also common or more abundant in mature conifer stands as well (Hansen et al., 1995).

Big Game

Big game species that are found in the project areas include Roosevelt elk (*Cervus elaphus roosevelti*) and black-tailed deer (*Odocoileus hemionus*). The project areas are in mid seral stands which provide hiding and thermal cover. The lower elevation stands are located on warm southerly aspects and show signs of moderate to heavy use, especially during the colder winter months. These include 9S-2E-11, 19; and 9S-3E-21 and 25, where elevations range from 750 to 1,700 feet and thermal cover values are moderate to high.

Stands in 8S-3E-29 (Power House) also show signs of moderate to high use, but thermal cover values are limited by the higher elevations of 2,800 to 3,500 feet, and use appears to be limited by snow levels during the winter months. Early seral communities and mid seral stands are abundant on adjacent private lands surrounding the project areas.

The Salem District Record of Decision and Resource Management Plan (RMP) approved May 1995, identifies no critical winter or summer range in the project areas (RMP p.26).

Environmental Effects

3.2.5.1 Proposed Action

General Habitat

Overall, short-term (less than 5 years) canopy cover reduction, disturbance, and reduction of understories and ground vegetation would occur due to thinning. The long term (more than 5 years) effects would be to increase structural complexity and improve habitat quality for wildlife, particularly in early and mid seral stands proposed for thinning.

In the short-term, there would be a loss of some diversity in tree sizes, spacing, and current understory structure, but stands would improve in the long term as understories develop and canopies close.

Research that has occurred since the 1980s has determined that it is possible to develop desired structural and compositional diversity in young managed stands through specific actions (Bailey and Tappeiner 1997, Chan et.al. 2006).

Thinning forest stands produces what has been described as "cascading ecological effects" (Hayes, Weikel and Huso, 2003) that result from reduced competition between overstory trees and increased availability of solar radiation to the forest floor. Growth, size, branch diameter, and crown ratio of the remaining trees is increased, and development of understory and ground cover vegetation is stimulated. These changes effectively increase structural complexity and alter habitat quality. The increase in structural diversity would improve wildlife habitat by providing more opportunities for foraging; nesting/breeding activities; resting, hiding and escape cover/habitat for a variety of species in the forest environment, including invertebrates, songbirds, and small mammal species.

Proposed road construction and renovation, skid trails and skyline corridors under the Proposed Action would create narrow linear openings through the vegetation, disturbing, reducing or removing ground vegetation and creating breaks in the canopy, which allow more light to reach the forest floor. Short term effects on wildlife habitat would be a reduction in ground vegetation and canopy cover that would increase access to the stand by certain wildlife species, specifically larger mammals such as big game, coyotes, and avian predators. In the long term and ground vegetation would become re-established due to increased light to the forest floor and the breaks in the canopy would close.

Riparian Reserves, Canopy Gaps and Associated Wildlife Species

The age classes proposed for thinning provide the greatest opportunities for acceleration of tree diameter growth and understory development through thinning and density management (LNSWA Chp. 7, pp. 5-6; NSWA Section 3, p. 8).

It is anticipated that thinning could improve habitat conditions for wildlife in the Riparian Reserves by accelerating development of late seral forest stand characteristics. Desirable late seral forest stand characteristics include larger trees for a large green tree component and recruitment of large standing dead and down CWD in future stands, multi-layered stands with well developed understories, and multiple species that include hardwoods and other minor species (LNSWA Chp. 7, pp. 5; NSWA Section 3, p. 6).

The one acre low density thinning areas would be implemented according to the variable density management criteria in the Watershed Analyses (LNSWA Chp. 7, pp. 5-6; NSWA Section 3, p. 8). These openings would result in more vertical understory layering and ground cover, adding complexity to the Riparian Reserve.

At the landscape level, connectivity for species such as the spotted owl is expected to improve as late successional conditions develop in the Riparian Reserves.

Other species which would benefit from the development of older forests in the Riparian Reserves include many species of mollusks, amphibians, bats, the red tree vole, blue grouse, red-breasted sapsucker, pileated woodpecker, Cooper's hawk, Pacific-slope flycatcher, Swainson's thrush, black-throated gray warbler, and black-headed grosbeak, olive-sided flycatcher, brown creeper, and hermit warbler. Species which are expected to benefit from canopy gaps in the Riparian Reserve are ruffed grouse, Wilson's warbler, warbling vireo, song sparrow and big game species.

Residual Old Growth Trees, Snags and Coarse Woody Debris (CWD)

There would be no effects to existing old-growth remnants in the Power Mill Thinning project area. All old-growth remnants would be reserved and/or excluded from the treatment units. The only unit which would likely have old-growth remnants within the unit boundaries would be 9S-2E-25C.

It has been determined that it is feasible to reserve and protect these remnants from logging activities due to their location and logging methods. Residual old-growth trees outside of final unit boundaries would not be affected by the Proposed Action.

Thinning these stands would reduce the number of small diameter (less than 15 inches DBH) snags over the next 20 years because thinning from below removes the smaller suppressed and intermediate trees that would be most likely to die from suppression mortality and become snags within that time period. Within thinning units, most existing snags in all sizes over 15 inches diameter would be retained. It is anticipated that 90+ percent of these snags would remain standing after treatment. This would effectively reserve the best existing habitat features for primary excavators (woodpeckers), and secondary cavity users, such as songbirds, bats and small mammals. The remaining 10 percent or less of these snags may need to be felled for safety, road construction, skid roads, skyline corridors or would fall incidental to logging operations. More of the smaller diameter/taller snags (<12 inches diameter and >25 feet tall), would be felled for safety reasons, or fall incidental to thinning operations. These snags are less important for wildlife species than the larger material over 15 inches (Rose et. al., 2001).

Any snag that falls for any reason as a result of thinning operations would remain on-site as CWD, providing important habitat for a different, but also, key group of dead-wood associated species, including the Oregon slender salamander, a Bureau Sensitive species.

All dead wood that is on-site when timber marking takes place would remain on-site, either in the form or standing snags or as down logs, after thinning.

Management direction for the Matrix LUA includes providing a renewable supply of snags and down logs well-distributed across the landscape (RMP p. 21). Most units throughout the project areas are expected to remain in a snag deficit condition (RMP, p. 21) for one to three decades, until live trees become large enough (at least 20" diameter) to provide for recruitment of large snags and CWD which will meet RMP requirements. As a result of thinning, growth of residual live trees would be accelerated, so that larger trees would be available sooner than without thinning to contribute additional large snags and CWD in the future stand.

The RMP guidelines for snags (40 percent maximum population densities) and CWD (240+ linear feet per acre of material in decay classes 1 or 2, at least 20" in diameter at the large end, and 20 feet in length), could be met in two to four decades. Large diameter CWD in more advanced decay conditions would persist and contribute to forest floor wildlife habitat conditions for many decades before passing through decay class five to become unrecognizable as down logs.

On an average logging site generally less than 10 percent of the existing CWD would be directly impacted by logging, and overall less than 10 percent of the thinning area would be directly impacted by skidding (the operation with the highest potential to impact existing CWD).

BLM approval of skid trail locations would ensure that skid trails are located to avoid impact to CWD wherever feasible, reducing the anticipated impacts below the 10 percent level that would be expected from locating skid trails without concern for CWD. The same principles generally apply to snag retention.

Special Habitats

The wet areas adjacent to 8S-3E-29, 9S-2E-11, 9S-3E-19 and 21 would be reserved and posted out of the unit boundaries, which would adequately protect them from ground disturbance. The peak of big game use occurs during the late fall, winter and early spring months when big game use thermal cover. The breeding season for birds is from about April 15 through July 31. Seasonal restrictions on ground based logging during periods of higher soil moistures and bark slippage would reduce logging activity during these periods, and reserving the wet areas would help avoid nesting disturbance during the remainder of this period.

Federally Listed Species - Northern Spotted Owl

Table 15 presents a summary of the Power Mill project and its effects on spotted owl habitat. In the short term, 455 acres of dispersal habitat in the Little North Santiam Watershed and 160 acres of dispersal habitat in the North Santiam Watershed would be altered as a result of thinning. Available scientific literature provides support for the finding that forest stands can be altered in a manner that is not necessarily expected to change the habitat function for spotted owls (Forsman et al. 1984, USFWS 2007c).

In the short-term, seasonal restrictions on habitat modification activities (felling, yarding, burning, and road building) in 9S-2E-13 would minimize the risk of disturbance to known northern spotted owls during the critical nesting season and delay habitat modification activities later into the nesting season when spotted owls are less sensitive to disturbance. Disturbance associated with thinning (logging, road-building, etc,) may have temporary effects on the presence or movement of spotted owls. However, thinning would maintain dispersal habitat, therefore maintaining the ability of the habitat to accommodate movement of birds after thinning is completed.

In the long term, thinning would accelerate the development of suitable habitat characteristics, especially in Riparian Reserves. As thinned stands mature, habitat conditions are expected to improve.

Canopy closures would increase and these stands would attain suitable habitat conditions within 10 to 40 years. These stands would develop foraging and nesting structure and residual trees will increase in size and be available for recruitment of snags, culls and CWD for prey species and nesting opportunities for spotted owls.

No suitable habitat would be downgraded or altered as a result of the thinning treatment. No suitable habitat would be altered or downgraded within the provincial home range radius of any known spotted owl sites. Overall habitat conditions with the provincial home range of one known and one historic spotted owl site would not change as a result of thinning. None of the proposed units are located in LSR or Critical Habitat for the Northern spotted owl.

None of the proposed units meet the criteria for Recovery Action 32 due to their young age and lack of structure.

Table 15 shows that current habitat conditions for the spotted owl would be "maintained" in all of the proposed thinning units after treatment. To "maintain" habitat means light to moderate thinning in which forest stand characteristics are altered but the components of spotted owl habitat are maintained such that spotted owl life history requirements are supported. As a result, the functionality of the habitat used by spotted owls remains intact post treatment. For spotted owl dispersal-only habitat a canopy cover of >40 percent along with other habitat elements (e.g. including snags, down wood, tree-height class-diversity, and older hardwoods) would be maintained post treatment to adequately provide for spotted owl dispersal. Such treatments can have long-term benefits to spotted owls by encouraging late-successional characteristics to occur more rapidly (BA p. 10, LOC p. 17).

Table 15: Spotted Owl Habitat Modification by Proposed Treatment[1], LUA[2], Pre/Post Treatment Habitat[3], Habitat Modification[4] and Effect Determination[5]

5th. Field Watershed	Township -Range-Section	Proposed Treatment	Acres	Land Use Allocation	Pre/Post Treatment and Habitat Type	Habitat Modification	Effect
Little North Santiam	8S-3E-29	Light to moderate thin	164	Matrix / Riparian Reserve	Dispersal to Dispersal	Maintain	NLAA
Little North Santiam	9S-2E-11, 13; 9S-3E-17	Light to moderate thin	291	Matrix / Riparian Reserve	Dispersal to Dispersal	Maintain	NLAA
North Santiam	9S-2E-25; 9S-3E-19, 21	Light to moderate thin	160	Matrix / Riparian Reserve	Dispersal to Dispersal	Maintain	NLAA
TOTAL			615				

Notes and definitions for Table 15 (BA, Table 4, pp. 3, -5; LOC, pp. 11, 12, 13). [1] Treatment Type:

Light to moderate thinning in dispersal or suitable habitat can be for forest health or to improve the structural characteristics of a stand or to provide commodity. Such treatments may be described as commercial thinning, density management, selective cut, partial cut, or mortality (standing) salvage. Such thinnings maintain a minimum of

40 percent average canopy cover. Light to moderate thinnings can have long-term benefits to spotted owls by encouraging late-successional characteristics to occur more rapidly.

[2] *Land Use Allocations: GFMA=General Forest Management Area Matrix; RR=Riparian Reserve.*

[3] *Habitat Types:*

Dispersal habitat consists of conifer and mixed mature conifer-hardwood habitats with a canopy cover greater than or equal to 40 percent and conifer trees greater than or equal to 11 inches average diameter at breast height (DBH). Generally, spotted owls use dispersal habitat to move between blocks of suitable habitat, roost, forage and survive until they can establish a nest territory. Juvenile owls also use dispersal habitat to move from natal areas. Dispersal habitat lacks the optimal structural characteristics needed for nesting.

[4] *Habitat Modifications:*

Maintain habitat means to alter forest stand characteristics but maintain the components of spotted owl habitat within the stand such that spotted owl life history requirements are supported (i.e. the functionality of the habitat used by spotted owls remains intact post treatment).

For spotted owl suitable habitat a canopy cover of >60 percent, and for dispersal-only habitat a canopy cover of >40 percent, along with other habitat elements (e.g. including snags, down wood, tree-height class-diversity, and older hardwoods) will be maintained post treatment to adequately provide for spotted owl dispersal.

[5] *Effect: NE=No effect; NLAA=May affect but not likely to adversely affect; LAA=May affect and likely to adversely affect.*

Special Status Species

Bureau Sensitive – Peregrine falcon

The Power Mill Thinning would have no effects on peregrine falcons or their habitat. The seasonal restriction from February 1 to July 31 on 8S-3E-29 would protect the falcon site from disturbance during the breeding season. The BLM may lift the seasonal restriction if surveys show that there are no nesting falcons within the disturbance range (1/2 mile from the project area).

Bureau Sensitive – Bald Eagle

The Power Mill Thinning would be expected to have no effects on bald eagles or their habitat. There are about 25 large trees suitable for perching and within 0.5 miles of the North Santiam River in 9S-2E-25. Of these 25 trees, all but two would be posted out of the thinning units. The two remaining trees would be reserved and remain standing after harvest.

Bureau Sensitive – Purple Martin

There would be no effects to purple martins because open habitats or recently harvested areas would not be impacted, including snags.

Bureau Sensitive – Oregon Slender Salamander

It is not expected that thinning these stands would result in effects to Oregon slender salamander populations or their habitat, although a few individuals might be affected. Post-thinning treatment surveys in the Keel Mountain Density Management Study Area indicate that Oregon slender salamanders are not substantially affected by thinning (Rundio and Olson 2007). These results are consistent with survey results elsewhere in Cascades Resource Area from stands that had been subjected to timber harvest in the past (Dowlan, unpublished 2006).

Oregon slender salamanders would be expected to persist at sites within stands where CWD of adequate size (RMP requirements >20" diameter at the large end, >20' in length) currently exists. The CWD currently on-site prior to thinning would continue to provide refuge for terrestrial salamanders many years after treatment (Table 12).

In the short term, direct effects (disruption or mortality) to individual Oregon slender salamanders may occur during logging operations. Ground based logging would result in the most impact due to higher ground disturbance, and skyline logging would have fewer impacts due to less ground disturbance. Due to seasonal restrictions on ground based logging, activity would occur during the drier seasons when amphibians are less active.

Design features common to all projects would minimize disturbance to existing CWD. Ground disturbance from skidding and other ground-based logging equipment would be limited to no more than 10 percent of project unit areas, and therefore, no more than 10 percent of potential Oregon slender salamander habitat within any unit.

Red Tree Vole

In the short-term, undetected red tree vole nests within marginal habitat (habitat less than 80 years of age) could be destroyed or disturbed during thinning. After thinning is completed, habitat conditions for red tree voles would gradually become more suitable after thinning as the stands continue to mature.

Bats

Old-growth forests provide higher quality roost sites than younger forests and many species prefer older forests (Thomas and West 1991, Perkins and Cross 1988). No old-growth forests are proposed for thinning. Bat species which use snags would be affected due to a loss of 10 percent or less of the standing dead material within the thinning units.

Most existing snags in all sizes over 15 inches diameter would be retained. It is anticipated that 90+ percent of these snags would remain standing after treatment. The remaining 10 percent or less of these snags may need to be felled for safety, road construction, skid roads, skyline corridors or would fall incidental to logging operations. Bat activity appears to be higher in thinned versus unthinned stands. Structural changes caused by thinning may benefit bats by creating habitat structure in young stands that bats are able to use more effectively (Humes, Hayes, Collopy 1999). Bat species which are more closely associated with buildings, bridges, mines, cliff crevices and caves than snag habitat would not be affected because none of these features are present in the Power Mill Thinning project area.

