Lone Pine Environmental Assessment

DOI-BLM-OR-C040-2011-0006-EA
Coos Bay District
Bureau of Land Management
1300 Airport Lane
North Bend, Oregon 97459

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Chapter 1 Purpose and Need for Action

Background

The Final – Coos Bay District Resource Management Plan and Environmental Impact Statement (RMP) and its Record of Decision (ROD) responds to multiple needs, the two primary ones are the need for forest habitat and the need for forest products. The RMP addressed these needs through an ecosystem strategy under which BLM lands "will be managed to maintain healthy, functioning ecosystems from which a sustainable production of resources can be provided."

The Coos Bay District has an allowable sale quantity (ASQ) of 27 MMbf per year, harvested entirely from the Matrix land use allocation (LUA). The Matrix LUA consists of two subsets, General Forest Management Area (GFMA) and Connectivity/Diversity Blocks (C/D). The Lone Pine stands are a combination of GFMA and C/D, and contain Riparian Reserves (RR).

Need for the Project

Some of the stands within the analysis area have reached an age at which overstocking levels are causing decelerated growth rates and limited structural diversity. Too many trees occupy the growing space resulting in reduced capacity for a desired output of volume. Thinning these stands at this time would reverse these trends and restore growth rates that would contribute to future commodity production. In the Riparian Reserves, thinning would encourage development of large diameter trees, snags, and other complex habitat characteristics needed to advance conditions to achieve the aquatic conservation strategy objectives.

Also within the project area, there are stands that unsuccessfully regenerated as conifer and contain a large presence of hardwoods, primarily alders. In the Matrix, these stands are not in a condition to provide for commercial extraction opportunities in the final regeneration harvest.

Purpose (Objectives) of the Project

A reasonable action alternative must meet the objectives provided in the ROD/RMP for implementing projects within the planning area. The ROD/RMP and applicable statutes specify the following objectives in managing the lands within the project area:

Matrix – General Forest Management Area and Connectivity/Diversity Blocks

Provide a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability (p. 22) by:

- Conducting timber harvest and other silvicultural activities in that portion of the Matrix with suitable forest lands (p. 22);
- Providing timber sale volume towards the Coos Bay District Allowable Sale Quantity as required by the Oregon and California Act (O&C Act) of August 28, 1937. The BLM has a statutory obligation under the O&C Act to manage suitable commercial forest lands revested by the federal government from the Oregon and California Railroad grant (O&C lands) for permanent forest production in accordance with the sustained yield principle.

Manage developing stands on available lands to promote tree survival and growth and to achieve a balance between wood volume production, quality of wood, and timber value at harvest (p. 52) by:

- Planning harvest of marketable hardwood stands in the same manner as conifer stands, unless the land is otherwise constrained from timber management (p. 53);
- Planning to reestablish a conifer stand on a site where hardwood stands have become established following previous harvest of conifers (p. 53).

Riparian Reserves

Manage riparian resources to meet the Aquatic Conservation Strategy objectives designed to maintain and restore the ecological health of aquatic ecosystems on public lands (p. 6) and provide for special status, SEIS special attention, and other terrestrial species (p. 12) by:

- Applying silvicultural practices for Riparian Reserves to control stocking, re-establish and manage stands and acquire desired vegetation characteristics (p. 13).

Location

The project area is located approximately 35 miles southeast of Coos Bay, OR. The bulk of the units are located in the North Fork Coquille and East Fork Coquille 5th field watersheds. There are a few units on the outer edges of the Coquille River and Middle Main Coquille 5th field watersheds. The proposed harvest activities are located in the following locations:

Table I-1 Location of proposed treatment areas.

Township	Range	Section(s)
27 S.	11 W.	21 and 35
27 S.	12 W.	35
28 S.	09 W.	17
28 S.	10 W.	22
28 S.	11 W.	1, 2, 3, 5, 7, 17, 19, 29, 31, 32
28 S.	12 W.	1, 13, 23, 25, 27, 35
29 S.	11 W.	5 and 7
29 S.	12 W.	12

Decision Factors

In choosing an alternative that best meets the purpose and need, the field manager will consider the extent each alternative would:

1. Reduce competition-based mortality and increase tree vigor and growth specific to the Matrix.
2. Provide for future sustained harvests by converting non-productive stands within the Matrix.
3. Improve Riparian Reserve stand structure by thinning out excess trees in overstocked stands to enhance the growth and vigor of the residual trees while retaining structural and habitat components, such as large trees, snags, and coarse wood.
4. Provide timber resources for sale and revenue from the sale of those resources to the government.
5. Provide cost effective management that would enable implementation of these management objectives while providing collateral economic benefits to society.
6. Comply with applicable laws and Bureau (BLM) policies including, but not limited to: the Clean Water Act, the Endangered Species Act, the O&C Act, the Magnuson-Stevens Fisheries Conservation and Management Act, and the special status species program.

Conformance with Existing Land Use Plans

This project was initiated under and is tiered to the *Coos Bay District Proposed Resource Management Plan/Final Environmental Impact Statement* (USDI 1994) and it's *Record of Decision* (ROD/RMP) (USDI 1995), as supplemented and amended. The Coos Bay District ROD/RMP is supported by and consistent with the *Final Supplemental Environmental Impact (FSEIS) on Management of Habitat for Late Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl* (Northwest Forest Plan) (USDA and USDI 1994) and it's *Record of Decision* (USDA and USDI 1994).

The Lone Pine project is consistent with the 1995 Coos Bay District 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* (USDA and USDI 2001) or is consistent with the Pechman Exemptions (see pp. 38-39 for further discussion).

Documents Incorporated by Reference

Staff specialists used the following documents in the analysis of the Lone Pine project and reference these documents throughout this environmental assessment:

North Fork Coquille Watershed Analysis (USDI 2002)
East Fork Coquille Watershed Analysis (USDI 2005 *Update*)
Middle Main Coquille, North Coquille Mouth, Catching Creek Water Watershed Analysis (USDI 1997)
Middle Fork Coquille Watershed Analysis (USDI 2007 *Update*)
Western Oregon Districts Transportation Management Plan (USDI 2010 *Update*)
Staff reports contained in the analysis file

Endangered Species Act

Consultation with the U.S. Fish and Wildlife Service (USFWS) as provided in Section 7 of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1536 (a)(2) and (a)(4) as amended) was completed and the Coos Bay District received a Biological Opinion on August 1, 2013(TAILS#:01EOFW00-2013-F-0159).

Consultation with the National Marine Fisheries Service has been initiated for those treatment areas that "may affect" the threatened Oregon Coast coho salmon and their designated Critical Habitat. The BLM has submitted a project-level biological assessment. Additionally, project activities have been determined to not adversely affect essential fish habitat under the Magnuson-Steven Fishery Conservation Act (16 U.S.C. 1855(b)).

Decisions to be Made

The field manager of the Myrtlewood Field Office, Coos Bay BLM, must decide whether to conduct commercial thinning, density management thinning and hardwood conversion activities within the Lone Pine project area. A description of the project is located in Chapter 2.

The field manager must also determine if implementation of the selected alternative would or would not constitute a major federal action significantly affecting the quality of the human environment. If the manager decides it would not significantly affect the quality of the human environment, then the manager can prepare and sign a FONSI (finding of no significant impact).

If the manager determines the selected alternative would significantly alter the quality of the human environment, then the manager will drop the project, modify the project, or have an EIS (environmental impact statement) and a ROD (record of decision) prepared and signed before proceeding.

Public Involvement

The primary purpose of scoping is to identify agency and public concerns relating to a proposed project and helps define the environmental impacts of concern the interdisciplinary team will examine in detail in the EA. The BLM notified the public of the proposed project and planned EA through the publication of the district's semi-annual Planning Update. Additionally, the BLM sent scoping notices to adjacent landowners, agencies requesting these documents, and other interested parties from the district NEPA mailing list. The scoping period was open from May 1- 31, 2012. The BLM received three comments representing four organizations. The BLM also received several comments from adjacent water rights owners/permittees. In response to these specific concerns, the BLM sent an additional letter to landowners with existing water rights within 0.25 miles down-steam of the project on July 30, 2012 notifying them of the project. The BLM received no further comments.

The BLM has identified a few locations by which the public does not have legal access either by locked gates or by reciprocal right-of-way agreements. These locations and roads are located in Appendix A – Road Access.

Issues Considered but Eliminated From Detailed Analysis

Hardwood Conversion

One of the scoping comments requested not doing any hardwood conversions. The interdisciplinary team (ID team) looked at the current landscape conditions, historic reference conditions, and identified areas with previous conifer stumps that failed to regenerate native conifers after a previous harvest. The ID team also identified large areas cleared for farming and grazing and hardwoods currently dominate those sites. As the RMP designated these lands as Matrix, for the primary purpose of timber production, the BLM's lack of management to convert these stands for sustainable timber production would violate the management direction of the RMP. The purpose and need for this particular project reflects this condition.