Migratory and Resident Birds

Unintentional take of nests, eggs, nestlings and nesting failure would be likely if harvest operations occur during active nesting periods. However, the impacts would be short term, involving loss of nests and unintentional take during one nesting season, and would not reduce the persistence of any bird species in the watershed or populations at the regional scale. Much of the nesting season each year would be completed before logging operations begin. The majority of birds in the Pacific Northwest complete their breeding cycle within the April 15 to July 31 time period (Altman, Hagar 2007). Some individual birds may be displaced during harvest operations in the project area due to disturbance.

Adjacent untreated areas and areas where active operations are not occurring would provide refuge and nesting habitat, which would help minimize short term disturbance.

Thinning densely-stocked conifer stands would be expected to immediately enhance habitat suitability for species which prefer a less dense conifer canopy, and reduce habitat suitability for species that prefer continuous conifer canopies.

Reducing the canopy closure and opening up stands would be expected to have short term negative effects on the brown creeper, golden-crowned kinglet, hermit warbler, Pacific-slope flycatcher and varied thrush however, these species are also common or more abundant in mature conifer stands as well (Hansen et.al., 1995).

The thinning would be expected to have positive long-term effects on this same set of species as understories develop and habitat quality improves.

Overall bird species richness (a combination of species diversity and abundance) would be expected to gradually increase for up to 20 years as hardwood components of stand structure develop, plant species composition becomes more complex, and hardwood shrub layers, epiphyte cover, and snag density become more prominent within the stands. The future development of hardwood/deciduous tree/bush components and canopy layers would favor species such as the band-tailed pigeon, ruffed grouse, red-breasted sapsucker, Wilson's warbler, Hutton's Vireo and black-throated gray warbler.

Big Game

Big game species would be temporarily disturbed during implementation of the Proposed Action. Logging equipment noise and human presence may cause animals to avoid or disperse from the project areas temporarily. The majority of the logging activity would occur outside the period when big-game would be using these stands for thermal cover during the colder months.

Thermal and hiding cover would be maintained after harvest, however cover quality would decrease in the short-term as a result of thinning, opening new roads, renovating roads and road improvements (Cole, et al. 1997, Trombulak and Frissell 1999).

Vegetative forage such as saplings, shrubs, grasses and forbs would increase as a result of thinning and road closures after thinning. As a result of increased light, forage quantity would increase and attract early successional species such as elk and deer to the thinned areas.

In the long term (5+ years), thermal and hiding cover quality would increase and vegetative forage such as saplings, shrubs, grasses and forbs would gradually decrease as a result of canopy closure decreasing the amount of light reaching the forest floor.

3.2.5.2 Cumulative Effects

<u>Snags and CWD</u>

Regardless of the scale for assessing cumulative effects, design features would retain existing CWD, and snags 15+ inches diameter. It is expected that 90+ percent of these snags would remain standing after treatment.

Some snags, especially smaller diameter/taller snags (<12 inches diameter and >25 feet tall), would be felled for safety reasons, or fall incidental to thinning operations. Any snag that falls for any reason as a result of thinning operations would remain on-site to become woody debris, providing important habitat for a different, but also, key group of dead-wood associated species (Aubry 2000, Bowman et.al. 2000, Butts and McComb 2000), including the Oregon slender salamander, a Bureau Sensitive species.

Beneficial cumulative effects to CWD, snag habitat and associated species may occur as a result of implementing the projects, since larger trees would be available sooner than without thinning to contribute additional large snags and CWD recruitment in future stands.

Federally Listed Species - Northern Spotted Owl

The scale for cumulative effects for the northern spotted owl is the provincial home range of known spotted owl sites (1.2 miles for the Cascades of Western Oregon ; BA, p. 3; LOC, p. 11) and the location of the project in relationship to adjacent known spotted owl sites and Late Successional Reserves (LSRs). The scale was chosen because the Northwest Forest Plan (NWFP) goal for conservation and recovery for spotted owl is to maintain suitable owl habitat within the provincial home range of known owl sites, and maintain dispersal habitat between LSRs and known owl sites.

The proposed project would not contribute to cumulative effects to spotted owls because dispersal habitat within and between known owl sites would be maintained, and no suitable habitat would be removed or downgraded within known owl sites. Overall habitat conditions within the provincial home range of the Budlong and Pollystout spotted owl sites would not change as a result of thinning.

Silvicultural prescriptions that promote multi-aged and multi-storied stands may increase the quality of spotted owl habitat over time (LOC p. 25).

Other BLM Special Status Species

Thinning in the project areas, would not be expected to contribute to the need to list any Bureau Sensitive species under the Endangered Species Act (BLM 6840) because habitat for the species that are known to occur in the project areas would not be eliminated, habitat connectivity would not be changed, any habitat alteration would have only short-term negative effects, and long-term effects could be beneficial.

The Proposed Action would not contribute to cumulative effects to the Oregon slender salamander or other CWD associated species. Suitable habitat conditions would be maintained in the short term in the project areas, providing refugia for low-mobility amphibians and invertebrates. In the long term, larger trees would be available sooner than without thinning to contribute additional large CWD in future stands. Implementation of the project would not eliminate connectivity between proposed units or adjacent untreated stands under BLM management.

No adverse cumulative effects to red tree vole habitat is expected because red tree voles are considered to be a late successional associate and no late successional habitat over 80 years of age would be lost or altered.

Undisturbed habitat in the same or similar age class with connectivity to the thinning units exists within the project area, elsewhere within the affected sections. In the long term, thinned stands would attain older forest conditions sooner as a result of thinning, particularly in Riparian Reserves.

Migratory and Resident Birds

The Proposed Action would not reduce the persistence of any bird species in the watershed or populations at the regional scale. Habitat changes resulting from the Proposed Action would not eliminate any forest cover type, change any habitat or patch size, and therefore would not contribute to fragmentation of bird habitat. Thinning would not contribute to a fundamental change in the species composition of existing bird communities within the watershed. Therefore, no adverse cumulative effects would occur to migratory birds.

Big Game

No adverse cumulative effects to big game species populations are expected. The Proposed Action would not fundamentally change or eliminate any forest cover type or change any habitat patch size. Therefore, thermal and hiding cover present before treatment would be maintained after harvest.

3.2.5.3 No Action Alternative

Habitat Structure, Residual Old Growth Trees, Snags and Coarse Woody Debris

Overcrowded stands with low vigor and small crowns would grow more slowly compared to thinned stands. Self-thinning would occur, but diameter growth would not accelerate as fast as in thinned stands. Snags and CWD created by self thinning mortality would not be large enough to meet RMP standards until later in the life of the stand (approximately 20 to 60 years) when suppressed co-dominates achieve these diameters before dying. Understory and ground cover development would take longer than if these stands were thinned. Without management intervention, stands would take longer to develop late successional habitat conditions and remain less diverse for a longer period of time.

Federally Listed Species: Northern Spotted Owl

There would be no immediate change in spotted owl habitat and no effect to spotted owls caused by management action. Habitat conditions would remain as described in the Affected Environment, and would continue to develop slowly over time for reasons stated above. In unthinned areas, it would take approximately 20 to 60 years to develop suitable habitat conditions if left untreated.

BLM Special Status Species

In the short term, there would be no immediate change in current habitat conditions for BLM Special Status Species. In the long term (20 to 60 years): Trees will grow more slowly, and material available for CWD recruitment would average smaller in diameter than if thinning were to occur.

Development of Oregon slender salamander habitat conditions would likely be delayed without the addition of new large woody material to replace existing well-decayed material that will eventually disappear. No undetected red tree vole nests would be affected since no new disturbance to the conifer canopy would occur. Optimal red tree vole habitat conditions, presumed to be older forest conditions, would develop more slowly without thinning.

Migratory and Resident Birds

Habitat conditions would remain as described in the Affected Environment, and would continue to develop slowly over time. Species richness of bird communities would reflect the simple single storied mid seral stages for a longer period of time, and overall bird species richness would be less than if these stands were thinned. Bird species richness may not noticeably increase and legacy features in the future stand would likely be smaller and less long-lasting, especially those that provide habitat for cavity-nesting species.

Big Game

In the short term (less than five years), there would be no disturbance effects due to the Proposed Action. Thermal and hiding cover quality would remain the same as current conditions. There would be no increase in vegetative forage due to increased light to the forest floor. In the long term (more than five years), thermal and hiding cover quality would gradually decrease as overstocked stands mature, hindering mobility. Forage quantity would continue to decrease over time as less light reaches the forest floor.

3.2.6 Air Quality / Fire Hazard/Risk

Affected Environment

Air Quality

The air quality in the North Santiam Watershed area is good. The Power Mill project area is located between approximately one and four air miles north, northeast and northwest of the town of Mill City. The closest point, near Lyons, is four miles east of the Smoke Sensitive Receptor Area (SSRA). The closest area is approximately 10 miles from the Opal Creek Wilderness Area designated as Class I. Burning is regulated to prevent any smoke intrusion into SSRAs and prevent any visibility issues in wilderness areas.

Fire Hazard and Risk

Assumptions: Overall potential increase in wildfire season duration and severity due to potential climate change during the project period (three to five years) would not be likely to exceed the range of conditions used to model fire potential for this time period. Predictions of climate change reviewed in a wide range of literature are generally within two degrees F. warming and unquantified degree of "drier" within the next decade or so. This degree of variation in the project area would be within the historical range of conditions that the BLM has observed for the area for the last several decades.

Fire History

The Little North Santiam Watershed Analysis contains the following fire history for the overall area:

- Historically, this watershed was well timbered with some prairie.
- The west end prairie ecosystem (lower elevations) was influenced by aboriginal burning as were main river corridors (Santiam River, LNS). In all likelihood, the agricultural land of today was prairie at the time of settlement. The aboriginal burning of the landscape prior to settlement influenced the ecology of the foothill forests and valley floors. Native Americans burned the prairie/forest ecotones to provide safety from warring tribes, better game forage, and ease of travel. The oak savannah (prairie) was burned to maintain foodstuffs, game management, safety, and ease of travel.
- Some aspects of the watershed were not influenced by Native Americans.

Fire history research has done three things. It has shown that fire has occurred more often than earlier believed; that fire has not been as severe on the landscape in the Cascades as in other areas; and that older growth stands have multiple age classes that are not easily discernible. This information helps collaborate aerial photo interpretation (1956) and written historical records about the watershed (survey notes, 1871, 1893, 1943, etc.).

The 1956 photos of the Power Mill Thinning project area show a correlation to the results of Teensmas' fire history study in the H.J. Andrews Experimental Forest (HJA). These results include: (1) High ridge tops and south slopes burned more often; this corresponds to young age classes at these locations where tree species are dense and more uniform in age; (2) East, west aspects at high/mid-elevation are next in fire frequency. Forest age, composition, and structure are more diverse and complex than on ridge tops and south slopes;

(3) North slopes, valley bottoms, riparian areas, and lower elevations have the longest fire frequency. This part of the forest is older with the greatest age class distribution, highest species composition, and greatest structural diversity. This forest is considered stable in that it can absorb a great deal of disturbance before its basic character changes.

Fire Behavior

The physical setting for the Cascades has major west-east lying mountain drainages. This allows for the creation of strong up-canyon winds in the afternoon during the late spring, summer and early fall. The west to east oriented drainages also provide funneling to strong, dry East winds that can occur unpredictably. During the summer and fall seasons, these dry, warm winds reach velocities of 30 to 40 miles per hour, with stronger gusts over the higher ridges and down west to east oriented drainages. East winds are important because they often occur when fuel moistures are at critically low levels. Large wildland fires igniting on the lower and middle thirds of slopes may spread to ridgelines before safe suppression action can be taken. (NWOR FMP, p.41)

Fuels

Fuel loading in the timber stands is based on visual estimates utilizing GTR-PNW-105, series 1-DF-2, and 2-DF-4. The estimated total dead fuel loading for these stands ranges from <5 up to 30 tons per acre. The units within this project are a Fuel Model 8 or 10, or a combination depending on the area. (Fuel Model 8 is Closed Timber Litter – tightly compacted short-needled conifer, not much branch/log fuel. Fuel Model 10 is Timber (litter and understory) – larger dead fuels as well as litter, some green understory, old-growth hemlock fir. Fire hazard ratings provide an index of resistance to control a wildfire and are based on vegetation, fuel arrangement and volume, condition and location. All are determinants of the potential for spread of a fire and difficulty of suppression. The Fire Regime Condition Class is currently condition class 3.

Wildland / Urban Interface (WUI) is a term used to describe the area where developed lands meet undeveloped lands. The developed lands can be homes, businesses or agricultural lands. Some areas are used by the public for walk-in activities, like hunting. Units 11, 19, 21, and 25 have residences located within one mile of the harvest areas. From the viewpoint of fire management the WUI creates significant problems because of the people (lives) and property (dollars) - any or all of which may be in jeopardy during wildfire events.

Environmental Effects

3.2.6.1 Proposed Action

Air Quality

During burn days there would be some smoke that would be dissipated with favorable wind conditions that must be met under the Oregon Smoke Management Plan. There would be a low risk that smoke would enter the Smoke Sensitive Receptor Area (SSRA) or Mill City. The burning may change the local air quality for a short duration but transport winds affecting the area would keep the air shed scoured out preventing a buildup of particulate matter and provide atmospheric mixing to prevent any intrusions or visibility.

Particulate matter produced by burning 1400 tons of slash in landing piles the pile burning would be approximately 9 tons of particulate matter in the 2.5 micron size class ($PM_{2.5}$). Carbon dioxide (CO_2) release from the burning of landing piles would be approximately 2100 tons, equal to approximately 520 tonnes of elemental carbon (C).

Burning between 400 and 1400 tons of dry, cured, piled fuels under favorable atmospheric conditions in the project area would not be expected to result in any long term negative effects to air quality in the air shed. Locally within ¼ - ½ mile of the piles there may be some very short term smoke impacts after piles are ignited resulting from drift smoke.

Generally, once covered dry piles have been ignited, the fire intensity builds rapidly to a point where the fuels burn cleanly and very little smoke is produced. The strong convection column produced carries the smoke and gases well up into the atmosphere where it is diluted and carried away in the air mass. After a few hours, as the piles burn down and the intensity subsides, additional smoke may be produced due to lower temperatures and less efficient combustion.

Depending on size, arrangement, type and moisture content of the remaining fuel, the smoke would diminish over several hours or days as the piles cool and burn out (sooner if rain develops). Generally this smoke only affects the immediate area (¼- ½ mile or less) around the pile.

If a temperature inversion develops over the area during the night time hours, smoke may be trapped under the inversion and accumulate, resulting in a short term impact to the local air quality. The accumulated smoke generally clears out by mid-morning as the inversion lifts. Due to the location of this project and only burning when west winds prevail it is unlikely that inversions would present a problem. Burning of slash would always be coordinated with Oregon Department of Forestry (ODF) and conducted in accordance with the Oregon State Smoke Management Plan. This oversight by ODF serves to coordinate all forest burning activities on a regional scale to prevent negative impacts to local and regional air sheds.

Fire Risk

Immediately after thinning, fuel loading, risk of a fire start and the resistance to control a fire, would all increase at the sites as a result of the proposed action because fuel loading increases.

Slash created from timber harvest would add an estimated 10-15 tons per acre of dead fuel to the thinned areas (PNW-105 series: 1-DF-2, 2-DF-4 and PNW-GTR -258 series). The fuel model will shift from Model 8 / 10 (closed timber litter / timber litter and understory) to a combination of Models 10 / 11 (timber litter and understory with the addition of light logging slash), with the exception of the fuel reduction areas, which would remain as a fuel model 8. The fuel arrangement would tend to be continuous with patches of low fuels.

Fuel models are selected to represent the forest stand before the thinning and after the thinning to predict fire behavior characteristics if a fire started. All thinning projects result in increased fire risk potential for one to three years because of the increased dead fine fuels (1 and 10 hour fuels). Larger 100 to 1000 hour fuels persist much longer and remain a factor contributing to resistance to control because they contribute to fire intensity and duration.