These comments also suggested the EA include a separate alternative that does not include hardwood conversion treatments. As stated above, an alternative of not conducting hardwood conversion treatments would not meet the purpose and need of the Lone Pine project to convert underperforming Matrix stands for sustainable timber production. In actuality, the analysis of not conducting hardwood conversion treatments is included in the no action alternative effects analysis.

Road Construction

There was a comment that the preliminary proposal for road construction was "excessive." While there is no context given to define this opinion, this EA contains a lengthy analysis concerning the effects of road construction associated with the Lone Pine project (pp. 46-47; 53-54). This analysis concludes that all of the proposed road construction would have no effect to water quality, peak flows, fisheries, or riparian conditions and is within the range of effects analyzed within the FEIS for the Coos Bay District RMP.

The ID team assessed each new road for implementing the purpose and need of this project. The ID team also used the updated Western Oregon Districts' Transportation Management Plan (TMP; USDI 2010 *update*) to manage the transportation system in a manner consistent with the RMP and other current regulations.

Roads represent a project cost that reduces timber sale value and receipts to the BLM and O&C county governments. Consequently, it is not in the BLM's interest to construct any more road than necessary for stand access of these Matrix lands, which are primarily for the purpose of timber production. Compared to traditional regeneration harvests, thinning harvests inherently require more road access to facilitate placement of yarding equipment to provide access within a timber sale boundary. The need for more roads is also the result of minimizing yarding corridors within Riparian Reserves over stream channels.

One comment requested an analysis showing the harvest acreage accessed for each road segment. The ID team inherently considers this information in the project development and analysis. The BLM has proposed only those roads needed to implement the project. Providing a list of each road and "acres accessed" would only show a numerical relationship between two items. There would be no environmental or economic threshold associated with this type of information; therefore, it is unnecessary for making resource management decisions. Other factors the ID team considers for each road segment include market volume removed from the stand, future access needs for maintenance of the stand, reforestation needs, and the capital investment in the construction of the road. These are just some of the factors that the BLM uses in planning, designing and proposing new road construction and are not inherent in showing a "acres accessed" representation. As stated above, this EA contains environmental effects analysis of new road construction included in the proposed action.

Chapter 2 Alternatives

This chapter is a description of each alternative and summarizes the environmental consequences of the alternatives

This EA contains the analysis of a no action alternative and proposed action alternative. For an ID team to consider an action alternative, that alternative must meet the purpose and need while not violating any minimum environmental standards. An action alternative must be consistent with the RMP and satisfy the purpose and need of implementing the RMP.

For unit locations, refer to the attached Map Appendix. Appendix D of the RMP describes the best management and conservation practices for harvest related activities while Appendix E describes the silvicultural objectives of commercial thinning, density management thinning, and removal of less desirable commercial species for Matrix lands. Research by Tappeiner *et al.* (1997), Poage and Tappeiner (2002), and others (Muir *et al.* 2002) also guide density management treatments. Many hardwood conversion areas were identified in applicable watershed analyses (e.g. North Fork Coquille and East Fork Coquille) because of unsuccessful regeneration of conifers from past management actions like grazing or clear-cut harvesting. There was also a large wildland fire in portions of the area; affected lands also failed to regenerate to conifer.

All quantifications (i.e. acreages, mileages, etc.) are based on estimates obtained from geographic information systems (GIS). In implementing these plans in the field, final numbers could vary slightly. Harvest volumes for the commercial thinning and density management treatments are estimates derived from stand exam information, LiDAR[1] imagery, and model projections. These volume estimates are variable and actual volume harvested may differ.

No Action Alternative

The no action alternative provides a baseline for the comparison of the action alternative. This alternative describes the existing condition and the continuing trends. Selection of the no action alternative would not constitute a decision to reallocate these lands to non-commodity uses. This would not preclude future harvesting in this area, at which time the BLM would prepare another EA. This alternative would not meet the purpose and need.

The project area would not receive the treatments described in this document in the near future. Ongoing activities would continue to occur. These include silvicultural activities in young stands, compliance with Oregon fire control regulations, construction of roads across BLM land under existing right-of-way agreements, routine road maintenance, control of noxious weeds and other projects covered by earlier decision records.

Proposed Action Alternative

The proposed action is to implement silvicultural treatments on approximately 3,727 acres of mid-seral stands. This action includes commercial and density management thinning of conifer stands and hardwood conversion in the Matrix (GFMA/Conn) and Riparian Reserve (RR) land use allocations. Treatments would occur commercially through timber sales and possibly stewardship contracting and non-commercial treatments. The BLM would derive harvest volumes for the thinning treatments from cruising methods that would employ sample tree falling techniques.

Table II-1 contains a brief summary of the harvest activities; Table II-2 contains a summary of the road-related activities. Final acreages and mileages may change as the BLM finalizes project on the ground; the variability of these estimates is included in the effects analysis in this environmental assessment. The ID team has not

[1] Light Detection and Ranging

developed specific timber sales, but the team has described harvest areas by general locations in logical groupings.

Table II-1 Proposed action - harvest activities

Category	Land Use Allocation	Activity	Acres
Timber Harvest (Acres)	Matrix	Commercial Thinning (CT)	1523
		Commercial Thinning with Hardwood Conversion (CT/HWC)	235
		Hardwood Conversion (HWC)	244
		Hardwood Conversion with Commercial Thinning (HWC/CT)	144
		Matrix Total	**2146**
Timber Harvest (Acres)	Riparian Reserve (RR)	Density Management Thinning (DMT)	1068
		Density Management Thinning with Hardwood Conversion (DMT/HWC)	187
		Hardwood Conversion (HWC)	217
		Hardwood Conversion with Density Management Thinning (HWC/DMT)	109
		Riparian Reserve Total	**1581**
		Proposed Action Total	***3727***
		Stream No-Treatment Zones	250
		Acreage Dropped From This Proposed Action	600
Harvest Methods	Matrix	Cable Yarding	2049
		Ground-Based Yarding	86
		Helicopter Yarding	11
	Riparian Reserve	Cable Yarding	1433
		Ground-Based Yarding	115
		Helicopter Yarding	33

Table II-2 - Proposed action - road-related activities.

Category	Activity	Mileage
Timber Haul	Dry Season/Dirt Roads	33
	Dry Season/Gravel Roads	16
	All Season/Gravel Roads	60.9
	All Season/Paved Roads	3.1
Road Management	Construction Total	13.9
	Construction in the RR	1
	Improvement	2.7
	Renovation	74.3
	Reconstruction	7.9
	Maintenance	7.1
	Decommissioning (Total)	30.8
	Full Decommissioning	1.5
	Decommissioning (Net)*	**12.7**
	Decommissioning Key Watershed (Net)+	**0.12**

* Net does not include new construction that would be decommissioned, only open existing roads.
+ Includes new construction to be decommissioned less existing roads to be fully decommissioned.

Silvicultural Treatments

There are four basic treatments within the proposed action. Thinning treatments, which include both commercial and density management thinning, would occur in stands that are predominately conifer with some scattered hardwoods. Commercial thinning (CT) is the terminology for Matrix treatments and density management thinning (DMT) describes treatments in Riparian Reserves. Hardwood conversion (HWC) restores a site that unsuccessfully regenerated conifer and converts the existing hardwood stand to a conifer dominated stand.

There are also conifer stands with a larger hardwood component and hardwood stands with larger conifer components that do not meet the two definitions above. A stand with more than 50 percent conifer is called CT/DMT and HWC. A stand with more than 50 percent hardwood is called HWC and CT/DMT. These classifications are based on GIS and LiDAR interpretation and are merely used to describe the predominant stand type. At the site-specific scale, this broad description may not describe these mixed stands as accurately. There will be variations in conifer and hardwood composition at the site-specific scale. These descriptions are used to describe the predominant composition of the stand to provide context for effects analysis at the scale of the project area. Table II-3 lists the sale area and the treatment acreages by general type.

Table II-3 - Acreages of each general prescription type by project area.

Project Area	Treatment Type (Acres)				Total Acreage
	CT or DMT	CT/DMT and HWC	HWC and CT/DMT	HWC	
Big Bend	76			43	119
Brownstone	361	9			370
Crosby	165	51		25	241
Dora	201	14		8	223
Fox Bridge		29			29
Frona	314		12	8	334
John's Creek	178	38		2	218
Llewellyn	119	66		3	188
Maint. Shop	89				89
N. Coq. Jct.	62	24	10		96
Rock Prairie				53	53
Schuck Mtn.	263	17	66	121	467
Steel Cherry	114	60	23	34	231
Weaver Tie	28		26	14	68
Weekly	197				197
Wimer	80				80
Yankee	261	65	48	75	449
Zumwalt	83	49	66	74	273
Totals	**2591**	**422**	**253**	**461**	**3727**

Thinning – Commercial and Density Management (CT and DMT)

Stands would be thinned from below by primarily cutting the overtopped, intermediate and co-dominant conifers (Douglas-fir, western hemlock and grand fir) and hardwoods to obtain the desired relative density (RD). All hardwoods would be removed from Matrix stands. The residual trees would be distributed across the site to rapidly capture the growing space made available by the thinning and would be trees with the largest crowns and stem diameters relative to other trees in the immediate area.