Risk of a fire start in the untreated slash would be greatest during the first season following cutting - the period when needles dry out but remain attached. These highly flammable “red needles” generally fall off within one year and risk of a fire start greatly diminishes. Fire risk would diminish as soon as the red needles drop and the area "greens up" with understory vegetation, and as the fine twigs and branches in the slash begin to break off and collect on the soil surface. Past experience, in the geographic area of this proposed action, has shown that in approximately 15 years untreated slash would generally decompose to the point where it no longer contributes substantially to increased fire risk.

Risk of a fire starting in portions of the units without fuels treatments under this proposed action is expected to be low because of limited public access to some units and the fuel free areas next to open roads. The continued existence of a tree canopy to shade the fuels would maintain cooler temperatures and higher humidity on the site reducing the risk of a fire start. There would be no slash piled or burned near the high voltage transmission power line right-of-way. In the Power Mill project area, access for initial attack forces is readily available.

Fuel treatments are based on the need to reduce the potential fire behavior from fire starts in the thinned areas to the prethinning level or less in key locations. Reducing the amount of slash left from the thinning would also result in more efficient and quicker fire suppression, less risk for fire fighters and less resource damage if a fire occurred after any treatment.

The Fire Regime Condition Class would remain at condition class 3.

3.2.6.2 Cumulative Effects

The cumulative potential for wildfire start and growth would increase in the short term (1-3 years) as a result of the proposed action because fuel loading on the ground would increase as a result of harvest. Cumulative potential for wildfire start and growth would decrease in the longer term (1-2 decades) compared to unmanaged stands as the logging slash decays and because the natural heavy fuel loading from suppression mortality (trees dying) would not be present after treatment. Neighboring private lands are generally clearcuts or in early seral stages with low fire risk.

3.2.6.3 No Action Alternative

Air Quality

No change to the affected environment. Short term impacts to air quality would be avoided by the lack of burning.

Fire Risk

In the short term there would not be much change for risk of fire. In the long term, suppression mortality and ladder fuels would continue to increase as the stand ages. High public use, current trends in human activity and related potential for fire starts would be expected to remain the same or increase as population and WUI increases. Severity and the potential for a crown fire will be higher for dense stands with accumulating surface fuels in the long term (one to several decades). The major change would be that surface fires would be long duration due more down wood and the potential for a crown fire to occur would increase due to increased ladder fuels and canopy closure. The potential risk can change annually with weather conditions and possibly increase faster in the long term if predicted climate change occurs. If a wildfire were to occur the effects may include: 1) total tree mortality, 2) elimination of the duff and litter layers, 3) reduction of the downed woody component, especially logs in later stages of decay, 4) increased erosion and sedimentation of water courses, and 5) formation of snags.

3.2.7 Carbon Storage, Carbon Emissions, and Climate Change

Sources Incorporated by Reference: *Power Mill Carbon Storage and Carbon Emissions Report, 2008 RMP/FEIS: Volume I, Pages 220-224; Volume II, Pages 537-543, and Volume III, Appendices, Pages 28-30.*

Methodology

The BLM calculated carbon storage, sequestration and release based on stand projection modeling (stand exam data analyzed with ORGANON, see EA section 3.2.1, Methodology) in decadal increments. The BLM calculated carbon sequestration, storage and emissions at the project scale as a basis for evaluating their significance relative to the appropriate spatial and temporal scales.

The spatial scale for analysis of carbon, greenhouse gasses and climate change is global because carbon cycling is only an issue as it relates to contributing to greenhouse gasses and their ability to potentially contribute to climate change. The unit of measure used is Gigatonnes[24] (Gt) of elemental carbon (C) because that is the unit of measure most commonly used in the scientific literature reviewed.

This analysis assesses short-term and long-term effects on carbon storage and carbon emissions. The BLM has selected 0-10 years as the analysis period for short-term effects on carbon storage and carbon emissions, because this time period would encompass the duration of all of the direct emissions from the proposed thinning. The BLM has selected 11-30 years as the analysis period for long-term effects on carbon storage and carbon emissions for this project because that is the maximum time period before the BLM would assess the forest stands in the project area to determine if additional treatments are needed to meet management objectives.

Affected Environment

Total carbon (C) contained in forest ecosystem vegetation[25] can be divided into three pools:

- Live Trees - foliage, branches, stems, bark and live roots of trees;
- Other Than Live Trees - dead wood and roots, non-tree vegetation, litter and soil organic matter. This pool does not include mineral carbon; and
- Harvested Wood Products – wood products "stored" long term as durable products (such as buildings, furniture, books) or in landfills. This pool includes wood products and by-products burned for energy production (energy capture). It does not include wood burned without energy capture. Calculations anticipate higher rates of decay and burning without energy capture in early years attenuating to lower rates in later years.

Table 16 shows estimates of existing forest ecosystem vegetation at a variety of scales.

Table 16: Carbon in Forest Ecosystem Vegetation

Scale	Gigatonnes Carbon	Source of Information
Worldwide	132-457	Matthews et al, 2000, p. 58
United States (US)	27	US EPA, 2009
Pacific Northwest	1.5-1.7	Hudiburg, et al. 2009
Power Mill Project Area	0.000103	BLM, Carbon Report 2012

Annual carbon sequestration (accumulation) on managed forest lands in the United States is 0.191 Gt. Annual sequestration on BLM managed lands in western Oregon is 0.00169 Gt. (2008 RMP/FEIS, p. 4-537) Annual sequestration on the Power Mill Thinning project area is 0.0000017 Gt.

Environmental Effects

Note: One tonne of elemental Carbon (C) yields approximately 3.67 tonnes of carbon dioxide (CO_2).

[24] Metric tons are approximately 2,200 pounds and are referred to in this document as tonnes. A Gigatonne (Gt) is one billion (1,000,000,000) tonnes. One tonne is 0.000,000,001 Gt. Gt are rounded to no more than seven decimal places because all reported numbers round to at least 10 tonnes.

[25] Carbon contained in both above ground and below ground parts of trees and forest vegetation, and downed wood, litter and duff. It does not include mineral carbon in soil, nor fossil fuels.

3.2.7.1 Proposed Action

Short term

Thinning would convert 0.0000264 Gt C from the Live Trees pool to the Harvested Wood Products pool. This is approximately 26 percent of the Forest Ecosystem C in the project area, 32 percent of the Live Tree C. The remaining C would remain on site. Dead wood would decay and release C to the atmosphere and soil over time, much of it within the first decade. The retained trees (see Table 7) would continue to grow and sequester C at an annual rate of 0.0000016 Gt.

Harvest operations (logging and log haul) would use diesel fuel and emit carbon as greenhouse gases. Estimated fuel consumption for harvest operations represents total emissions of 0.0000001 Gt C. Burning piles of slash would emit approximately 0.0000005 Gt C (from Fuels Report, 2100 short tons of CO_2) as greenhouse gasses in the short term.

Much of the emissions from harvested wood (logging, burning, accelerated decay) would occur shortly after harvest (a few weeks to five years), and harvest would be spread over one to five years within the 10 year short-term effects analysis period. In the first 10 years after harvest, approximately 0.0000037 Gt C would be emitted by decay and burning without energy capture (including pile burning described above).

Long-term Effects (11-30 years after timber harvest)

Retained trees would continue to sequester as they grow. Live tree carbon would increase to 0.000113 Gt after 30 years of growth. From 11-30 years after harvest an additional 0.0000008 Gt C would be emitted from harvested wood by decay and burning without energy capture. 0.0000099 Gt C would remain stored in wood products still in use, in landfills, or burned with energy capture. (2008 RMP/FEIS, pp. 540-541; Appendices, p. 30). Figure 6 shows a summary of the carbon storage by alternative and the carbon emissions as a result of the proposed action.

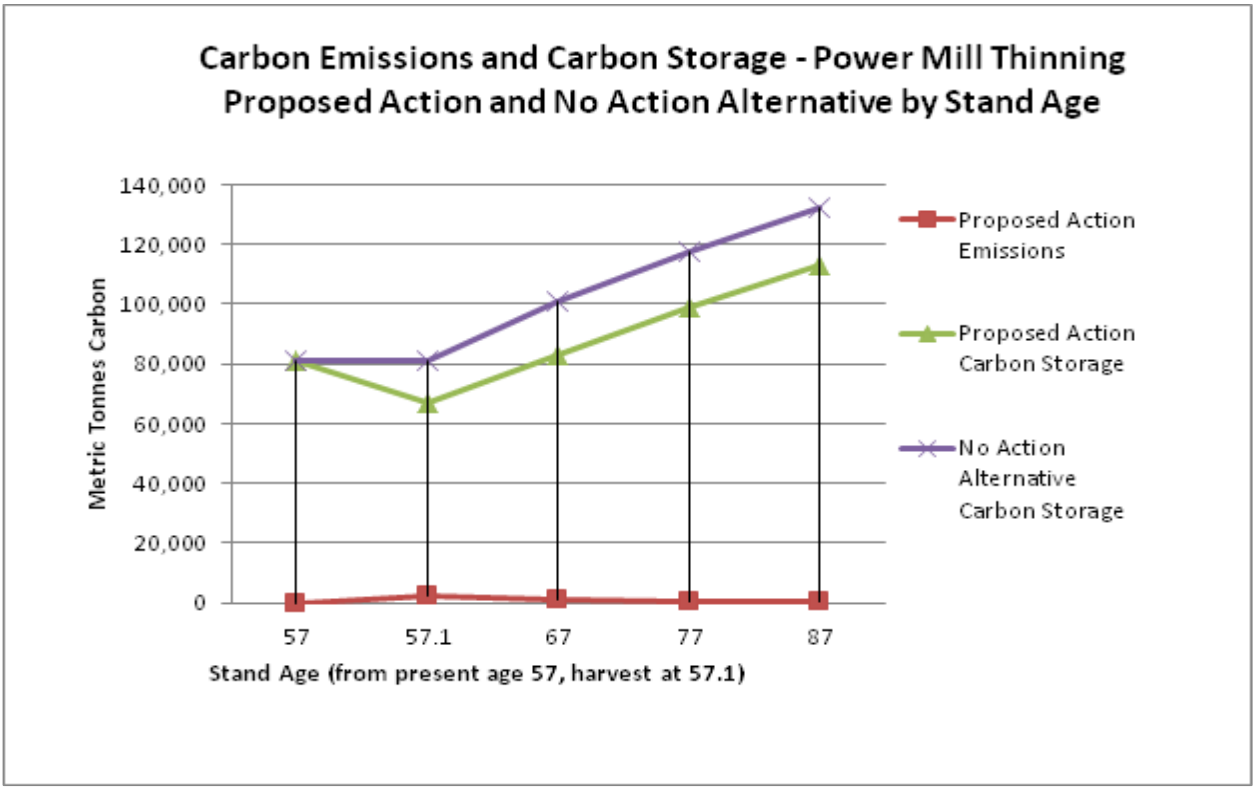


Figure 6: Carbon Emissions and Storage, Live Tree and Harvested Wood Products Pools

3.2.7.1 Cumulative Effects

Annual sequestration of 0.0000016 Gt C would account for 0.00083 percent of the 0.191 Gt C annual accumulation of C from forest management in the United States. Total Forest Ecosystem C storage on the project area at the end of the 30-year analysis cycle would be 0.0001353 Gt.

Cumulatively, the proposed thinning would store 0.0000188 Gt C less and emit 0.0000043 Gt more C as greenhouse gasses than the No Action alternative at the end of the 30 year analysis cycle.

The incremental increase in carbon emissions as greenhouse gasses that could be attributable to the Proposed Action is of such small magnitude that it is unlikely to be detectable at global, continental or regional scales or to affect the results of any models now being used to predict climate change.

Table 17: Elements of the Carbon Cycle and Carbon Amounts in Gigatonnes of Elemental Carbon (Gt C).

Item	Element of the Carbon Cycle	Project Area, No Action	Project Area, Proposed Action	Difference, No Action – Proposed Action	PNW	US	World
Current Condition							
1a	Current Carbon (C) in Forest Ecosystem Vegetation - Gt (high)	0.0001035	0.0001035	0	1.7	27	457
1b	(Current C - low)				1.5		132
1c	Live Tree Forest C	0.0000813	0.0000813	0			
1d	Other than Live Tree Forest C	0.0000222	0.0000222	0			
1e	Harvested Wood Products (including .Energy Capture)	0	0	0			
Carbon Storage							
2a	Gt C Removed by Proposed Harvest of 10,455 MBF	0	0.0000264	0.0000264	0.0000264	0.0000264	0.0000264
2b	Percent of Forest Ecosystem Carbon Harvested, high		26%		0.001553%	0.000098%	0.000006%
2c	Percent Harvested, low				0.001760%		0.000020%
3a	LiveTree Carbon (Immediately after Harvest) @ 1 year	0.0000813	0.0000549	-0.0000264			
3b	Carbon Sequestration, 30 years growth	0.0000507	0.0000484	-0.0000024			
4a	Forest Ecosystem Carbon Storage after 30 years	0.0001542	0.0001354	-0.0000188			
4b	Live Tree Forest C @ 30 years	0.0001320	0.0001033	-0.0000287			
4c	Other than Live Tree Forest C @ 30 years	0.0000222	0.0000222	0.0000000			
4d	Harvested Wood Products (incl. Energy Capture)	0	0.0000099	0.0000099			
4e	Average Annual Carbon Sequestration, 30 years	0.0000017	0.0000016	-0.0000001			
Carbon Emissions - Direct Effects							
5	Short Term Carbon Emissions, Total Years 1-10	0	0.0000035	0.0000035			
5a	Harvested Wood - Decay or Burn w/o Energy Capt.	0	0.0000032	0.0000032			
5b	Harvest Operations - Logging, Transportation	0	0.0000001	0.0000001			
5c	Fuel Treatment (burning piled slash)	0	0.0000003	0.0000003			
6	Long Term Carbon Emissions, Total Years 11-30: Harvested Wood, Decay + Burn w/o Energy Capt.	0	0.0000008	0.0000008			
7	Total Direct Carbon Emissions, 30 year total	0	0.0000043	0.0000043			
8	Annual Direct Carbon Emissions, 30 year average	0	0.0000003	0.0000003			

3.2.7.2 No Action Alternative

Under the no action alternative, no carbon as greenhouse gases would be emitted from harvest operations or fuels treatments. Carbon stored in live trees would not be converted to the harvested wood carbon pool, and would be converted to the other than live tree pool through ongoing processes of tree mortality. Live tree carbon would increase to 132,000 tonnes (0.000132 Gt) after 30 years of growth, an increase of 50,700 tonnes (0.000051 Gt) from the 2010 levels of 81,300 tonnes.

The no action alternative would result in greater increase in net carbon over the 30 year analysis period than the Proposed Action by approximately 23,000 tonnes (0.000023 Gt)

Cumulative Effects, No Action Alternative

The untreated stand would continue to grow and sequester C at an annual rate of 0.0000017 Gt., which is 0.00089 percent of the 0.191 Gt C annual accumulation of C from forest management in the United States. Total Forest Ecosystem C storage on the project area at the end of the 30 year analysis cycle would be 0.0001542 Gt, which is 0.0000188 Gt more than the proposed action.

On a regional scale it is reasonable to assume that, with market demand for wood products, harvest of an equal amount of timber would take place on other lands to fill that demand. This would result in no difference between the net effects of the Proposed Action and the No Action alternative on a regional or global scale for either carbon cycling or climate change.

3.2.8 Recreation, Visual Resources and Rural Interface

Source incorporated by reference: Recreation/Visual/Rural Interface Report, Meredith 2010.

Affected Environment

Access

Unit 19J has direct public access from Hudel Road, a county road. All other units are accessed by gated private logging or powerline roads which are closed to public vehicle access.

Recreation

The project areas are within a forest setting accessed by gravel roads. Evidence of man-made modifications (roads, timber harvest activities, utilities, buildings, houses) is visible from both private and public lands within or in the vicinity of the project areas. The project area has dispersed recreation with no developed recreation sites. Fishermen's Bend Recreation Site (BLM) is approximately half a mile to the southwest of units in section 25.