Relative density "expresses the actual density of trees in a stand relative to the theoretical maximum density (RD100) possible for trees of that size" (Hayes *et al.* 1997) . It is a measure used to estimate when a stand reaches a density where diameter growth begins to decline and suppression mortality increases. Relative density increases for a given stem diameter if the number of trees per acre decrease. Given the stage of the stands proposed for treatments, they require manipulation in density to maintain growth rates.

Stands have been stratified into two age groupings for relative density goals, those stands 37-59 years of age, and stands 60-79 years of age. In commercial thinning areas, the dense young stands in the 37-59 age class would be thinned to an RD between 21 and 34, with an average of 27. The older 60-79 year old stands would be thinned to an RD between 26 and 47 with an average of 37. Using parameters provided in Hayes *et al.* 1997, The BLM considers thinning to this density a medium thinning typical for stands intended for timber production.

In density management areas (Riparian Reserves), the 30-59 age class would be thinned to an RD between 26 and 35, with an average of 30 while the 60-79 year old age class would be thinned to an RD between 33 and 53 with an average of 43. These higher RDs reflect the application of an upper diameter limit (retaining all trees ≥ 24" DBH) and additional hardwoods per acre (described in project design features).

Hardwood Conversion (HWC)

The intent of hardwood conversion is to reestablish conifer on sites where conifers failed to regenerate after harvest or wildfires due to a lack of active management. These stands were originally conifer dominated as evidenced by stumps, historical records, and aerial photos. All hardwoods (except in Riparian Reserves) would be removed. These stands are mostly pure hardwoods with a few scattered suppressed conifers. Any scattered conifers would be left. Gaps greater than two acres in size would be planted with conifer seedlings. No individual HWC area is greater than 32 acres; most average approximately three acres or less.

Thinning and Hardwood Conversion Mixed Stands (Mixed)

These stands are highly variable in composition. The CT/DMT and HWC stands have more conifer than hardwoods or brush, but the conifer may be denser in some areas of the stand and scattered in another area. The HWC and CT/DMT stands have more areas of hardwoods than conifers. Hardwood species include red alder, big leaf maple, Oregon myrtle, golden chinquapin, and tanoak. The treatments across both stand types (mixed) include thinning of dense areas of conifers and removal of overtopping/concentrated hardwoods.

Riparian Reserves

Treatments in the Riparian Reserves are the beginning of a process designed to accelerate development of late-successional forest characteristics and improve habitat conditions for riparian dependent/associated species. The objectives of these treatments are to promote development of large conifers, improve future recruitment of large woody debris, improve diversity of species composition, improve an understory shrub layer, improve structural diversity, and improve stand density. Reduced and more variable stand densities can be defined as an improvement in that they facilitate meeting Riparian Reserve and Aquatic Conservation Strategy (ACS) objectives as stated in the purpose and need.

As the objectives for treatments in the Riparian Reserves are different, there are project design features specific to this LUA to achieve those objectives. These design features apply to all of the Riparian Reserve treatments within any of the three treatments. First, not all hardwoods would be removed. Approximately four to eight hardwoods per acre would be retained to provide for species diversity. As Oregon myrtle and big leaf maple often grow in clumps, with multiple stems growing from one base, these trees would be considered as one hardwood towards meeting the hardwood retention requirement. These leave trees would be clumped potentially adjacent to stream no-treatment zones or scattered throughout the Riparian Reserve, depending upon site conditions and tree locations. Preference would be given to the largest hardwoods in the following species order: big leaf maple, golden chinquapin, madrone, Oregon myrtle, tanoak then alder.

In addition, there is a tree size limit in the Riparian Reserves. All trees (including hardwoods) 24” diameter at breast height (DBH) and larger would be retained.

Sample Tree Falling

The technique of sample tree falling would be used in preparation of timber sale contracts. This would improve the accuracy of the final cruise of the proposed timber volume offered for sale. The trees would be selected from trees marked for removal. Appendix B contains more information about sample tree falling. If a timber sale does not occur after the sample trees were felled, the trees would count towards coarse wood objectives described in applicable watershed analyses.

Created Structural Legacies – Snags and Downed Wood

Following harvest operations, 1.5 snags/acre and one piece of downed wood/acre would be created in conifer-dominated treatment units (Table II-4). These features would be created from trees remaining in the residual stand following thinning.

Table II-4 - Snag and down wood creation parameters for proposed harvest areas.

	Project Area	Estimated DBH at 66th percentile of leave trees	Creation Code*
Units or portions of units that are greater than 60 years old and conifer dominated	Maintenance Shop	22”	Snags/DW
	John’s Creek	20”	Snags/DW
	Brownstone	24”	Snags/DW
	Weaver Tie	26”	Snags/DW
	Frona	26”	Snags/DW
	Big Bend	26”	Snags/DW
	Yankee	26”	Snags/DW
	Crosby	24”	Snags/DW
	North Coquille Junction	28”	Snags/DW
	Zumwalt	20”	Snags/DW
	Schuck Mt.	20”	Snags/DW
Units or portions of units that are less than 60 years old and conifer dominated.	Big Bend	16”	Snags
	Brownstone	16”	Snags
	Crosby	16”	Snags
	Dora	16”	Snags
	Frona	16”	Snags
	John’s Creek	16”	Snags
	Llewellyn	16”	Snags
	North Coquille Junction	16”	Snags
	Schuck Mt.	16”	Snags
	Steel Cherry	16”	Snags
	Weekly	16”	Snags
	Wimer	16”	Snags
	Yankee	16”	Snags
	Zumwalt	16”	Snags
Units or portions of units that are less than 40 years old.	Crosby	15”	None
	Dora	15”	None
	John’s Creek	15”	None
	Llewelyn	15”	None
	Schuck Mt.	15”	None
	Steel Cherry	15”	None
	Weekly Creek	15”	None
	Wimer	15”	None
	Yankee	15”	None

*** Snag/down wood (DW) creation codes: Snags** – Snag creation recommended – DBH at 66th percentile is ≥ 16” DBH **and** unit is not ROD compliant for snags. **Snags/DW** - Snag and down wood creation recommended – Greater than 1/3 of residual TPA exceeds DBH thresholds **and** units are not ROD compliant for snags or down wood.

Port-Orford-cedar

As there are infected Port-Orford-cedar (POC) trees within the project area, the BLM would implement management practices from the *2004 Final Supplemental Final Environmental Impact Statement (FSEIS) for Management of Port-Orford-cedar in Southwest Oregon* (USDA and USDI 2004) and its *Record of Decision* (USDI 2004). These include Management Practices #9) road management measures, #12) logging systems and #17) site-specific POC management (USDI 2004).

Road Management

Road management for this project consists of developing and maintaining a transportation system that serves the project needs in an environmentally sound manner as directed by the Coos Bay RMP/ROD and the updated TMP. This would involve construction of new roads, renovation, and reconstruction of existing roads, maintenance of roads necessary to facilitate harvest operations, and decommissioning of roads at the completion of the project.

Construction of new roads and use of existing roads in this project have been designed to allow yarding and hauling operations to occur at the most appropriate times of the year after considering adjacent wildlife habitat, existing road conditions, unit size, unit volume and logging cost. For year-round use to occur, roads must have rocked or paved surfacing adequate to withstand winter operations.

New Road Construction

New road construction would consist of approximately 8.93 miles of dirt roads and 4.97 miles of rocked roads (Table II-5). The best management practices (BMPs) listed in the project design features starting on page 17 would guide the type of road construction and road locations. Approximately 1.05 miles of new road construction would occur within the Riparian Reserves. This mileage is from 19 spurs with the longest segment being 0.13 miles (690 feet); the average is 0.036 miles (190 feet). Landing construction would consist of creating wide spots to facilitate safe yarding and loading of logs and are typically about ¼ acre in size, which includes the existing roadbed. As development of each individual sale progresses and becomes more refined, some short unidentified spur roads or landings may be required that would better facilitate harvest operations. This unidentified new construction would be implemented using these same BMPs.

Table II-5 - New road construction estimates, surface and closure types, and haul seasons by treatment area.

Treatment Area	EA Spur No.	Surface Type	Closure Type	Haul Season	Miles	Miles in RR
Big Bend	BB-NC1	Rock	Decomm	All	0.10	
	BB-NC2	Rock	Full Decomm	All	0.08	0.06
	BB-NC3	Dirt	Decomm	Summer	0.29	
Brownstone	BS-NC1	Rock	Decomm	All	0.19	
	BS-NC10	Dirt	Decomm	Summer	0.09	
	BS-NC11	Rock	Decomm	All	0.04	
	BS-NC2	Rock	Decomm	All	0.11	
	BS-NC3	Rock	Decomm	All	0.16	
	BS-NC4	Rock	Decomm	All	0.13	
	BS-NC5	Rock	Decomm	All	0.11	
	BS-NC6	Rock	Decomm	All	0.04	
	BS-NC7	Rock	Decomm	All	0.06	0.01
	BS-NC8	Dirt	Decomm	Summer	0.16	0.11
	BS-NC9	Dirt	Full Decomm	Summer	0.11	0.05
Crosby	CR-NC1	Dirt	Decomm	Summer	0.43	
	CR-NC2	Dirt	Decomm	Summer	0.31	
	CR-NC3	Dirt	Decomm	Summer	0.13	
	CR-NC4	Dirt	Decomm	Summer	0.15	0.02
	CR-NC5	Dirt	Decomm	Summer	0.36	
Dora	DO-NC1	Rock	Decomm	All	0.20	
	DO-NC2	Rock	Full Decomm	All	0.15	0.06
	DO-NC3	Rock	Full Decomm	All	0.19	
Fox Bridge	FB-NC1	Rock	Decomm	All	0.27	0.16
Frona	FR-NC1	Dirt	Decomm	Summer	0.31	
	FR-NC10	Dirt	Decomm	Summer	0.10	
	FR-NC11	Dirt	Full Decomm	Summer	0.07	0.04
	FR-NC2	Dirt	Decomm	Summer	0.39	
	FR-NC3	Dirt	Decomm	Summer	0.05	
	FR-NC5	Dirt	Decomm	Summer	0.38	
	FR-NC6	Dirt	Decomm	Summer	0.07	
	FR-NC7	Dirt	Decomm	Summer	0.06	
	FR-NC8	Dirt	Decomm	Summer	0.09	
	FR-NC9	Dirt	Decomm	Summer	0.29	
John's Creek	JC-NC1	Dirt	Decomm	Summer	0.08	
	JC-NC2	Dirt	Decomm	Summer	0.16	
	JC-NC3	Rock	Decomm	All	0.05	0.01
	JC-NC4	Rock	Decomm	All	0.13	0.01
	JC-NC5	Dirt	Decomm	Summer	0.20	
Llewellyn	LL-NC1	Dirt	Decomm	Summer	0.23	
	LL-NC2	Dirt	Decomm	Summer	0.05	
	LL-NC3	Dirt	Decomm	Summer	0.02	
	LL-NC4	Dirt	Decomm	Summer	0.34	
	LL-NC5	Dirt	Decomm	Summer	0.20	
	LL-NC6	Dirt	Decomm	Summer	0.13	

Treatment Area	EA Spur No.	Surface Type	Closure Type	Haul Season	Miles	Miles in RR
Maintenance Shop	MS-NC1	Dirt	Full Decomm	Summer	0.12	0.02
	MS-NC2	Dirt	Full Decomm	Summer	0.02	0.01
	MS-NC3	Dirt	Decomm	Summer	0.16	0.05
	MS-NC4	Dirt	Decomm	Summer	0.11	
	MS-NC6	Dirt	Decomm	Summer	0.14	0.07
North Coquille Junction	CJ-NC1	Rock	Decomm	All	0.33	
	CJ-NC2	Rock	Decomm	All	0.25	
	CJ-NC3	Rock	Decomm	All	0.15	
Rock Prairie	RP-NC1	Dirt	Decomm	Summer	0.24	
Schuck Mt.	SM-NC1	Dirt	Decomm	Summer	0.46	
	SM-NC2	Dirt	Decomm	Summer	0.06	
	SM-NC3	Rock	Decomm	All	0.24	
	SM-NC4	Rock	Decomm	All	0.07	
	SM-NC5	Rock	Decomm	All	0.32	
	SM-NC6	Rock	Decomm	All	0.15	
Steel Cherry	SC-NC1	Dirt	Decomm	Summer	0.08	
	SC-NC2	Dirt	Decomm	Summer	0.10	0.07
Weaver Tie	WT-NC1	Rock	Decomm	All	0.18	
	WT-NC2	Rock	Decomm	All	0.03	
Weekly	WC-NC1	Rock	Decomm	All	0.06	
	WC-NC2	Dirt	Decomm	Summer	0.16	
Wimer	WR-NC1	Dirt	Decomm	Summer	0.29	
Yankee	YR-NC1	Rock	Decomm	All	0.10	
	YR-NC12	Rock	Decomm	All	0.04	
	YR-NC2	Rock	Decomm	All	0.04	
	YR-NC3	Rock	Decomm	All	0.16	0.01
	YR-NC4	Rock	Decomm	All	0.19	
	YR-NC5	Rock	Decomm	All	0.12	
	YR-NC6	Dirt	Decomm	Summer	0.36	
	YR-NC7	Dirt	Decomm	Summer	0.06	
	YR-NC8	Rock	Decomm	All	0.53	
	YR-NC9	Dirt	Decomm	Summer	0.09	
Zumwalt	ZU-NC1	Dirt	Decomm	Summer	0.10	0.05
	ZU-NC2	Dirt	Decomm	Summer	0.27	
	ZU-NC3	Dirt	Decomm	Summer	0.32	0.11
	ZU-NC4	Dirt	Decomm	Summer	0.18	0.13
	ZU-NC5	Dirt	Decomm	Summer	0.36	
Grand Total					**13.9**	**1.05**

Road Renovation

Road renovation involves bringing an existing road back up to the original design standard. For a natural surfaced road, work includes clearing brush within the road prism, cleaning or replacing ditch relief/stream crossing culverts, restoring proper road surface drainage, grading or other maintenance. For a gravel road, it also may include adding rock so the road is adequate for winter operations.

Road Reconstruction

Road reconstruction includes work on those roads that have generally been neglected, may not have been used in several decades, are closed with vegetation or debris, or would require substantial work within the road prism to return the roads back to their original condition. The vegetation in the road prism may consist of trees rather than just brush. One could consider reconstruction “heavy” renovation work.

Road Improvement

Road improvement for this project consists of increasing the existing road standard to a higher design standard by surfacing existing dirt roads. Rock-surfaced roads would extend cable harvesting and hauling during the winter season to allow work outside of murrelet and owl seasonally restricted periods and to reduce yarding damage in stands where hemlock would be a major component of the residual stands.

Road Decommissioning

The project would decommission/fully decommission a total of 30.8 miles of roads, resulting in a net decrease of 12.7 miles of open roads within the project area. There would be 1.5 miles of road fully decommissioned, which includes a 0.33 mile spur road that would not be used to implement project activities. This spur road would be fully decommissioned in conjunction with the completion of other project activities.

Roads to be “decommissioned” would be closed to vehicles on a long-term basis (> 5 years). However, for future administrative use, the BLM may open and maintain these roads. These roads would be left in an erosion-resistant condition by installing waterbars, eliminating diversion potential at stream channels, stabilizing or removing fills on unstable areas, and treating exposed soils. Additionally, the installation of barriers would prevent vehicular traffic (including OHVs). If slash were available, it would be scattered over the road surface. All decommissioned roads would have no connectivity to the hydrologic network and some stream crossing culverts may be removed. The ID team has determined that there are future administrative uses for these roads.

Roads to be “fully decommissioned” would also be left in an erosion-resistant condition; however, to enhance surface infiltration, decompaction of the roadbed and landings may be required dependent upon site-specific conditions. All stream crossing culverts and surface rock would be removed. The ID team has determined there is no future administrative need for these roads.

There are 8.3 miles of the haul route that have gates to prevent unauthorized traffic. These gates would remain after the BLM concludes project activities and the TMP classifies this as “temporary closure.”

The following table (Table II-6) displays each road, EA or existing road number, roadwork type, closure type, haul season and mileage length.

Table II-6 - Road renovation, improvement, reconstruction, and closure type by treatment area.

Treatment Area	EA Spur No	Road Number	Road Work	Closure Type	Surface Type	Haul Season	Miles
Big Bend	BB-RO1		Reno	Decomm	Dirt	Summer	0.72
		28-11-5.1	Reno	Decomm	Dirt	Summer	0.65
		28-11-5.4	Reno	Temp	Rock	All	0.29
Brownstone	BS-RR1		Re-const.	Decomm	Rock	All	0.20
	BS-RR2		Re-const.	Decomm	Rock	All	0.16
	BS-RR3		Re-const.	-	Dirt	Summer	0.22
	BS-RV2		Reno	-	Rock	All	0.45
	BS-RV2		Reno	-	Rock	Summer	0.49
	BS-RV3		Reno	-	Rock	All	0.94
		28-8-19	Reno	-	Rock	All	1.68
		28-9-14	Reno	-	Rock	All	2.51
		28-9-15	Reno	-	Rock	All	1.04
		28-9-17	Reno	-	Rock	All	1.69
		28-9-18.2	Reno	-	Rock	All	0.26
		28-9-18.5	Reno	-	Rock	All	1.66
		28-9-23	Reno	-	Rock	All	1.07
		28-9-8.1	Imp	-	Rock	All	1.06
		28-9-8.1	Reno	-	Rock	All	0.69
		28-9-8.1	Re-const.	Decomm	Dirt	Summer	0.69
		28-9-8.1	Re-const.	-	Rock	Summer	0.47
		28-9-8.2	Reno	Decomm	Dirt	Summer	0.44
		28-9-8.2	Reno	Temp	Dirt	Summer	0.57
		28-9-8.2	Reno	-	Rock	All	0.55
	BS-RV1		Reno	-	Rock	All	0.31
Crosby	CR-RR1		Re-const.	Decomm	Dirt	Summer	0.32
		28-11-19.6	Reno	-	Rock	All	0.13
		28-11-19.6	Re-const.	Decomm	Rock	All	0.20
		28-11-30.2	Reno	Decomm	Dirt	Summer	0.15
		28-11-30.2	Reno	Temp	Rock	All	1.03
Dora	DO-RV1		Reno	-	Rock	All	0.10