The North Fork Road has designated recreation sites and a large amount of dispersed recreation along the roadway. Three recreation sites, North Fork County Park, Canyon Creek, and Elkhorn Valley, are between two and three miles from proposed units. The Little North Fork Special Recreation Management Area (SRMA) encompasses these recreation sites and continues up the canyon to US Forest Service lands.

There are numerous private residences, a private golf course and multiple private camp facilities along the Little North Fork.

Off-highway vehicle (OHV) usage of the project area is restricted to existing roads and designated trails; no designated OHV trails are within the project area. Activities that may occur in the project area include OHV riding, biking, hunting, target shooting, driving for pleasure, and special forest product harvest. There are no designated trails in the proposed project area and no existing recreation management plans recognize or protect unauthorized, user-created trails.

Visual Resources

The view from major roads and highways of the surrounding terrain is one of timber management, and various age classes of trees are visible. The project area falls with the Visual Resource Management (VRM) classes 2, 3, and 4 as shown in Table 18. On VRM 2 lands management activities may be seen, but should not attract the attention of passersby (RMP p. 37).

On VRM 3 lands management activities should not dominate the view (RMP p. 37). On VRM 4 lands, management activities may be the major focus of attention (RMP p. 37).

Table 18: Visual Resource Management (VRM) Acreages by class

VRM Acreages		
Class 2	**Class 3**	**Class 4**
8	480	170

Rural Interface Areas (RIAs)

Unit 25C is the only unit within a rural interface area (RIA). RIAs are BLM-administered lands where they intersect a created half-mile buffer around county zoning. The BLM must take into account homes located near the proposed projects, such as those in the city of Gates and Mill City and along the highways, some of which are not within county zoning but are near BLM-administered lands. Residential property is to the south of unit 25C and to the east of unit 19J. The haul route would pass residential houses along Highway 22, North Fork County Road, Ok Thin Mainline, and Hudel roads and pass through theRIA. Roads surrounding these proposed units have historically experienced log truck traffic as shown local knowledge and by the patchwork of age classes visible on aerial photographs.

Environmental Effects

3.2.8.1 Proposed Action

Recreation

To comply with Occupational Safety and Health Administration (OSHA) regulations, dispersed recreation use would be restricted within the proposed units during timber harvest operations in order to protect recreationists. Recreation use is expected to return to prior levels upon completion of harvest. Other BLM lands nearby would remain available for recreational opportunities. Harvest operations may damage or obliterate unauthorized trails.

Visual Resources

The proposed timber sale project would not have a significant impact on visual resources. After harvest, a forested setting would still be maintained in all of the proposed units. Changes to landscape character are expected to be low and primarily associated with disturbance to understory vegetation. Understory vegetation would be expected to grow so that the disturbance would not be visible within two to five years.

Rural Interface Areas (RIAs)

The proposed timber sale project would not cause changes to private property or have a long term (more than a few weeks) impact on rural interface areas. Local residents would experience slight impacts (noise, dust and increased traffic on public roads for a few weeks on each road system). These impacts are not unusual because logging operations on private lands in the vicinity are common occurrences.

3.2.8.2 Cumulative Effects

Along county roads there would be small short term (weeks to months) cumulative increase in log truck hauling to overall traffic near residences along county roads accessing the units. The cumulative impacts of commercial thinning to recreation, VRM and RIA would be minimal because the proposed action would maintain a forested setting.

3.2.8.3 No Action Alternative

With the exception of unplanned changes (i.e. wildfire, disease etc.), no modifications to the landscape character of the proposed units would be expected to occur.

3.2.9 Cultural Resources

Sources incorporated by reference: Cultural Resource Pre-Disturbance Inventory Report – Power Mill Timber Sale, F. Greatorex, 2011

Methodology: The BLM Cultural Resources specialist reviewed BLM records to identify previously recorded cultural resource sites and examined additional historical references and aerial photographs to identify locations of known archaeological or historical sites and determine areas of potential cultural resource site occurrences where inventory should be conducted. The inventory was conducted according to Appendix A of the *Protocol for Managing Cultural Resources on Lands Administered by the Bureau of Land Management in Oregon*. Under the direction of the District Cultural Resource Specialist, and archaeologist then surveyed the project area, monitoring the location and condition of previously recorded historic sites and features and focusing on previously recorded sites and on areas having potential to contain cultural resources, based on observations of topography, water sources, trails and improvements that may have been suitable for camping, settlement and other human activities.

Affected Environment

Historic resources found in the project vicinity during cultural resources inventory are either in locations not affected by the project or do not provide any new or unknown information regarding the historic logging period in the area. The remnants of an historic cabin in the vicinity are outside of the project unit boundaries and there are various remnants of historic logging activities throughout the project area.

Environmental Effects

3.2.9.1 Proposed Action

There are no adverse effects to important cultural resources because the historical logging remnants located within the timber sale area, such as the springboard stumps, cables, and fuel cans, are not unique and do not provide important historical information. There are no effects to the Polly Creek cabin because the archeologist confirmed that the remnants of the cabin are outside the project area boundaries.

3.2.9.2 No Action Alternative

Current status and trends would continue.

3.2.10 Project's Compliance with Authorities or Management Direction

Table 19: Project's Compliance with Authorities or Management Direction

Authorities or Management Direction	Compliance / Effects
Aquatic Conservation Strategy	In compliance with PCFFA IV (Civ. No. 04-1299RSM), this project complies with the Aquatic Conservation Strategy described in the Northwest Forest Plan and RMP. This project also complies with the PCFFA II (265 F.3d 1028 (9th Cir. 2001)) by analyzing the site scale effects on the Aquatic Conservation Strategy. EA sections 3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.2.5, 3.2.10, and 5.1 show how the Power Mill thinning project meets the Aquatic Conservation Strategy in the context of the PCFFA cases.
Air Quality (Clean Air Act as amended (42 USC 7401 et seq.)	This project complies with this direction because air quality impacts would be of short duration. Addressed in Text (EA Section 3.2.6).
Cultural Resources (National Historic Preservation Act, as amended (16 USC 470) [40 CFR 1508.27(b)(3)], [40 CFR 1508.27(b)(8)]	Cultural inventories, and record searches have determined that there are no known cultural resources existing within the project area that contribute new or uncommon historical information.
Cumulative Effects [40 CFR 1508.27(b)(7)]	Addressed in EA section 3.2.
Ecologically critical areas [40 CFR 1508.27(b)(3)]	This project would have no effect on this element because there are no ecologically critical areas present within the project area.
Energy Policy (Executive Order 13212)	This project complies with this direction because this project would not interfere with the Energy Policy (Executive Order 13212).
Environmental Justice (E.O. 12898, "Environmental Justice" February 11, 1994)	This project complies with this direction because project would have no effect on low income populations.
Fish Habitat, Essential (Magnuson-Stevens Act Provision: Essential Fish Habitat (EFH): Final Rule (50 CFR Part 600; 67 FR 2376, January 17, 2002)	This project complies with this direction because EFH would not be affected. Addressed in text (EA section 3.2.3).
Farm Lands, Prime [40 CFR 1508.27(b)(3)]	The project would have no effect on this element because no prime farm lands are present on BLM land within the Cascades RA.
Floodplains (E.O. 11988, as amended, Floodplain Management, 5/24/77)	This project complies with this direction because the proposed treatments would not change or affect floodplain functions.

Authorities or Management Direction	Compliance / Effects
Hazardous or Solid Wastes (Resource Conservation and Recovery Act of 1976 (43 USC 6901 et seq.) Comprehensive Environmental Repose Compensation, and Liability Act of 1980, as amended (43 USC 9615)	This project would have no effect on this element because no Hazardous or Solid Waste would be stored or disposed of on BLM lands as a result of this project.
Healthy Forests Restoration Act (Healthy Forests Restoration Act of 2003 (P.L. 108-148)	This project complies with this direction because treatments would decrease the risk of wildfire and help restore forests to healthy functioning condition (EA Section 3.2.1, 3.2.6)
Migratory Birds (Migratory Bird Act of 1918, as amended (16 USC 703 et seq)	This project complies with this direction because treatments would increase the overall habitat diversity for migratory birds and increase overall bird species richness in the long term (20 years). Addressed in text (EA Section 3.2.5)
Native American Religious Concerns (American Indian Religious Freedom Act of 1978 (42 USC 1996)	This project complies with this direction because no Native American religious concerns were identified during the scoping period (EA section 1.4).
Noxious weed or non-Invasive, Species (Federal Noxious Weed Control Act and Executive Order 13112)	This project complies with invasive/non-native species policies and direction because Project Design Features would help in preventing the establishment of new populations of invasive plant species and because native vegetation development would result in decline in both number and vigor of invasive plant populations in the project area. Addressed in text (EA sections 2.2.3 and 3.2.1)
Oregon Smoke Management Plan (OR Dept. of Environmental Quality)	Burning of slash would be conducted in accordance with the Oregon State Smoke Management Plan
Park lands [40 CFR 1508.27(b)(3)]	The project would have no effect on this element because there are no parks within or adjacent to the project area.
Public Health and Safety [40 CFR 1508.27(b)(2)]	The project would have no effect on this element because the public would be restricted from the project area during operations and the project would not create hazards lasting beyond project operations.
Threatened or Endangered Species (Endangered Species Act of 1973, as amended (16 USC 1531)	This project complies with this direction because effects of the project were considered and consultation under section 7 has been conducted, or is in progress. (EA section 3.2.1; 3.2.3; 3.2.5).
Water Quality –Drinking, Ground (Safe Drinking Water Act, as amended (43 USC 300f et seq.) Clean Water Act of 1977 (33 USC 1251 et seq.)	This project complies with this direction because ODEQ water quality standards would be adhered to and the area hydrology would not be changed measurably. Addressed in text (EA section 3.2.2)
Wetlands (E.O. 11990 Protection of Wetlands 5/24/77) [40 CFR 1508.27(b)(3)]	This project complies with this direction because wetlands are excluded from treatment, and would be protected by buffers. (EA section 3.2.2)
Wild and Scenic Rivers (Wild and Scenic Rivers Act, as amended (16 USC 1271) [40 CFR 1508.27(b)(3)]	This project complies with this direction because there are no Wild and Scenic Rivers within or adjacent to the project area.
Wilderness (Federal Land Policy and Management Act of 1976 (43 USC 1701 et seq.); Wilderness Act of 1964 (16 USC 1131 et seq.)	This project complies with this direction because there are no Wilderness Areas, areas being considered for Wilderness Area status, or lands containing wilderness characteristics in or adjacent to the project area.

3.2.11 Compliance with the Aquatic Conservation Strategy

Based on the environmental analysis described in the previous sections of the EA, Cascades Resource Area Staff have determined that the project complies with the ACS on the project (site) scale. The project complies with the four components of the Aquatic Conservation Strategy, as follows:

The following paragraphs show the projects' compliance with the four components of the Aquatic Conservation Strategy, (1/ Riparian Reserves, 2/ Key Watersheds, 3/ Watershed Analysis and 4/ Watershed Restoration).

ACS Component 1 - Riparian Reserves

The project would comply with Component 1 by maintaining canopy cover along all streams and wetlands, which protect stream bank stability and water temperature. Stream Protection Zones (SPZ) would protect streams from direct disturbance from logging. Road and landing locations have been minimized in Riparian Reserves. Addressed in text (EA sections 3.2.2-3.2.3).

ACS Component 2 - Key Watershed

The Little North Santiam 5th field watershed is a Tier 1 Key Watershed (RMP p. 6, ROD p. B-18). The project would comply with Component 2 because the project would not result in a net increase in road mileage. (EA section 2.2.2).

ACS Component 3 – Watershed Analysis

The project would comply with Component 3 by incorporating the following recommendations from the Little North Santiam Watershed Analysis (LNSWA)and the North Santiam Watershed Analysis (NSWA). Density management and thinning in Riparian Reserve to develop older forest stand characteristics in younger age classes. Thinning in this project is designed to develop the large tree component faster, leading to earlier potential for recruiting CWD, snag, and large tree habitat and to develop understory vegetation. Maintains 50 percent average crown closure in Riparian Reserve. Untreated areas provide additional range of species and density mix.

In the LNSWA, Recommendation #5 addresses thinning younger stands in Riparian Reserve:

> "Implement density management prescriptions in RR, LSR to develop and maintain older forest stand characteristics in younger age classes. Desirable stand characteristics include larger trees for a large green tree component and recruitment of large standing dead/down CWD in future stands, multi-layered stands with well developed understories, and multiple species that include hardwoods and other minor species (LNSWA Chapter 7, page 5).
>
> Recommendations for management in Riparian Reserve include implementing density management prescriptions to develop and maintain older forest stand characteristics in younger age classes. Desirable stand characteristics include larger trees for a large green tree component and recruitment of large standing dead/down CWD in future stands, multi-layered stands with well developed understories, and multiple species that include hardwoods and other minor species" (chapter 7, page 5).

In the NSWA, Recommendation #1 addresses thinning younger stands in Riparian Reserve:

> "Timber harvest on federal lands should emphasize enhancement and restoration opportunities that target stands in Riparian Reserves, LSR, and Connectivity lands (CONN) that have been managed primarily for timber in the past. Implement density management prescriptions to develop and maintain late successional forest stand characteristics. Desirable stand characteristics include larger trees for a large green tree component and recruitment of large standing dead/down coarse woody debris in future stands, multi-layered stands with well-developed understories, and multiple species that include hardwoods and other minor species (NSWA Section 3, p.6).
>
> This analysis recommends prescribing Density Management treatments in mid-successional stands in the stem exclusion stage to encourage the development of late successional conditions. Objectives in all stands would be to develop and maintain late successional forest conditions, meet Aquatic Conservation Strategy (ACS) Objectives and maintain and enhance existing habitat for the spotted owl."

ACS Component 4 – Watershed Restoration

The project would comply with Component 4 by the combination of thinning and unthinned areas in Riparian Reserves, which would further enhance terrestrial habitat complexity in the long and short term. Thinning in all LUAs would be expected to result in long-term restoration of large conifers and the potential for material that would contribute to in-stream habitat complexity in the long-term.

Cascades Resource Area Staff have reviewed this project against the ACS objectives at the project or site scale with the following results. The No Action alternative does not retard or prevent the attainment of any of the nine ACS objectives because this alternative would maintain current conditions. The Proposed Action does not retard or prevent the attainment of any of the nine ACS objectives for the following reasons.

1. **ACSO 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.** Addressed in Text (EA sections 3.2.1, 3.2.5). In summary:

No Action Alternative: The No Action alternative would maintain the development of the existing vegetation and associated stand structure at its present rate. The current distribution, diversity and complexity of watershed and landscape-scale features would be maintained. Faster restoration of distribution, diversity, and complexity of watershed and landscape features would not occur.

Proposed Action: The proposed combination of thinning from below and unthinned areas in the Riparian Reserve Land Use Allocation (RR) would result in forest stands that exhibit attributes typically associated with stands of a more advanced age and stand structural development (larger trees, a more developed understory, and an increase in the number, size and quality of snags and down logs) sooner than would result from the No Action alternative.

Since Riparian Reserve provides travel corridors and resources for aquatic, riparian dependent and other late-successional associated plants and animals, the increased structural and plant diversity would ensure protection of aquatic systems by maintaining and restoring the distribution, diversity and complexity of watershed and landscape features.

2. **ACSO 2: Maintain and restore spatial and temporal connectivity within and between watersheds.** Addressed in Text (EA sections 3.2.1,3.2.3, 3.2.5) In summary:

   No Action Alternative: The No Action alternative would have little effect on connectivity within the affected watershed except in the long term.

   Proposed Action: Long term connectivity of terrestrial watershed features would be improved by enhancing conditions for stand structure development. In time, the Riparian Reserve LUA would improve in functioning as refugia for late successional, aquatic and riparian associated and dependent species. Both terrestrial and aquatic connectivity would be maintained, and over the long-term, as the Riparian Reserve LUA develops late successional characteristics, lateral, longitudinal and drainage connectivity would be restored.