Treatment Area	EA Spur No	Road Number	Road Work	Closure Type	Surface Type	Haul Season	Miles
	DO-RV2		Reno	Temp	Rock	Summer	0.43
		28-11-3.1	Reno	-	Rock	All	0.80
		28-11-3.4	Imp	Decomm	Rock	All	0.14
		28-11-3.7	Reno	Decomm	Dirt	Summer	0.30
		28-11-3.7	Reno	Decomm	Rock	All	0.28
		28-11-4	Imp	Decomm	Rock	All	0.48
		28-11-4	Imp	Full Decomm	Rock	All	0.17
	FR-RR1		Re-const.	Decomm	Dirt	Summer	0.35
	FR-RV1		Reno	Decomm	Dirt	Summer	0.09
		27-11-7	Reno	Decomm	Dirt	Summer	0.37
Frona		28-11-11	Reno	Temp	Rock	Summer	0.11
		28-11-11.1	Reno	Temp	Rock	Summer	0.90
		28-11-11.2	Reno	Decomm	Dirt	Summer	0.22
		28-11-2.1	Reno	Decomm	Dirt	Summer	0.57
	JC-RV1		Reno	Temp	Rock	Summer	0.39
	JC-RV2		Reno	Decomm	Rock	All	0.08
		29-11-7	Reno	-	Rock	All	0.30
		29-11-7.1	Reno	-	Rock	All	1.64
		29-11-7.2	Reno	-	Rock	Summer	0.05
		29-11-7.3	Reno	Decomm	Dirt	Summer	0.59
		29-11-7.4	Reno	Decomm	Dirt	Summer	0.36
John's Creek		29-11-7.6	Reno	-	Dirt	Summer	0.02
		29-11-7.6	Reno	-	Rock	All	0.23
		29-11-7.8	Reno	-	Rock	Summer	0.26
		29-12-1.1	Reno	Decomm	Rock	Summer	0.14
		29-12-1.1	Reno	-	Rock	All	1.82
		29-12-24	Reno	-	Rock	All	4.08
	JC-RV3		Reno	-	Dirt	Summer	0.76
	LL-RR1		Re-const.	Decomm	Dirt	Summer	0.11
	LL-RR2		Re-const.	Decomm	Dirt	Summer	0.15
	LL-RV1		Reno	Decomm	Dirt	Summer	0.29
Llewellyn	LL-RV2		Reno	Decomm	Dirt	Summer	0.26
		29-12-4	Reno	Decomm	Rock	Summer	0.93
		29-12-4	Reno	-	Rock	Summer	0.50
		29-12-4	Re-const.	Decomm	Dirt	Summer	0.89
	MS-RV1	Private Drive	Reno	-	Dirt	Summer	0.05
		27-11-21.1	Reno	-	Rock	Summer	0.48
		27-11-22	Reno	-	Rock	Summer	0.07
Maintenance Shop		27-11-22.5	Re-const.	Decomm	Dirt	Summer	0.68
		27-11-27	Reno	-	Rock	Summer	0.11
		27-11-7	Reno	-	Rock	Summer	1.43
	MS-RR1		Re-const.	Full Decomm	Dirt	Summer	0.04
	CJ-RR1		Re-const.	Decomm	Rock	All	0.17
	CJ-RV1		Reno	-	Rock	All	0.68
		27-11-30.1	Reno	Temp	Rock	All	0.74
		27-11-30.10	Reno	Temp	Rock	All	0.28
North Coquille Junction		27-11-30.17	Reno	Temp	Rock	All	1.16
		27-11-30.2	Reno	Temp	Rock	All	0.67
		27-12-36.2	Reno	Temp	Rock	Restricted	0.10
		28-12-1	Re-const.	-	Rock	All	0.18
		28-12-12.1	Re-const.	-	Rock	All	0.76
Rock Prairie	RP-RV1		Reno	Temp	Dirt	Summer	0.48
		27-11-30.2	Reno	Temp	Dirt	Summer	0.91
	SM-RR1		Re-const.	Decomm	Dirt	Summer	0.15
		28-12-22	Reno	-	Rock	All	3.07
		28-12-22	Re-const.	Decomm	Dirt	Summer	0.07
Schuck Mt.		28-12-27	Reno	-	Rock	All	1.12
		28-12-27.1	Reno	-	Rock	All	0.75
		28-12-27.2	Re-const.	-	Rock	All	0.28
	SM-RR2		Re-const.	Full Decomm	Dirt	Summer	0.23
	SC-IP1		Imp	Full Decomm	Rock	All	0.12
Steel Cherry	SC-RR1		Re-const.	Decomm	Rock	All	0.50
	SC-RR2		Reno	-	Rock	All	0.04

Treatment Area	EA Spur No	Road Number	Road Work	Closure Type	Surface Type	Haul Season	Miles
		27-11-35	Reno	-	Rock	All	0.80
		27-11-35.1	Reno	Decomm	Dirt	Summer	0.06
		27-11-35.1	Reno	-	Rock	All	0.30
		27-11-36	Reno	-	Rock	All	0.13
		27-11-7	Reno	-	Rock	All	0.83
		28-11-2	Reno	Decomm	Dirt	Summer	0.37
		28-11-2	Reno	-	Rock	All	0.63
		28-11-3	Reno	-	Rock	All	3.16
		29-12-24	Reno	-	Rock	All	0.01
Weaver Tie		28-10-22	Re-const.	Decomm	Rock	All	0.39
Weekly	WC-IM1		Imp	Decomm	Rock	All	0.04
	WC-IM2		Imp	Decomm	Rock	All	0.06
		28-11-30	Reno	-	Rock	All	2.79
		28-11-31	Reno	-	Rock	All	0.72
		28-11-31.2	Reno	Decomm	Dirt	Summer	0.44
		28-11-31.4	Reno	-	Rock	All	0.14
		29-11-6	Reno	Decomm	Dirt	Summer	0.10
		29-11-7.1	Reno	-	Rock	All	0.73
Wimer	WR-RR1		Re-const.	Decomm	Dirt	Summer	0.22
	WR-RV1		Reno	Decomm	Dirt	Summer	0.31
		28-11-18	Reno	-	Rock	Summer	0.35
		28-11-19	Reno	Decomm	Dirt	Summer	0.24
		28-11-19.1	Reno	-	Rock	All	0.53
		28-11-19.2	Re-const.	Decomm	Dirt	Summer	0.08
		28-11-19.2	Re-const.	Full Decomm	Dirt	Summer	0.22
		28-11-19.3	Re-const.	Decomm	Dirt	Summer	0.17
		28-12-13.1	Reno	-	Rock	Summer	0.32
Wimer and Yankee		28-11-19	Reno	Decomm	Dirt	Summer	0.39
		28-11-19	Reno	-	Rock	All	0.75
Wimer/Yankee/Crosby		28-11-19	Reno	-	Rock	All	1.10
		28-12-24	Reno	-	Rock	All	0.80
Yankee	YR-IP2		Imp	Decomm	Rock	All	0.08
	YR-RV1		Reno	Decomm	Dirt	Summer	0.54
	YR-RV3		Reno	-	Rock	All	0.18
		28-11-17	Reno	-	Rock	All	0.85
		28-11-17.1	Reno	Decomm	Dirt	Summer	0.53
		28-11-17.3	Reno	-	Rock	All	0.82
		28-11-17.5	Reno	-	Rock	All	0.89
		28-11-17.5	Reno	-	Rock	Summer	0.16
		28-11-17.6	Imp	-	Rock	All	0.52
		28-11-17.7	Reno	-	Rock	Summer	0.19
		28-11-18.1	Reno	Decomm	Dirt	Summer	0.09
		28-11-20	Reno	-	Rock	All	1.07
		28-11-20	Reno	-	Rock	Summer	0.55
		28-11-20.1	Reno	-	Rock	All	0.83
		28-11-20.2	Reno	-	Rock	All	0.09
		28-11-6	Reno	Decomm	Dirt	Summer	1.31
		28-11-8.0	Reno	-	Rock	Summer	1.76
		28-12-12.2	Reno	Decomm	Dirt	Summer	0.05
		28-12-13.2	Reno	-	Rock	Summer	0.23
Zumwalt		28-12-13	Reno	-	Rock	Summer	0.40
		28-12-13.1	Reno	-	Rock	Summer	0.12
		28-12-13.2	Reno	-	Rock	Summer	0.67
		28-12-13.3	Reno	-	Rock	Summer	0.31
		28-12-23	Reno	-	Rock	Summer	0.14
		28-11-19.3	Decomm				0.33
		28-11-3.3	Reno	Decomm	Dirt	Summer	0.11
Grand Total							**85.17**

Cherry Creek Tier I Key Watershed and Road Construction/Decommissioning

The RMP states that there can be no net increase in road mileage unless the BLM has made efforts to reduce existing road mileage. Since 1994, the BLM has fully decommissioned 0.32 miles of roads in this watershed. Another 0.1 miles of full decommissioning would occur with implementation of sales from the Cherry Vaughn EA, bringing the total to 0.33 miles for the watershed.

There would be no net increase of new road construction in this Key Watershed; there would be a net decrease of 0.12 miles. The proposed action includes new construction of approximately 0.34 miles of new roads in the Key Watershed, which would all be fully decommissioned. Approximately 0.12 miles of existing roads in the Key Watershed would be fully decommissioned. The TMP states "only the full decommission and obliteration categories are appropriate to meet the Management Direction of a reduction or no net increase in the amount of roads within Key Watersheds" (USDI 2010 *update*). This would result in the total road reduction of 0.45 miles for the watershed.

The proposed action also includes decommissioning a total of 0.25 miles of existing roads in the Key Watershed. These roads would not count toward the net reduction of roads within the Key Watershed because they would not be fully decommissioned. However, they are hydrologically disconnected from the stream network. Since 1994, there would have been 4.6 miles of roads decommissioned (which also includes Cherry Vaughn EA decommissioning) with the implementation of the Lone Pine project.

Haul Route Maintenance

Maintenance of roughly 7.1 miles of roads would occur. Maintenance consists of, but is not limited to, brushing to control vegetation, cleaning of drainage ditches, maintaining the road surface (such as grading), and removal of road debris creating safety hazards (slough material, fallen trees, etc.).

Design Features for the Proposed Action

This section describes measures designed to avoid, minimize or rectify impacts on resources and are included as part of the proposed action. Design features are site-specific measures, restrictions, requirements or mitigations included in the design of a project in order to reduce, if not eliminate, adverse environmental impacts.

Riparian Reserves (RRs)

- A minimum 50-foot no-treatment zone (NTZ) would be retained adjacent to perennial and fish bearing streams; intermittent non-fish bearing streams would have minimum 30-foot no-treatment zones.
- Trees, including hardwoods, 24 inches diameter at breast height (24" DBH) and larger would be retained.
- Approximately four to eight hardwoods per acre would be left. These leave trees would be clumped potentially adjacent to the no-treatment zones or scattered throughout the RR, depending on site conditions and tree locations. Preference would be given to the largest hardwoods in the following order: big leaf maple, golden chinquapin, madrone, Oregon myrtle, tanoak, and alder.
- Stream no-treatment zone distances would be measured starting from a stream bank, an identifiable topographic break near the bank (generally, the top of a steep inner gorge), or from the streamside edge of vegetation, whichever is greater.
- Full suspension would be required across all stream channels and all identified wetlands if feasible.
- All trees felled in the NTZs to facilitate yarding corridors would remain on site. Operators would directionally fall trees towards stream channels.
- If operationally feasible, yarding corridors would be placed to avoid cutting trees ≥ 24" DBH. Within the RRs any trees ≥ 24" DBH felled for yarding corridors would be left on-site.
- Ground-based equipment would not enter the 30-foot and 50-foot NTZs.

General Harvest Operations

- Mechanical harvesters or chainsaws would be used for tree felling.
- Operators would fell trees away from all unit boundaries, reserves, and property lines.

- The timber sale contract would include language reserving existing snags from cutting except those that must be felled to meet safety standards. Operations would retain on-site any felled or accidentally knocked over snags.
- The BLM would reserve from cutting/removal existing down logs in decay classes 3, 4, and 5 and down logs in decay classes 1 and 2 greater than 20-inches in diameter on the large end. Contractors would protect these down logs from damage during logging operations to the extent possible.
- Harvest unit boundaries would be adjusted in two areas to protect private surface water rights for domestic use (see maps). One point of diversion is in SW ¼ of SW ¼ of section 28-12-13 (Barron, permit 51898). The other is in SE ¼ of NE ¼ of section 28-11-7 (Follansbee, permit 52736).
- The Frona and Dora units may have a no-treatment area immediately adjacent (50-75 feet) to the BPA[2] powerline easement to maintain a tree line not susceptible to blow down.

Ground-Based Areas

- Ground-based equipment would be restricted to areas with slopes less than 35 percent.
- Ground-based equipment would be restricted to the dry season when soil moistures are below the 25 percent threshold. This threshold is defined as when soil moisture content measurements, taken 2 to 4 inches below the organic layer, are below 25 percent. This is typically May through October. Soil moisture contents above 25 percent may require the discontinuation or limitation of ground-based operations in order to prevent excessive compaction.
- Forwarder, log loader, tractor, or rubber tire skidder capable of achieving one-end suspension may be used to yard logs within the ground-based yarding areas.
- Skid trails would be designated with the objective of having less than 12 percent of a harvest area affected by compaction. Existing skid roads/trails would be used to the extent practical.
- If available, ground-based logging operations would utilize slash layers created by the harvesting process to limit bare soil exposure and compaction.
- Drainage and erosion control measures, including water barring of skid trails, would be applied to bare soil areas following use and prior to winter rains.
- Operators would block access points for skid trails with logging debris to prevent vehicle access after harvest operations are completed.
- A skyline cable system capable of achieving one-end suspension would be permitted to operate during the wet season in ground-based areas; however, road surface condition may restrict timber haul.

Cable-Yarding Areas

- A skyline cable system with 75-foot lateral yarding capability would be required.
- The BLM would require a minimum of one-end log suspension in all cable-yarding areas.
- Operators would utilize full log suspension when feasible across streams.
- Full log suspension or seasonal yarding restrictions (dry season only) would be required as operationally feasible on the following fragile soil areas as designated in the TPCC system:
    - FGR2 – Dora
    - FGNW – Rock Prairie, Steel Cherry and Weaver Tie
- The location, number, and width of corridors would be specified prior to yarding, and natural openings would be used as much as possible as approved by the contract administrator.
- Skyline corridors would be a maximum of 12 feet wide. Distance between skyline corridors would be a minimum of 150 feet apart at the widest point where feasible.
- Skyline corridors would be perpendicular to streams as much as possible to minimize the total length of openings created by yarding corridors along stream channels.

Harvested Volume (sample tree falling)

- Timber cruising would employ methods that would include the felling of sample trees to formulate local

[2] Bonneville Power Administration

volume tables. Felled sample trees would be a subset of those already designated for removal.
- No more than one sample tree per 2.5 acres would be selected.
- Trees larger than 24" DBH would not be selected in Riparian Reserves.
- Sample trees would not be selected within 110 feet of stream channels.
- Trees would not be selected within the immediate vicinity of snags.
- All seasonal and daily timing restrictions for T&E species would be applied.
- If timber sales would not occur after cruisers have felled the sample trees, the trees would remain on-site to provide down woody material.
- The BLM would provide 100 percent contract administration throughout the sample tree falling process.

Fuel Treatments
- In hardwood reduction units, all material ≥ 8" diameter and ≥ 6' in length would be yarded to the landing.
- Along roads that would remain open for traffic, hazardous fuels reduction measures would include breaking apart and scattering heavy accumulations of logging slash within 20 feet of both sides of the road.
- Heavy concentrations of slash on landings and roads would be piled and burned. Piles would be as few as possible and free of soil and rock material. Operators would avoid placement of landing piles closer than 15 feet to reserved trees, snags, or suitable coarse woody debris. Piles would be covered with 4 ML black plastic and would not exceed 100 square feet (10' × 10'). Burning generally occurs during the late fall and winter months.
- If there were enough larger debris available, these landing piles would be offered for firewood collection through the BLM firewood permit process.
- Heavily dependent upon market conditions (which are currently low), this logging debris located on landings after harvest could be available for biomass utilization. Piled material would be processed within one year after the piling occurs.
- As site-specific conditions permit, landing piles of slash could be broken up and scattered evenly throughout the harvest unit before equipment vacates the site.
- Areas identified to be under-stocked after logging would receive site prep and planting. Site prep would include slashing, lop and scatter, hand piling, or machine piling. If necessary, piles would be covered in support of a hand or machine pile burn.
- Machine piling would be limited to slopes less than 35 percent.
- All burning will follow applicable Oregon State Fire Laws. Burning of slash piles would comply with the Oregon Smoke Management Plan (2007 OAR 629-43-043).

Roads

<u>New Construction</u>

New construction would use the applicable "conservation practices for road and landing construction" best management practices (pp. D3-D4) found in the RMP. These include:

- Road and landing construction activities would be limited to the dry season, generally from May to October.
- Roads and landings would be designed and constructed to BLM standards, but be the narrowest and smallest sizes that would meet safety standards, objectives of anticipated uses, and resource protection. For this project, rocked and natural surface roads would typically have a running surface of 14 – 16 feet (Figure 1).
- Operators would have the option of rocking roads currently proposed as natural surface at their own expense providing it does not conflict with other objectives or design features.
- New road construction would be located on stable locations, such as ridge tops, stable benches or flats, and gentle-to-moderate side-slopes.
- Stable end-haul (waste) sites would be located prior to end-hauling. These sites would be kept properly shaped, drained, and vegetated.
- Road drainage would be designed to minimize soil erosion and stream sedimentation. Energy dissipaters, culvert down pipes, or drainage dips would be used where water is discharged onto

loose material and onto erodible or steep slopes.