3. **ACSO 3: Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations**. Addressed in Text (EA sections 2.2.3, 3.2.2, and 3.2.3). In summary:

   No Action Alternative: The current condition of physical integrity would be maintained.

   Proposed Action: Physical integrity of channels at existing stream crossings would be altered for one to several years following maintenance and/or installation of stream crossings. Within the road prism (estimated at 30 feet maximum width), the channel surface, banks, bed and vegetation would be disturbed by the removal of fill material and culverts. The bed/banks would be reshaped and stabilized with woody debris and vegetation when the crossing is permanently removed and/or re-buried with the installation of a new culvert. Disturbance would be limited to the original "footprint" at the site. Due to the stable nature of channels at these locations, little to no additional disturbance to channel morphology would be expected either upstream or downstream from the proposed culvert work.

4. **ACSO 4: Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.** Addressed in Text (EA sections 2.2.3, 3.2.2, and 3.2.3). In summary:

   No Action Alternative: It is assumed that the current condition of the water quality would be maintained. Since at least one culvert is plugged and eroding the roadbed, it is reasonable to assume that one or more culvert failures could cause short term degradation of water quality at some time.

   Proposed Action: Stream Protection Zones (SPZs) in the Riparian Reserve LUA (RR) would be maintained. The proposed new roads are on ridge top or upper-slope locations with no hydrologic connections to streams. Overall, the Proposed Action would have no measurable effect on stream temperatures, pH, or dissolved oxygen. Sediment transport and turbidity in the affected watersheds is likely to increase over the short term as a direct result of road renovation at stream crossings. Turbidity increases would not be visible beyond 800 meters (0.5 mile) downstream from road/stream intersections and would not be expected to affect beneficial uses.

Over the long-term (beyond 3-5 years), current conditions and trends in turbidity and sediment yield would likely be maintained under the Proposed Action.

5. **ACSO 5: Maintain and restore the sediment regime under which aquatic ecosystems evolved.** Addressed in Text (EA sections 2.2.3, 3.2.2, and 3.2.3). In summary:

   No Action Alternative: It is assumed that the current sediment regime would be maintained. Since at least one culvert is plugged and eroding the roadbed, it is reasonable to assume that one or more culvert failures could cause short term increase in sediment at some time.

   Proposed Action: Stream protection Zones (SPZs) in RRs would be a minimum of 85 feet on fish bearing streams and 30 feet on non-fish bearing streams in treatment areas, and within 1.0 miles of listed fish habitat SPZs would be a minimum of 100 feet on perennial streams, and 50 feet on intermittent streams. Hauling restrictions and best management practices would maintain the sediment delivery within it's natural range.

6. **ACSO 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.** Addressed in Text (*EA sections 2.2.3, 3.2.2, and 3.2.3*). In summary:

   No Action Alternative: No change in in-streams flows would be anticipated.

   Proposed Action: A preliminary analysis for the risk of increases in peak flow as a result of forest harvest was conducted using the Oregon Watershed Assessment Manual watershed analysis methods for forest hydrology (OWEB, 1997). Because the proposed project would remove less than half the existing forest canopy and only a small fraction of the forest cover (roads and landings), it is unlikely to produce any measurable effect on stream flows.

7. **ACSO 7: Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.** Addressed in Text (*EA sections 2.2.3; 3.2.2*). In summary:

   No Action Alternative: The current condition of flood plains and their ability to sustain inundation and the water table elevations in meadows and wetlands is expected to be maintained.

   Proposed Action: With the exception of road renovation at stream crossings, all operations, equipment and disturbances would be kept a minimum of 85 feet from all wetlands and perennial stream channels, and 30 feet from all intermittent stream channels. Thus, the current condition of floodplain inundation and water tables would be maintained.

8. **ACSO 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.** Addressed in Text (EA sections 2.2.2; 2.2.3; 3.2.1; 3.2.2; and 3.2.3). In summary:

No Action Alternative: The current species composition and structural diversity of plant communities would continue along the current trajectory. Diversification would occur over a longer period of time.

Proposed Action: Biological and physical riparian areas would be contained entirely within stream protection zones (SPZ). SPZ and other untreated areas would maintain the current species composition and structural diversity of plant communities in riparian areas and wetlands from 30 feet (intermittent streams) to 85 feet (perennial streams) in treatment areas. SPZ minimum widths are wider within one mile of listed fish habitat, as described in the text (EA section 2.2.1).

9. **ACSO 9: Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.** Addressed in Text (EA sections 2.2.1; 2.2.3; 3.2.1; 3.2.2; 3.2.3 and 3.2.5). In summary:

No Action Alternative: Habitats would be maintained over the short-term and continue to develop over the long-term with no known impacts on species currently present.

Proposed Action: The Proposed Action would have no adverse effect on riparian dependent species. Although thinning activities in the short term may affect some species within the treatment areas, adjacent non-thinned areas should provide adequate refugia for these species. In the long term, the treatments would restore elements of structural diversity to treatment areas in the Riparian Reserve LUA. These attributes would help to provide resources currently lacking or of low quality, and over the long-term, would benefit both aquatic and terrestrial species.

3.2.12 Comparison of Alternatives with regard to the Decision Factors

This section compares the alternatives with regard to the decision factors described in EA section 1.2.3 and the project objectives in EA section 1.2.2.

1. Provide timber resources and revenue to the government from the sale of those resources (objectives 1 and 2);
2. Reduce the costs both short-term and long-term of managing the lands in the project area objectives 1 and 2); and
3. Provides safe, cost-effective access for logging operations, fuels management and fire suppression (objectives 2, 6, and 7):

The No Action alternative would not meet these factors since no timber sale would take place. The Proposed Action would provide timber resources to the market and would use commonly used silvicultural, transportation and logging practices that BLM experience with past timber sales has shown to be cost effective, providing revenue with reasonable logging costs (EA section 2.2.1; 2.2.2; 2.2.3).

4. Reduce competition-related mortality and wildfire risk, and increase tree vigor and growth (objectives 1 and 7):

The No Action alternative would not meet this factor. The Proposed Action would meet this factor. (EA sections 3.2.1 and 3.2.6).

5. Reduce erosion and subsequent sedimentation from roads (objectives 3 and 6):

   The No Action alternative would partially meet this factor because the existing roads are generally stable, though at least one stream crossing is eroding. The Proposed Action meets this factor because roads would be maintained, reducing the risk of erosion and sedimentation associated with the existing road system, replacing culverts at stream crossings would reduce the amount of sediment currently associated with those crossings, and because new road construction would not cause sedimentation (EA sections 2.2.3, 3.2.2 and 3.2.3).

6. Provide for the establishment and growth of conifer species while retaining structural and habitat components, such as large trees, snags, and coarse woody debris (objectives 4 and 5); and

7. Promote the development of healthy late-successional characteristics in the Riparian Reserve land use allocation (objective 4):

   Under the No Action alternative, stand health and tree growth rates would decline if stands are not thinned. Competition would result in mortality of smaller trees in the stands, resulting in numerous snags and CWD that are too small to meet resource objectives (minimum 15 inches diameter for snags, minimum 20 inches diameter for CWD). This alternative retains existing elements, but does not enhance conditions to provide these elements for the future stand. Trees would continue to grow slowly until reaching suitable size for large woody debris, snags and late successional habitat. (EA sections 3.2.1, 3.2.5)

   The Proposed Action would meet decision factors 6 and 7. Stand health and tree growth rates would be maintained as trees are released from competition. The alternative retains the elements described under “no action” on untreated areas of the stands in the project area and encourages development of larger diameter trees and more open stand conditions in treated areas. These conditions add an element of diversity to the landscape on BLM lands which is not provided under the No Action alternative. (EA sections 3.2.1, 3.2.5).

4.0 LIST OF PREPARERS

Table 20: List of Preparers

Resource	Name
Writer/Editor	Sandra Holmberg / Carolyn Sands
NEPA Review	Carolyn Sands
Botany	Terry Fennell
Cultural Resources	Heather Ulrich
Engineering	Amy Herburger
Fire/Fuels	Maria Caliva
Fisheries	Bruce Zoellick
Hydrology/ Water Quality	Patrick Hawe
Logging Systems	Sandra Holmberg / Dugan Bonney
Recreation, Visual Resources Management and Rural Interface	Traci Meredith
Silviculture	Dugan Bonney
Soils	Patrick Hawe
Wildlife	Jim England

5.0 CONTACTS AND CONSULTATION

5.1 Consultation

The Power Mill Thinning project would be implemented as two separate timber sales with separate decisions. The consultation summaries presented below are for the first project that would be implemented, named the Power Mill Thinning Timber Sale. Consultation for the second project, Power House Thinning Timber Sale is still in process.

5.1.1 US Fish and Wildlife Service (USFWS)

The Power Mill Thinning portion (9S-2E-11, 13, 25; 9S-3E-17, 19, 21) was submitted for Informal Consultation with U.S. Fish and Wildlife Service (USFWS) as provided in Section 7 of the Endangered Species Act (ESA) of 1973 (16U.S.C. 1536 (a)(2) and (a)(4) as amended) during the FY2011/2012 consultation process. The Biological Assessment of NLAA Projects with the Potential to Modify the Habitat of Northern Spotted Owls Willamette Planning Province - FY 2011-2012 (BA), was submitted in March 2010. Using effect determination guidelines, the BA concluded that the Power Mill Project may affect, but is not likely to adversely affect the northern spotted owl due to the modification of dispersal habitat (BA, pp. 28-29).

The Letter of Concurrence Regarding the Effects of Habitat Modification Activities within the Willamette Province, FY2011-2012 (LOC) associated with the Power Mill Project was issued in June 2010 (reference # 13420-2010-I-0092). The LOC concurred that the habitat modification activities described in the BA, including the Power Mill Project, are not likely to adversely affect spotted owls and are not likely to adversely affect spotted owl Critical Habitat (LOC, p. 38). Furthermore, the Proposed Action is not likely to diminish the effectiveness of the conservation program established under the NWFP to protect the spotted owl and its habitat on federal lands within its range (LOC, p. 38).

The proposed thinning and connected actions described in this EA have incorporated the applicable General Standards that were described in the BA (p. 6-8) and LOC (LOC, pp. 14-16). This includes a seasonal restriction within disturbance distance of known spotted owl sites during the critical nesting season, and monitoring/reporting on the implementation of this project to the U.S. Fish and Wildlife Service.

The Power House Thinning (8S-3E-29) is planned to be offered in FY2013, and is scheduled for consultation during the FY2013 process. The Power House Project involves harvest activity in 165 acres of dispersal habitat which would maintain dispersal habitat after harvest; the same type of harvest activity that is planned for Power Mill. Similarly, the Power House Project may affect, but is not likely to adversely affect the northern spotted owl due to modification of dispersal habitat. The Power House Project will be submitted for consultation in spring of 2012, and a Letter of Concurrence is expected in the fall of 2012.

5.1.2 National Marine Fisheries Service (NMFS)

Consultation with the National Marine Fisheries Service (NMFS) on effects of the Power Mill Thinning project on Upper Willamette River (UWR) Chinook salmon and UWR winter steelhead trout is not required because the thinning sale would have no effect on these species or on essential fish habitat.

Most thinning units are more than one mile upstream of steelhead and salmon habitat in the North Santiam and Little North Fork Santiam Rivers. Two project Units are located 0.5 mile upstream of listed fish habitat. No-disturbance buffer widths on tributaries within one mile of listed fish habitat of 100 feet on perennial streams, and 50 feet on intermittent 1st and 2nd order tributaries would be adequate to intercept and infiltrate water carrying sediment preventing its delivery to listed fish habitat habitats. These no-disturbance buffers would retain all stream shade in primary shade zones (up to 85 feet in width). This in conjunction with retaining >50 percent canopy closure in the secondary shade zone, would result in no change in stream temperatures of perennial headwater tributaries to the North Santiam and Little North Fork Santiam Rivers (Groom et al. 2011, Wilkerson et al. 2006, USFS and BLM, 2005).

Large wood (LW) levels in the two rivers would not be affected by the thinning project because tributary streams are too small to move LW to the rivers. Steelhead trout and salmon habitat would not be impacted by log hauling as the haul routes are well graveled and hauling would be limited to summer and early fall when road surfaces are dry.

Additional project design features for the Power Mill Thinning project (EA section 2.2.3) which result in no effect to listed fish, particularly relative to preventing sediment delivery to listed fish habitat, include:

- meeting NW Forest plan standards and guidelines and BMPs for protection of water quality;
- thinning from below, retaining the dominant/co-dominant trees;
- meeting or exceeding minimum stream protection zone widths (e.g. 100 feet on perennial streams and 50 feet on intermittent streams within one mile of LFH; and >85 feet on perennial and 30 feet on intermittent streams more than one mile from LFH);
- no felling of trees within the primary shade zone on perennial streams;
- retaining minimum 50 percent average canopy closure within the secondary shade zone;
- using existing landings and skid trails to the maximum extent possible;
- constructing new roads on stable, relatively flat topography;
- restricting culvert work to the in-water work period;
- implementing erosion control measures; and
- no timber transport on natural surface roads or rocked roads with stream crossings during the wet season.

5.2 Cultural Resources: Section 106 Consultation with State Historical Preservation Office

Cultural resource surveys were conducted throughout the sale area in June and July 2011 (Report # C1103), in accordance with the *Protocols for Managing Cultural Resources on Lands Administered by the BLM in Oregon*. Records indicate logging and road building activities in the general sale area beginning in the 1930s. Within the units old cable and skid roads were found. No artifacts or other cultural resources with historical value have been found and none are expected to occur in the project area, therefore no consultation was required.

5.3 Public Scoping and EA Public Comment Period

For the results of project scoping, see EA section 1.4. The EA and FONSI will be made available for public review from April 11, 2012 to May 11, 2012 and posted at the Salem District website at http://www.blm.gov/or/districts/salem/plans/index.php.

The notice for public comment will be published in a legal notice in the ***Stayton Mail*** newspaper. Written comments should be addressed to Cindy Enstrom, Field Manager, Cascades Resource Area, 1717 Fabry Road SE., Salem, Oregon 97306. Emailed comments may be sent to BLM_OR_SA_Mail@blm.gov . Attention: Cindy Enstrom

6.0 LIST OF INTERDISCIPLINARY TEAM REPORTS INCORPORATED BY REFERENCE

The Interdisciplinary team reports can be found in the Power Mill Thinning EA project file and are available for review at the Salem District Office.