- ❖ When possible, road drainage would be directed onto convex slopes (ridges) and not onto concave slopes (troughs) to prevent adding more water to typically wet, slide-prone areas.
- ❖ Road surface shape (e.g. crowning, insloping, and outsloping) that meets planned use and resource protection needs would be used.

- Bare soil areas created from landing and road construction (or any other disturbance) would be mulched with appropriate weed-free straw, or equivalent, and seeded with a native or botanist-approved mix.
- Right-of-way clearing limits including the roadbed would be approximately 35 feet in width (Figure 1).

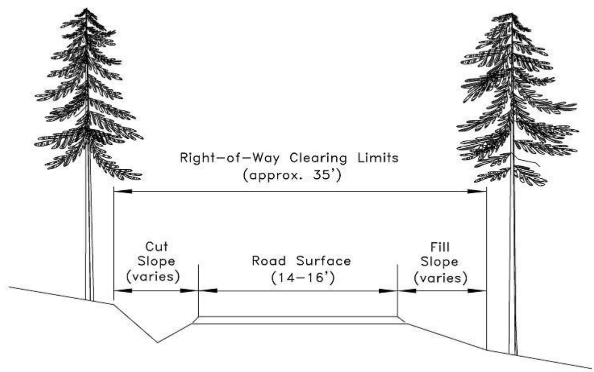


Figure 1 Illustration of road widths and clearing limits for visibility.

- Operators would seasonally maintain natural surface roads and landings prior to winter rains if road/landing use is required the following year. This maintenance may include, but is not limited to, the addition of water bars, mulching with wood chips or straw, and seeding with the seed mix described above.
- When installing stream culverts stream flow would be diverted around the work area, sediment would be contained using appropriate filters or barriers and turbid water would be pumped from the excavation site onto a vegetated terrace or hill slope. Stream culvert placements would follow ODFW in-stream timing guidelines, which is from July 1 – September 15.

Road Maintenance, Renovation, Reconstruction, and Improvement

- The following table summarizes specific road improvements:

Table II-7 - Specific road work by road number

Road Number (Culvert Location Number)	Culvert Work Type	Drainage Feature Type
28-12-27 (H2)	Install 24" pipe and reshape ditch. Currently no culvert at stream crossing	Stream and ditch relief
29-11-7.1 (H40)	Unplug pipe outlet	Ditch relief
29-12-4 (H47)	Replace culvert with a 24" pipe	Stream
29-12-4 (H48)	Replace cross drain with an 18" pipe	Ditch relief
28-11-2.0 (H53)	Install new 36" pipe	Stream
28-11-2.0 (H54)	Install new 18" pipe	Spring
27-11-22.5 (H73)	Install new 24" pipe	Ephemeral draw
27-11-35.1 (H56)	Install new 24" pipe	Stream
Unnamed road in T27S R11W section 35 (H57)	Install 18" pipe and reconstruct ditch	Ditch relief and ditchline
27-11-35.1 (H99)	Replace culvert with a 24" pipe	Stream
27-11-35 (H58)	Replace culvert with a 24" pipe	Stream
27-11-35 (H60)	Replace culvert with a 24" pipe	Stream
27-11-35 (H61)	Replace culvert with a 24" pipe	Stream
27-11-35 (H62)	Replace culvert with a 24" pipe	Stream
28-9-23 (H66)	Replace culvert with a 24" pipe	Stream
28-9-15 (H67)	Replace cross drain with a 18" pipe	Ditch relief

Road Number (Culvert Location Number)	Culvert Work Type	Drainage Feature Type
28-9-8.1 (H72)	Replace culvert with a 36" pipe	Stream
28-9-17 (H69)	Unplug pipe inlet	Ditch relief
28-9-17 (H71)	Unplug pipe inlet	Stream

- Drainage and erosion control practices would be applied to renovated or reconstructed roads in the same manner as newly constructed roads (ROD, D-4 #17). These may include, but are not limited to, dry season grading and ditch-relief culvert replacements, appropriate end-haul and disposal areas, and proper dispersal of water from ditch-relief culverts.
- Road maintenance/renovation activities would be planned to minimize soil erosion and subsequent stream sedimentation (ROD, D-4 #18). These would include, but are not limited to, grading to remove ruts, removal of bank slough and adding gravel lifts where needed in the road surface. Existing drainage ditches that are functioning and have a protective layer of non-woody vegetation would not be disturbed.
- As part of the renovation/maintenance activities, contractors would place sediment filters at designated locations on the following three roads: 28-9-17 (H70), 27-11-35 (H59) and 27-11-35.1 (H55). Depending on road conditions after renovation and maintenance, the BLM contract administrator may require placement of additional sediment filters to prevent sediment from entering stream channels from road ditch lines. Sediment filters would allow free passage of water without detention or plugging. The filters would receive frequent maintenance; this would consist of the removal of retained sediment and disposal of this sediment. Contractors would dispose of the sediment in areas with no potential of delivery to stream channels.
- Dirt roads and landings would receive seasonal preventative maintenance prior to the onset of winter rains. Seasonal preventative maintenance may include, but is not limited to, installing water bars, sediment control mats, or devices, removing ruts, mulching and barricades.
- When replacing stream culverts, stream flow would be diverted around the work area, sediment would be contained using appropriate filters or barriers, and turbid water would be pumped from the excavation site onto a vegetated terrace or hill slope. Stream culvert replacements would follow ODFW in-stream timing guidelines, which is from July 1 – September 15.
- Other stream culverts or cross-drains may be installed in areas with deficient drainage during road maintenance or renovation. Table II-8 would be used as the guide for road drainage spacing if needed. In addition, a road drainage feature may be installed upslope of each stream crossing in order to route most of the ditch flow away from the stream and onto forest soils where it can re-infiltrate. Depending on slope and other site conditions, this distance would generally be about 100 feet from the drainage feature outlet to the channel. When possible, road drainage would be directed onto convex slopes (ridges) and not onto concave slopes (troughs) to prevent adding more water to typically wet, slide-prone areas.

Table II-8 Guide for drainage spacing by soil erosion class and road grade.

Gradients (%)	Road Surface	
	Natural	Rock or Paved
3-5	200	400
6-10	150	300
11-15	100	200
16-20	75	150
21-35	50	100
36+	50	50
Spacing is in feet and is the maximum allowed for the grade. Drainage features may include cross drains, waterbars, ditch-outs, or water dips.		

<u>Haul</u>

- Hauling on dirt-surfaced roads would be prohibited during the wet season, generally November through April.
- The BLM contract administrator would monitor road conditions during winter use to prevent rutting of the rock surface and delivery of fine sediment to stream networks.
- Depending on road conditions during winter haul, additional sediment filters may be required to prevent sediment from entering stream channels from road ditch lines.

- The BLM contract administrator would require an additional lift of rock to the area of a road that can influence the stream prior to erosion and sediment delivery occurring from the road tread near live stream crossings.
- If the ground is already saturated from winter rains and more than 1 inch of precipitation is predicted in the project area over the next 24 hours, then winter haul would be suspended. Operations would resume after the 24-hour suspension, except when another storm (exceeding 1 inch) is forecasted. Currently, precipitation predictions are based on the Quantitative Precipitation Forecast (QPF) maps from The Hydrometeorological Prediction Center internet site: http://www.hpc.ncep.noaa.gov/qpf/qpf2.shtml . A similar predictive model internet site may be used if this site should be unavailable in the future.

<u>Decommissioning</u>

- Contractors would use soil-stabilization techniques such as seeding, mulching, and fertilizing exposed soils. Other activities may include installation of water bars/dips to route surface runoff to vegetated areas depending on site-specific conditions.
- Final decommissioning would occur prior to winter rains of all natural surface roads and landings.
- Closure of decommissioned roads would include the installation of a barrier to prevent vehicular traffic.
- If available, operators would scatter slash material over the road surface to protect and reintroduce organic material to the soil. Slash material would also be used to prevent vehicle access.
- If slash were not available, operators would use soil stabilization techniques and block the road to vehicular access. Barriers could include, but are not limited to, tank traps and boulder barriers or earthen berms.
- Diversion potential would be eliminated at stream crossings. This may include installation of an armored trench that protects the fill and road if the culvert is plugged by debris.
- Stream channels would be restored when stream crossings are removed. The natural channel gradient, width, and floodplain would be reestablished. Stream banks would be excavated to establish a maximum 50 percent side-slope, if feasible. Banks would be protected from erosion using seed and mulch, geotextiles, rock or other soil stabilization materials.