Bonney, D., 2011. Power Mill Thinning and Silvicultural Prescriptions, Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Caliva, M., 2012. Power Mill Thinning Project Air Quality and Fire Hazard/Risk Specialist Report (Fuels Report), Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

England, J., 2012. Cascades Resource Area Wildlife Report Power Mill Project, Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Fennell, T., 2010. Cascades Resource Area Botanical Report Proposed Power Mill Thinning Timber Sale, Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Hawe, W. P., 2011. Hydrology/Channels/Water Quality: Specialist Report for the Power Mill Thinning Project, Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Hawe, W.P. 2010. Soils Environmental Assessment for the Proposed Power Mill Thinning Project, Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Greatorex, Fred., 2011, Cultural Resource Inventory Reports, Power Mill and Power House Thinning Timber Sale Pre-project Surveys. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Bonney, D.., 2011. Power Mill Logging Systems Report, Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Sands, C., 2012. Power Mill Carbon Report, Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Meredith, T., 2010. Recreation, Visual and Rural Interface Resources Report. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

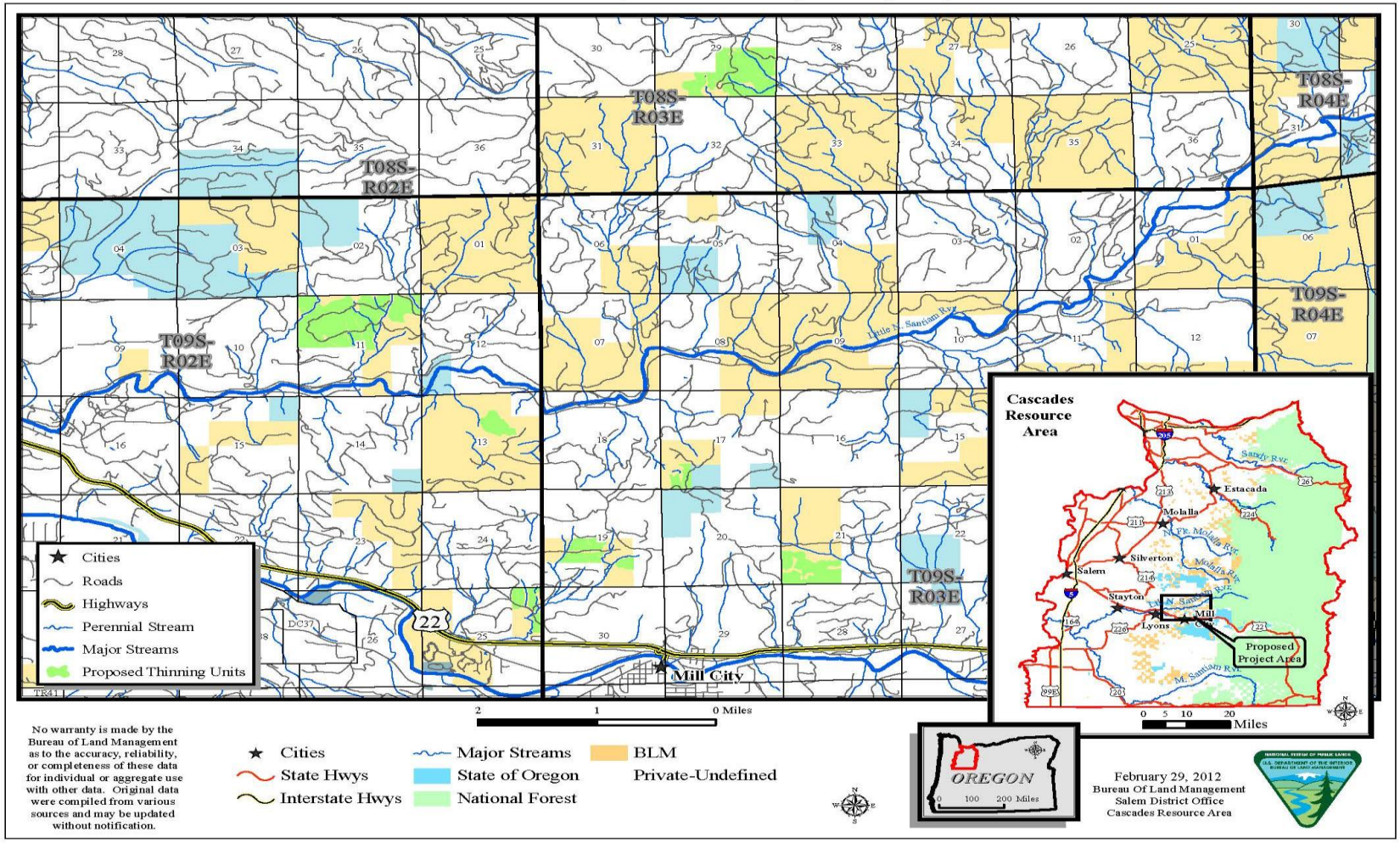
Zoellick, B., 2011 Power Mill Thinning Fisheries Specialist Report, Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

7.0 PROJECT MAPS, GLOSSARY AND ACRONYMS

7.1 Maps of the Proposed Action

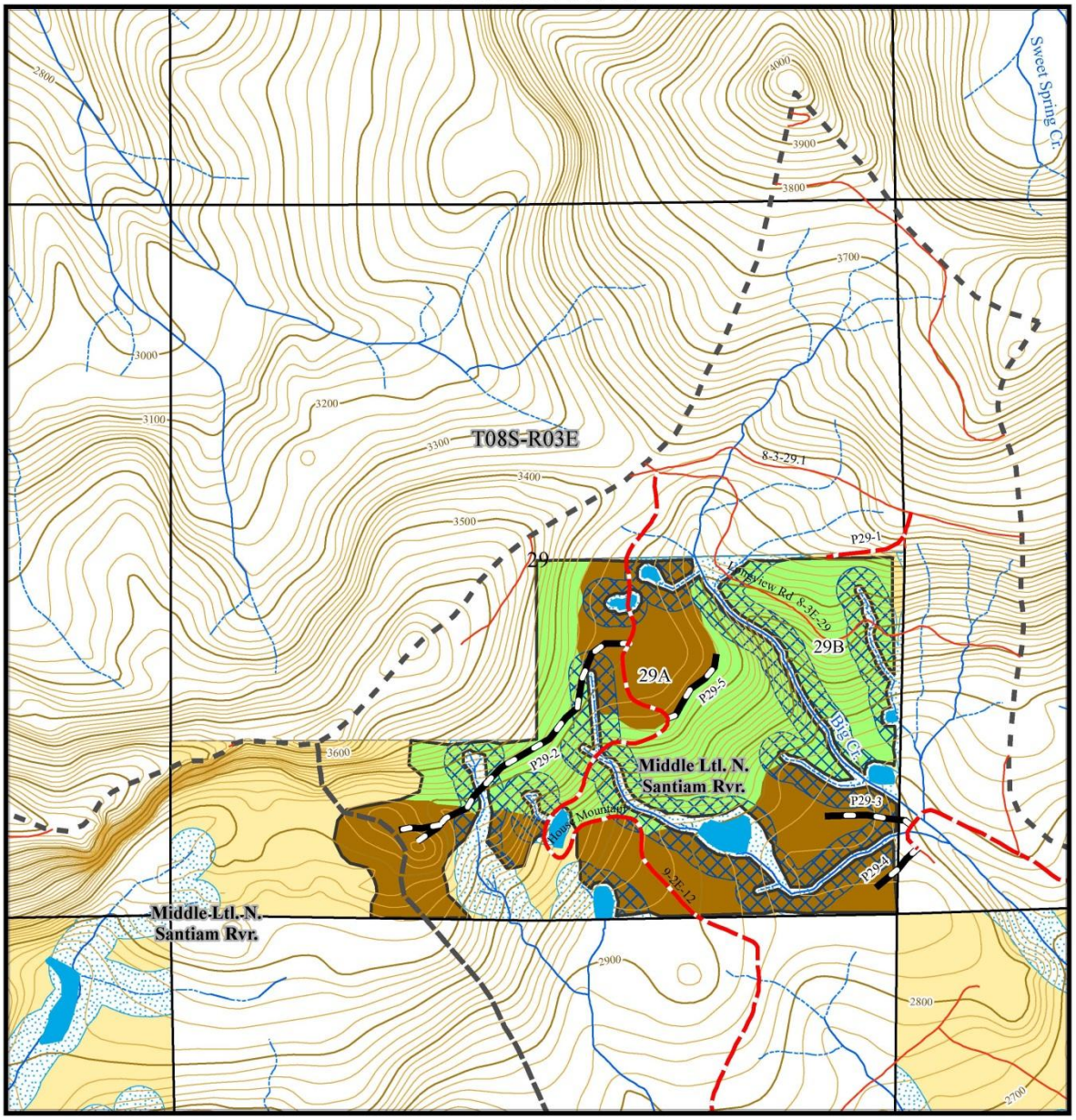
7.1.1 Vicinity Map

Power Mill EA (#S040-2010-007) Vicinity Map



7.1.2 Proposed Action Maps

Power Mill EA (#S040-2010-0007) Proposed Action Map
T08S-R03E Sec 29



1,000 500 0 Feet

Contour Interval: 20'

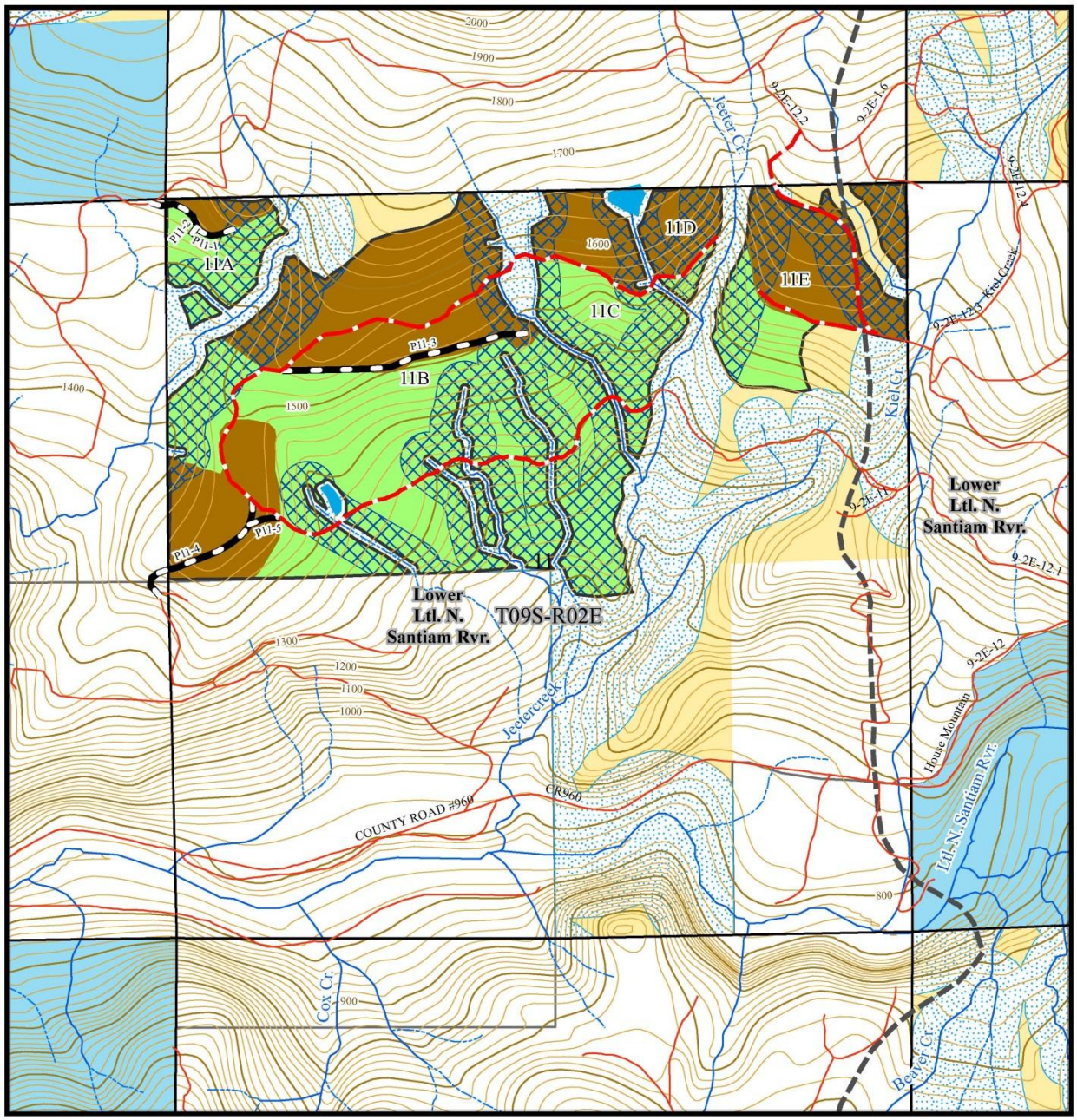
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

- Roads
- Intermittent Stream
- Perennial Stream
- Road Renovation
- New Construction
- Watershed Boundary
- Wetlands / Special Habitat Area
- Thinning Unit Boundary
- Riparian Reserve (No Treatment)
- Riparian Reserve (Treated)
- Skyline Yarding
- Ground-Based Yarding
- BLM
- Private Industrial

March 19, 2012
Bureau Of Land Management
Salem District Office
Cascades Resource Area

Power Mill EA (#S040-2010-0007) Proposed Action Map

T09S-R02E Sec 11



1,000 500 0Feet

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- Roads
- Intermittent Stream
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- Road Renovation
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- Watershed Boundary
- Wetlands / Special Habitat Area
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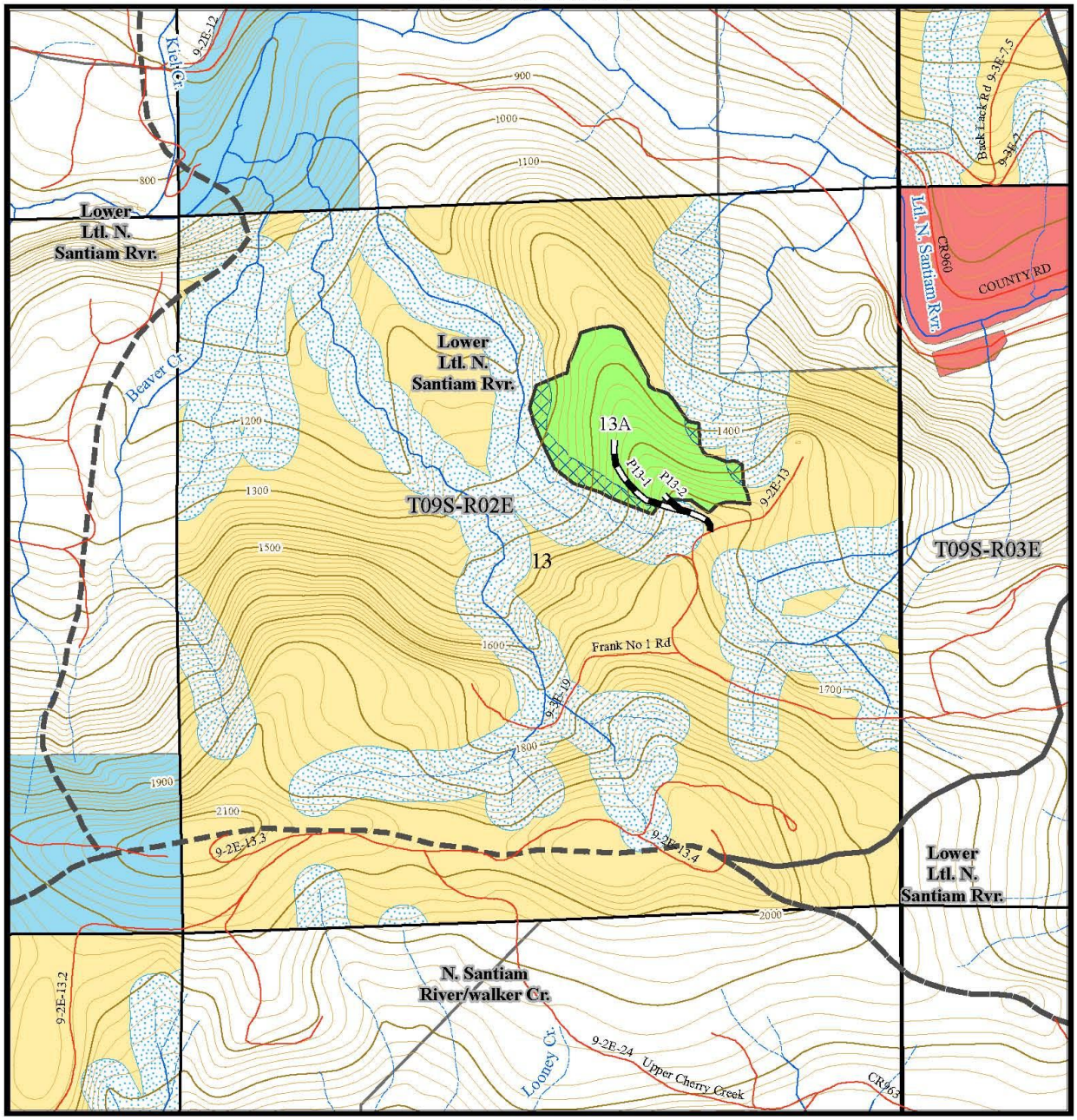
- Riparian Reserve (No Treatment)
- Riparian Reserve (Treated)
- Skyline Yarding
- Ground-Based Yarding
- BLM
- Private Industrial
- State

March 19, 2012
Bureau Of Land Management
Salem District Office
Cascades Resource Area

Power Mill EA (#S040-2010-0007) Proposed Action Map

T90S-R02E Sec 13



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Contour Interval: 20'

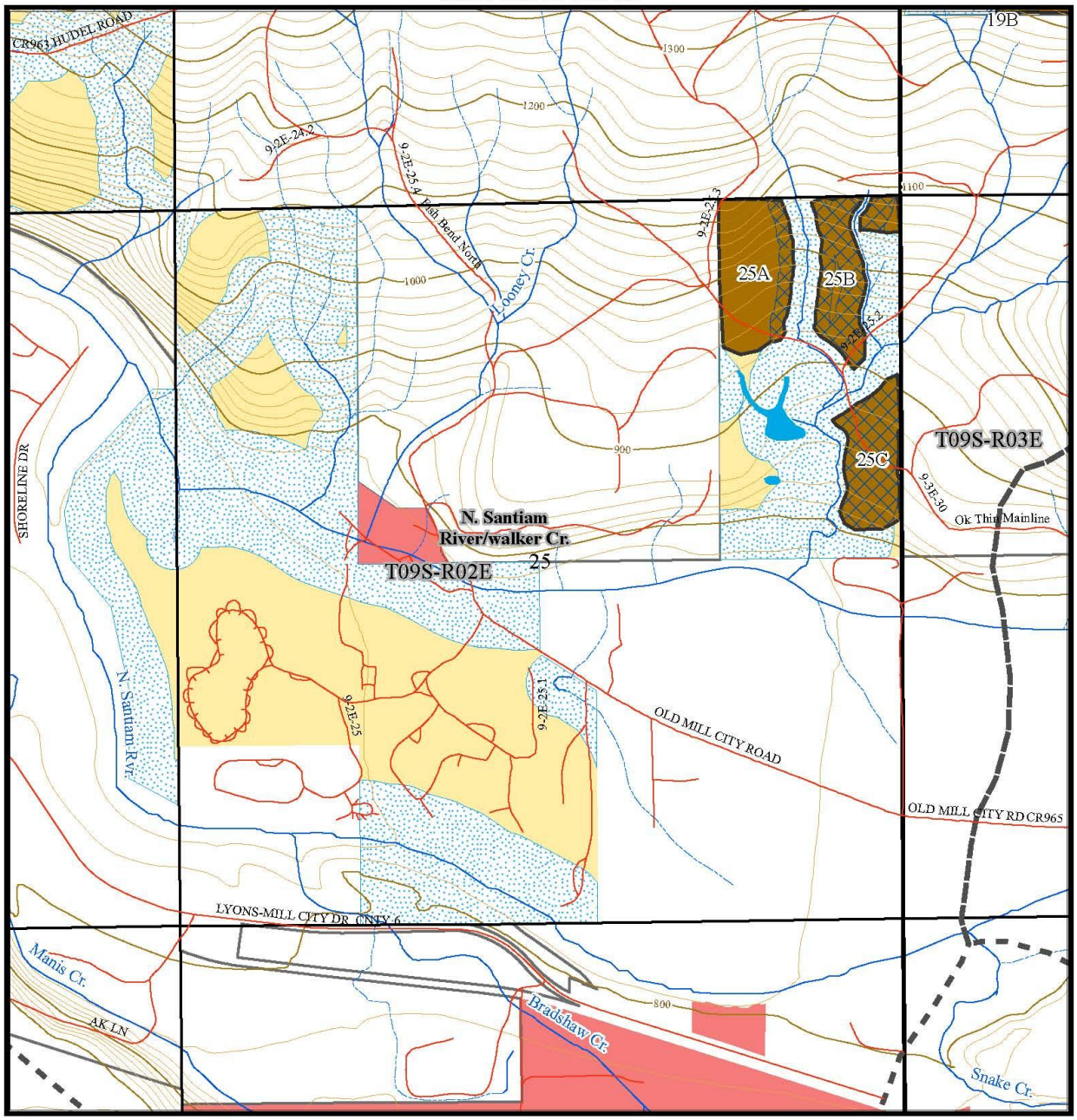
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

- Roads
- Intermittent Stream
- Perennial Stream
- New Construction
- Watershed Boundary
- Wetlands / Special Habitat Area
- Thinning Unit Boundary
- Riparian Reserve (No Treatment)
- Riparian Reserve (Treated)
- Skyline Yarding
- BLM
- Private
- Private Industrial
- State

March 16, 2012
Bureau Of Land Management
Salem District Office
Cascades Resource Area

Power Mill EA (#S040-2010-0007) Proposed Action Map

T09S-R02E Sec 25



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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.

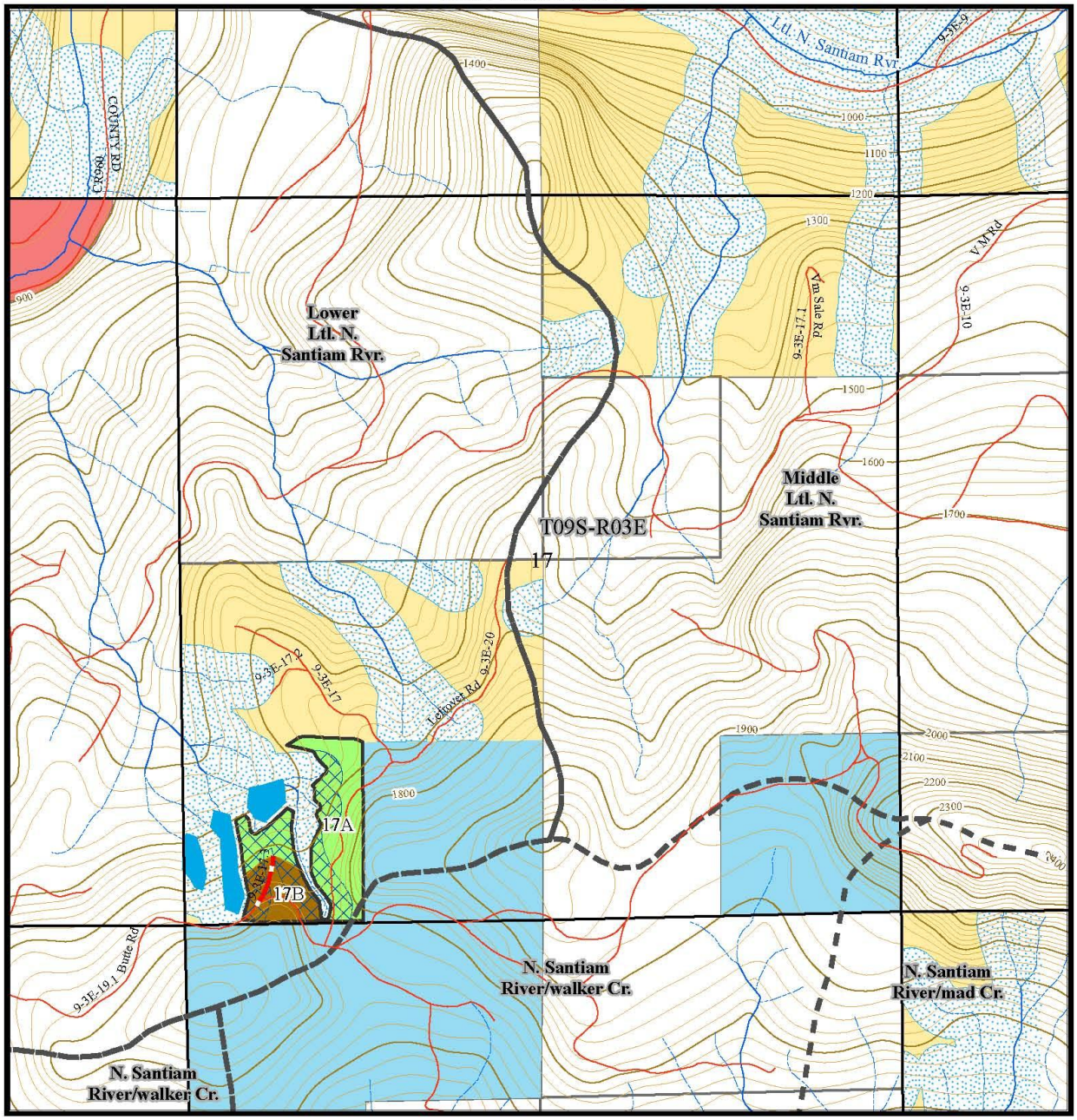
Roads
Intermittent Stream
Perennial Stream
Watershed Boundary
Wetlands / Special Habitat Area

Thinning Unit Boundary
Riparian Reserve (No Treatment)
Riparian Reserve (Treated)
Ground-Based Yarding
BLM
Private
Private Industrial

March 16, 2012
Bureau Of Land Management
Salem District Office
Cascades Resource Area

Power Mill EA (#S040-2010-0007) Proposed Action Map

T09S-R03E Sec 17



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Contour Interval: 20'

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- Roads
- Intermittent Stream
- Perennial Stream
- Road Renovation
- Watershed Boundary
- Wetlands / Special Habitat Area
- Thinning Unit Boundary
- Riparian Reserve (No Treatment)
- Riparian Reserve (Treated)
- Skyline Yarding
- Ground-Based Yarding
- BLM
- Private
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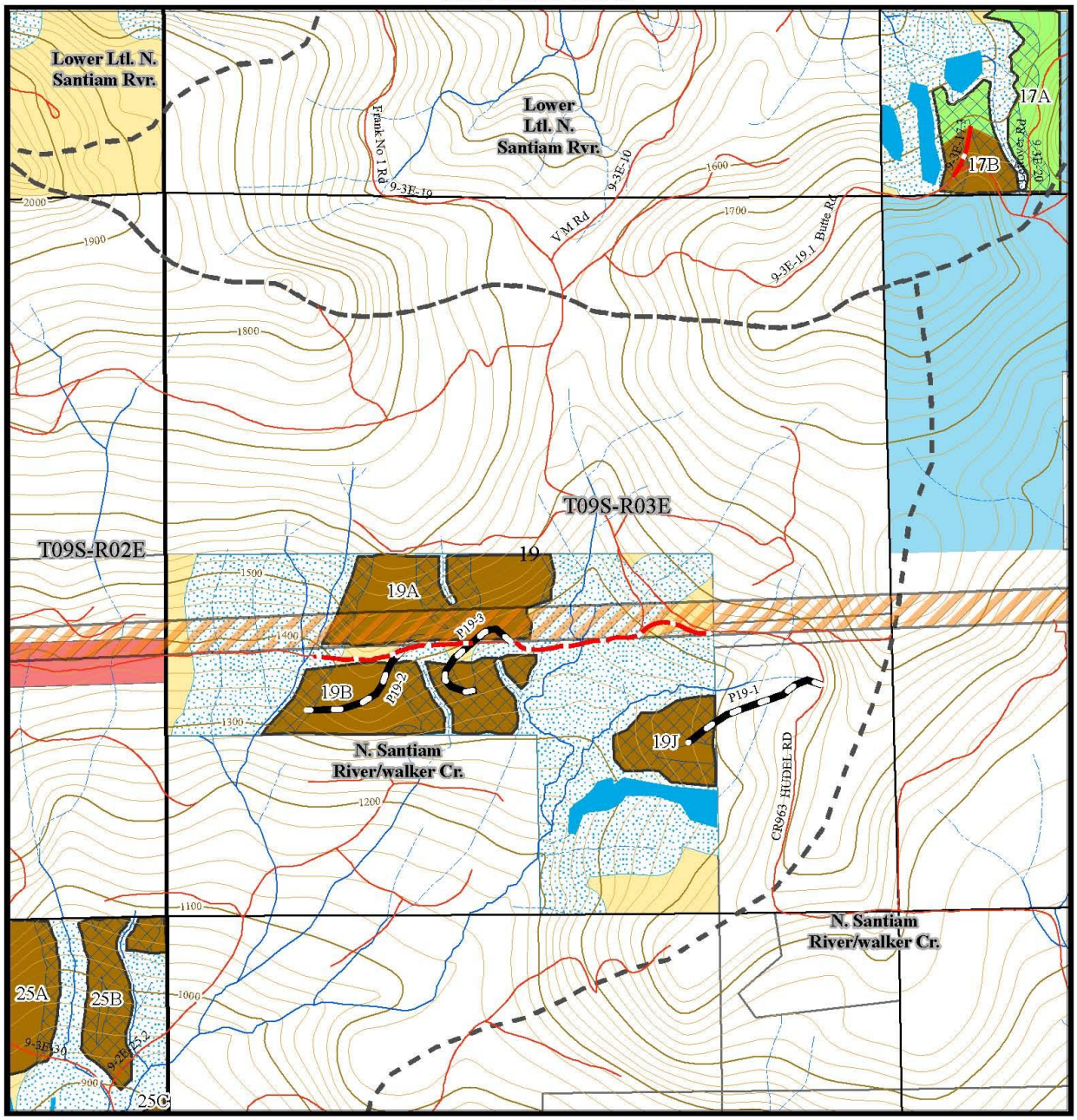
- State

March 16, 2012

Bureau Of Land Management
Salem District Office
Cascades Resource Area

Power Mill EA (#S040-2010-0007) Proposed Action Map

T09S-R03E Sec 19



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Contour Interval: 20'

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.

- Roads
- Intermittent Stream
- Perennial Stream
- Road Renovation
- New Construction
- PGE Cascade Crossing Proposal
- Watershed Boundary
- Wetlands / Special Habitat Area
- Thinning Unit Boundary
- Riparian Reserve (No Treatment)
- Riparian Reserve (Treated)
- Skyline Yarding
- Ground-Based Yarding
- BLM
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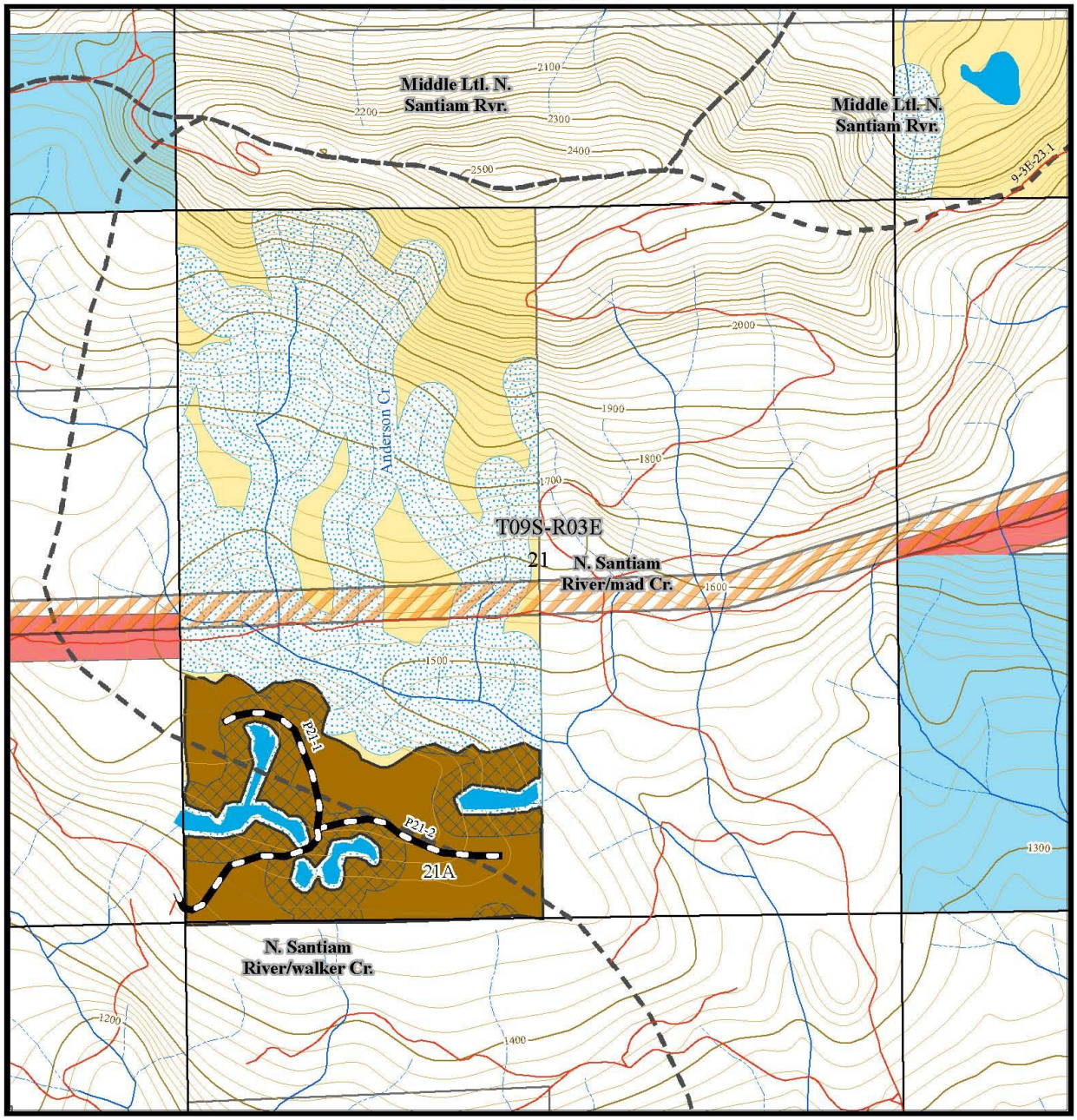
March 16, 2012

Bureau Of Land Management
Salem District Office
Cascades Resource Area

Power Mill EA (#S040-2010-0007) Proposed Action Map

T09S-R03E Sec 21



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March 16, 2012
Bureau Of Land Management
Salem District Office
Cascades Resource Area

7.2 Glossary

Activity fuel - Debris (wood chips, bark, branches, limbs, logs, or stumps) left on the ground after management actions, such as logging, pruning, thinning, or brush cutting, versus debris left after storms or fires.

Alternative - One of several proposed management actions that have been studied and found to meet the goals and objectives of a project's purpose and need and, as a result, is suitable to aid decision-making.

Anadromous fish - Fish that are born and reared in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce, including species such as salmon and steelhead.

(ACS) Aquatic Conservation Strategy - A Northwest Forest Plan methodology designed to restore and maintain the ecological health of watersheds and aquatic ecosystems, consisting of four components: riparian reserves, key watersheds, watershed analysis, and watershed restoration.

Beneficial use - In water use law, such uses include, but are not limited to: instream, out of stream, and ground water uses; domestic, municipal, and industrial water supplies; mining, irrigation, and livestock watering; fish and aquatic life; wildlife watering; fishing and water contact recreation; aesthetics and scenic attraction; hydropower; and commercial navigation.

(BMPs) Best Management Practices - BMPs are defined as methods, measures, or practices selected on the basis of site-specific conditions to ensure that water quality will be maintained at its highest practicable level. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation).

Canopy cover - The ground area covered by the crowns of trees or woody vegetation as delimited by the vertical projection of crown perimeter and commonly expressed as a percent of total ground area.

(CWD) coarse woody debris - That portion of trees that has naturally fallen or been cut and left in the forest. Usually refers to pieces at least 20 inches in diameter. There are four classes used to describe coarse woody debris. The classes range from Class I (which has the least decay, intact bark, and a hard log) to Class IV (i.e., the coarse woody debris has decayed to the point of nearly being incorporated into the forest floor).

Cumulative effect - The impact on the environment that results from incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions regardless of which agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

Diameter at breast height (DBH) - The diameter of the stem of a tree measured at 4.5 feet above the ground level on the uphill side of the stem.

Dispersal habitat (spotted owl) - Forest habitat that allows northern spotted owls to move (disperse) across the landscape; typically characterized by forest stands with average tree diameters of greater than 11 inches, and conifer overstory trees having closed canopies (greater than 40 percent canopy closure) with open space beneath the canopy to allow owls to fly.

Dropped – dropped from this proposed action. The actions may be considered in the future and would be documented in an environmental analysis with a new decision. Dropping these areas does not constitute a change in land use allocations.

Effective shade - The proportion of direct beam solar radiation reaching a stream surface to total daily solar radiation.

Environmental effects - The direct, indirect and cumulative effects of a proposed action or alternative on existing conditions in the environment in which the action(s) would occur.

Fine sediment (i.e. Fines) - Fine-grained soil material, less than 2mm in size, normally deposited by water, but in some cases by wind (aeolian) or gravity (dry ravel).

Land use allocation - A designation for a use that is allowed, restricted, or prohibited for a particular area of land, such as the matrix, adaptive management, late-successional reserve, or critical habitat land use allocations.

Late-successional forest - A forest that is in its mature stage and contains a diversity of structural characteristics, such as live trees, snags, woody debris, and a patchy, multi-layered canopy.

Long term - A period of time used as an analytical timeframe; starts more than 10 years after implementation of a project, depending on the resource being analyzed. Also see short term.

Mass wasting - The sudden or slow dislodgement and downslope movement of rock, soil, and organic materials.

Old-growth forest - A forest stand usually at least 180-220 years old with moderate to high canopy closure; a multilayered, multispecies canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground.

Overstory - That portion of trees forming the uppermost canopy layer in a forest stand and that consists of more than one distinct layer.

Short term - A period of time used as an analytical timeframe and that is within the first 10 years of the implementation of a resource management plan. Also see long term.

Silvicultural prescription - A planned series of treatments designed to change current stand structure to one that meets management goals.

Snag - Any standing (upright) dead tree.

Thinning - A silvicultural treatment made to reduce the density of trees primarily to improve tree/stand growth and vigor, and/or recover potential mortality of trees, generally for commodity use.

(USFWS) United States Fish and Wildlife Service - A federal agency under the United States Department of the Interior that is responsible for working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats.

Watershed - All of the land and water within the boundaries of a drainage area that are separated by land ridges from other drainage areas. Larger watersheds can contain smaller watersheds that all ultimately flow their surface water to a common point.

(WUI) wildland/urban interface- The area in which structures and other human development meet or intermingle with undeveloped wildland. The term used primarily for wildfire prevention and suppression. Rural/Urban Interface is used primarily for other recreation and forest management activities.

windthrow - A tree or trees uprooted or felled by the wind.

7.3 Additional Acronyms

BS – Bureau Sensitive, a category of species under the Oregon/Washington Special Status Species Policy

FONSI – Finding of No Significant Impact

GFMA – General Forest Management Area land use allocation (Matrix)

ODEQ – Oregon Department of Environmental Quality

RIA – Rural-Urban Interface (recreation, visual and sociological issues)

ROW – right-of-way (roads)

RR – Riparian Reserve Land Use Allocation (Riparian Reserves)

SPZ – Stream Protection Zone (no-cut protection zone)

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9.0 Response to Issues/ Comments Raised in Scoping

Issues/Comments	Addressed in EA Section
1. Water Quality, Fisheries, Riparian Reserves, and Aquatic Conservation Strategy (Issue 1) *Issues / Comments from the Public:*	1.0, 2.0, 3.1, 3.2.1, 3.2.3, 3.2.5, 3.2.11, 5.1.2
a) No new roads - eliminate eastern most parcel if road is needed. This area is already too densely roaded for any new roads. **Response to # 1a:** Part of the purpose of the project is to provide appropriate access to the project.	1.2.2, 2.6
b) Describe effects of roads on connectivity, especially at road/stream crossings, across ridge tops, and mid-slope hydrological processes (such as large wood delivery routes).	3.2.2, 3.2.3
c) Avoid log hauling during the wet season.	2.2.3, 5.1.1
d) Protect Stream Crossings	2.2.3
e) Buffer streams from the effects of heavy equipment and loss of bank trees and trees that shade streams.	2.2.3
f) Mitigate for the loss of LWD input by retaining extra snags and wood in riparian areas.	3.2.3
g) Identify Beneficial Uses (e.g. fisheries, recreation, visual, water intakes)	3.2.2, 3.2.3
h) Impacts to Salem's Municipal Water Supply? Where is intake in relation to the units?	3.2.2
i) Describe soils characteristics, impacts of roads and logging methods	3.2.4
j) Logging - reuse old skid trails; minimize landings, seasonal restrictions for wildlife and recreational use. Minimize impacts on streams, including fisheries resources.	2.2.3, 3.2.2, 3.2.3
k) Remove old culverts, log fills, etc.	2.2.2
l) Remove/decommission old roads near streams Response to #1l: The IDT looked for road decommissioning opportunities, especially old roads near streams and determined that the roads that provide access to project units would be needed in the future to access BLM lands.	See Response
Additional comments/issues from the IDT:	
m) Effects to Fisheries associated with the stream crossing on Jeeter Creek Response to 1m: Crossing Jeeter Creek has been dropped because of fish issues. See maps.	2.6
n) Avoid new road construction within stream protection zones.	2.2.2
o) No net increase in roads within the Little North Santiam key watershed.	2.2.2, 3.2.2
2. Forest Structure (Issue 2) *Issues / Comments from the Public:*	1.0, 2.0, 3.2.1, 3.2.5
a) Thin riparian to accelerate development of desired riparian conditions	1.2, 3.2.1, 3.2.5, 3.2.11
b) Consider the effects of thinning on adjacent mature & old-growth habitat which may provide habitat for spotted owls and other species. Include criteria such as: existing habitat characteristics, proximity to activity centers, proximity to NRF habitat, and proximity to recently thinned areas, non-habitat, and roads.	3.2.5

Issues/Comments	Addressed in EA Section
c) The agency should also consider adjusting both the location and timing of thinning to minimize the cumulative effects of widespread thinning on the sensitive and listed species.	3.2.1, 3.2.3, 3.2.5
d) Thin from below, retain all the largest trees	2.2.1, 2.2.3
e) "Free thin from below" retaining some smaller trees in all age-size classes.	2.2.1, 2.2.3
f) Retain and protect under-represented conifer and non-conifer trees and shrubs.	2.2.1, 2.2.3
g) Establish diversity and complexity both within and between stands. Use skips and gaps within units to help achieve diversity. Gaps should not be clearcut but rather should retain some residual structure in the form of live or dead trees.	2.2.1
h) The scale of patches in variable density thinning regimes is important. variability should be implemented at numerous scales ranging from small to large, including: the scale of tree fall events; pockets of variably contagious disturbance from insects, disease, and mixed-severity fire; soil-property heterogeneity; topographic discontinuities; the imprint of natural historical events; etc	2.2.1
i) Retain abundant snags and course wood both distributed and in clumps so that thinning mimics natural disturbance. Retain wildlife trees such as hollows, forked tops, broken tops, leaning trees, etc	2.2.1, 2.2.3
j) Leave residual old growth	2.2.3
k) Thinning both reduces and delays recruitment of snags, first by removing trees that would otherwise suffer suppression mortality, and second by increasing stand vigor and postponing overall mortality. Generous unthinned patches should be retained WITHIN thinned stands in order to continue the snag recruitment process and mitigate for captured mortality. Response to #2k: Table 8 shows that the proposed action would thin approximately 23 percent of the acres within the Riparian Reserve land use allocation on BLM land within the project area. The remaining 77 percent of the Riparian Reserve land use allocation will continue to recruit snags at the current rate.	2.6, 3.2.1, 3.2.5
l) Retain 40 percent crown closure to allow sunlight for early seral species	2.2.1, 2.2.3
m) Early Seral habitat/big-game forage: Early seral vegetation is in critical short supply. Early seral is needed to supply forage for big game and other species who depend on this habitat. Revegetate disturbed soils with native forage seed mix for deer elk, include native fruit and nuts	2.2.1
n) Early Seral habitat/big game forage: Create multiple small patch cuts. Create 2 acre gaps free of conifers, away from open roads, plant native shrubs that produce fruit nuts and or browse for wildlife	2.2.1
Additional comments/issues from IDT	
o) Effects to Spotted owl habitat, a spotted owl site, and stocking in 9S 2E section 23 **Response to #2o:** The IDT determined that silviculturally the two proposed units in 9S 2E section 23 were not good candidates for thinning; therefore these units were dropped from the proposed project.	2.5
p) Create low density thinning patches for habitat diversity for early seral habitat/big game	2.2.1
3. Special Status Species (Including ESA) (Issue 3)	3.2.1, 3.2.3, 3.2.5

Issues/Comments	Addressed in EA Section
Issues/Comments from the Public:	
a) Do SSS, SM pre-disturbance surveys (amphibians, lichens, bryophytes) discuss in EA b) Do site specific bird surveys	3.2.1, 3.2.5
4. Economic Viability (Issue 4) *Issues/Comments from the Public:*	1.2, 2.2
a) Use appropriate harvest systems and temporary roads	2.2
b) Do not decommission permanent roads that provide fire access c) Allow winter haul d) Minimize seasonal restrictions e) Reduce no harvest buffers in the Riparian Reserve LUA Response to #4b to 4e: We are unable to incorporate these suggestions because of possible effects to water quality and fisheries in the project area.	See Response
f) Make mechanical harvesting and pre-bunching available on all harvest ground g) Emphasize the objective that needs to be achieved rather than the method. Have more purchaser choice. Response to # 4f and 4g: These suggestions will be considered as long as they meet RMP standards and guidelines.	See Response
h) Increase intensity of thinning to more than 4-8 mbf per acre Response to # 4h: The silviculturist determines thinning prescriptions based on current stand conditions and future entries.	See Response
i) Offer SBA sales j) Allow enough time on contracts - extend contracts if contract requirements interfere with getting job done within contract time. k) Offer scale sales instead of lump sum. Allow logger to select trees to be removed. Response to # 4i to 4k: These comments are out of the scope of this EA. Changes in contract length or extensions based upon market conditions are determined at the Congressional level and are outside the scope of this EA. Scale sales and allowing logger to select trees is out of the scope of this EA.	See Response
l) Block roads instead of road decommissioning Response to 4l: We will block roads, except those that are to be decommissioned in accordance with RMP standards and guidelines.	2.2.2, 2.2.3
Additional comments/issues from IDT: m) Provide adequate access to sale units, to minimize yarding distances.	2.2.2, 7.1
5. Visual Resources (Issue 5) *Comments/issues from Public and IDT:*	3.2.8
a) Units' visibility from Highway 22; visual effects of the proposed thinning.	3.2.8

Issues/Comments	Addressed in EA Section
6. Additional Comments from the Public	
a) Develop an alternative that addresses carbon and climate by (a) deferring harvest of older forests to store carbon and provide biodiversity and connectivity and (b) thin younger stands to increase forest resilience and diversity and connectivity.	2.5
b) As stands develop from young to mature to old, they recruit large amounts of material from the live tree pool to the dead wood pool and this pool continues to accumulate large amounts of carbon for centuries. Logging, even thinning, can dramatically affect the accumulation of carbon in the dead wood pool by capturing mortality, diverting it from the forest, and accelerating the transfer of carbon to the atmosphere. Carbon stays out of the atmosphere much longer if it remains in the forest as live and/or dead trees, instead of being converted to wood products and industrial and consumer waste.	3.2.7
c) Biomass Utilization: If this project involves biomass utilization, the impacts need to be clearly disclosed. d) Fuels Treatments: If using whole tree yarding or yarding with tops attached to control fuels, the agency should top a portion of the trees and leave the greens in the forest in order to retain nutrients on site.	2.2.2
e) Illegal Human Use: Address human fire starts, illegal ORV use/dumping, rural urban wildlands interface - blocking roads should be part of this project	2.2.2
f) Invasive Species: Take proactive steps to avoid the spread of weeds. Use canopy cover to suppress weeds. Avoid soil disturbance and road construction	2.2.3, 3.2.1
g) Monitoring: Use projects as an opportunity to learn by conducting monitoring and research on the effects of thinning.	
h) Raptor Nests: Avoid impacts to raptor nests and enhance habitat for diverse prey species. Train marking crews and cutting crews to look up and avoid cutting trees with nests of any sort and trees with defects.	3.2.5
i) Stands to be thinned: Focus on treating the youngest stands that are most "plastic" and amenable to restoration.	2.2.1, 3.2.1
j) Watershed Restoration: When conducting commercial thinning projects take the opportunity to implement other critical aspects of watershed restoration especially pre-commercial thinning, restoring fish passage, reducing the impacts of the road system, and treating invasive weeds.	3.2.11