<u>Full Decommissioning</u> (These are in addition to the decommissioning design features)

- Where necessary to restore hydrologic function or to help reestablish vegetation, operators would subsoil/till road surfaces to a depth between 8 and 16 inches.
- All stream culverts would be removed and stream bank integrity would be restored as described above.
- If applicable, surfacing material (i.e. rock), would be removed.

Special Status Species - Including T&E and S&M Species[3]

- Operators would avoid tailhold or guyline anchors within the NSO nest patches.
- Operators would follow BLM/USFWS guidance for guyline/tailhold tree selection in suitable MM/NSO habitat.
- Harvest operations would require the use of tailhold anchors and guylines within some adjoining occupied MM habitat. Contractors are required to follow applicable seasonal restrictions to prevent disturbance during the nesting season as well as tree selection criteria.
- Contractors would also implement daily timing restrictions limiting harvest activities from two hours after sunrise to two hours before sunset on applicable units to minimize disturbance to nesting murrelets. In some cases, only portions of units would be subjected to restrictions because of topographic breaks or other landscape features. These are described in Appendix C. Restrictions only apply within the disruption zone within the units.
- If a species of concern is found after the contract has been awarded, the contractor would be required to follow the management guidelines to protect the species. These species include threatened and endangered species, occupied marbled murrelet sites, active raptor nests, federal proposed and candidate species, and Bureau sensitive or state-listed species protected under BLM Manual 6840.

[3] T&E – federal Threatened and Endangered; S&M – Survey and Manage; NSO – northern spotted owl; MM – marbled murrelet

- All Bureau sensitive and S&M vascular plant, lichen, and bryophyte plant species found during pre-disturbance surveys would be buffered to protect the microsite so that the species persists at the site.
- If found during required surveys, all S&M wildlife species would be managed as to the most current direction.

Noxious Weeds
- To prevent the introduction and spread of noxious weeds during the contract period, equipment would be washed prior to entering a sale area.
- Vehicles and equipment would be required to stay on road and landing surfaces, except equipment specifically designated to operate off roads and landings (e.g. mechanical harvesters).
- To the extent practical, travel would be avoided or minimized through weed-infested areas.
- BLM-controlled haul routes and potential landing areas would be inventoried for noxious weeds and treated, either mechanically or chemically, prior to hauling from the harvest units.

Reforestation (Hardwood Conversion areas)
- A post-harvest survey would be conducted to identify under stocked areas in need of tree planting and to determine seedling needs.
- The planting stock would be principally Douglas-fir, but would also include some western red cedar, Port-Orford-cedar, and western hemlock.
- Genetically improved stock would be used when available. Seedlings would be planted at approximately 435 trees per acre (if inventories are available) and receive Vexar tubing if needed for animal protections.

Port-Orford-cedar (POC)
Note - Marking would be adjusted to meet the prescription if more POC is located within the unit.
- Logging systems.
    - Cable logging systems would be used during the wet times of the year.
- Road Management Measures.
    - Haul would be limited to surfaced roads during the wet times of the year.
    - All equipment would be washed before arriving on BLM lands.
    - All ground-based equipment would be exit washed before moving from a unit with POC to another unit with POC.
- Site-specific POC Management.
    - Marking would leave Port-Orford-cedar at spacing no closer than 30’ × 30’ within units.
    - Port-Orford-cedar would be spaced approximately 50 feet from roads. This marking prescription for the removal of merchantable POC trees in a commercial thinning or density management treatment near roads provides a discontinuous population of POC trees and removes the future seed source along roadside cut banks (similar to Management Practice #13 in the POC SEIS). Our experience shows that removing the roadside seed source diminishes the need for POC sanitation treatments.

Cultural Resources
- If any objects or sites of possible cultural value such as historical or prehistoric ruins, fossils, or artifacts are found during project implementation, the BLM would suspend project activities near these objects and notify the Authorized Officer of the findings.
- A prehistoric site, while mostly destroyed, is located adjacent the Schuck Mt. project area. Harvest equipment would avoid the area to prevent any further degradation to the site.

Analysis Background

This Chapter combines the affected environment (typically Chapter 3) and the effects analysis discussion (Chapter 4). Chapter 3&4 includes those resources that may be impacted from implementation of each alternative. It identifies the direct, indirect, and cumulative environmental effect that may result from implementation of either of the two alternatives described in Chapter 2. It also addresses the interaction between the effects of the proposed commercial thinning/hardwood conversion with the current environmental baseline, describing the effects that might be expected, how they would occur and the incremental effect that could result. The description of the current conditions inherently includes and represents the cumulative effects of past and current land management activities undertaken by the BLM, other federal agencies and tribal and private entities.

Reasonably Foreseeable Activities

Annual recurring activities are likely to occur within the project area. These include, but are not limited to, fire suppression activities, routine road maintenance, treatment of noxious weeds and silvicultural activities in young stands.

Table III/IV-1 displays the known federal timber sale acres for sales that are active or will be active in the analysis area over the next five years.

Table III/IV-1 Proposed or active federal timber sales within the Lone Pine analysis area (AA).

EA Name/Number	Timber Sale Name	Contract Number	Type of Treatment	Acres in AA
Brummit Creek DM OR128-03-24	Broken China	OR120-TS12-30	DM/HWC	79
Weaver-Sitkum DOI-BLM-OR-C040-2010-0001-EA	Sandy Quarry	OR120-TS11-34	CT	140
	Green Chain	OR120-TS11-32	CT	58
	Bob N Weave	OR120-TS11-33	CT	10
	Weavie Wonder	OR120-TS12-34	CT	86
Cherry Vaughn DOI-BLM-OR-C040-2010-0005-EA	S Bridge	ORC00-TS-2013.0031	DM/HWC	349
	Parkview	ORC00-TS-2013.0032	DM/HWC	233
	Vaughn's Jct.	ORC00-TS-2013.0030	DM/HWC	132
	East Cherry	-	DM/HWC	298
	Steel Trap	-	DM/HWC	282
Wagon Road Pilot DOI-BLM-OR-C040-2011-0008-EA	Wagon Road Pilot	OR120-TS12-35	Variable Retention Harvest	159
Fairview NWFP DOI-BLM-OR-C	Wintergreen	ORC00-TS-2012.0002	CT	29
	Wooly Mammoth	ORC00-TS-2012.0003	CT	188
	Swayne Creek	ORC00-TS-2012.0005	CT	169
	Blue 25	ORC00-TS-2012.0006	CT	75
	Space Wrangler	ORC00-TS-2013.0001	CT	104
	Whisky Train	ORC00-TS-2013.0002	CT	51
	Blue 35	ORC00-TS-2013.0003	CT	75
	Thunderbolt	ORC00-TS-2013.0004	CT	190
	Various	-	CT/HWC	3,021/113

The BLM assumes intensive management of private forests on a 40-year harvest rotation under the guidelines of the State of Oregon Forests Practices Act (ORS 2011).

On June 8, 2012, William Connector Gas Operator, LLC (Pacific Connector) received approval from the Federal Energy Regulatory Commission (FERC) to enter into the pre-filing process for the proposed Pacific Connector Gas Pipeline Project. FERC is in the process of preparing an EIS to address the effects of the Jordan Cove Liquefaction and Pacific Connector Pipeline Projects; a draft EIS is tentatively scheduled to be released late in 2013 or early 2014. As portions of the route goes through the terrestrial action area, it is analyzed as part of the baseline (the no action alternative) from which the Lone Pine effects would be added. The following Table (Table III/IV-2) contains a summary of the effects of the pipeline project concerning forest removal. The permanently maintained conditions would consist of a low herbaceous cover only.

Table III/IV-2 BLM acres impacted by the Pacific Gas Connector Pipeline in the analysis area

	Age Class Grouping (in acres)				Operation Totals
	< 35 Years	30 to 80 Years	>80 Years	Non-forest	
Across Entire Lone Pine Analysis Area					
Initial Clearing Operations[1]	26.11	52.49	36.20	6.97	**121.77**
Permanently Maintained Conditions[2]	5.22	14.62	11.06	2.87	**33.78**
Where Crossing Individual Units (Big Bend area only)					
Initial Clearing Operations	0	2.30	1.40	0	**3.70**
Permanently Maintained Conditions	0	0.46	0.26	0	**0.71**

[1] Includes Construction ROW, Rock Source/Disposal Sites and Temporary Extra Work Spaces
[2] Includes 30' ROW buffer and Rock Source/Disposal Sites

Cumulative Effects Considerations

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

The information on individual past actions is merely subjective, and would not be an acceptable scientific method to illuminate or predict the direct or indirect effects of the action alternative. The basis for predicting the direct or indirect effects of the action alternative should be based on generally accepted scientific methods such as empirical research. The cumulative effects analysis of this project upon the environment did not identify any need to exhaustively list individual past actions or analyze, compare, describe the environmental effects of individual past actions in order to complete an analysis which would be useful for illuminating or predicting the effects of the proposed action.

Resources

Forest Structure

Analysis Area

The BLM manages 32,219-forested acres in the analysis area. There are 15,561 acres (48 percent) that are 30-79 years old, of which 13,894 acres are dominated by Douglas-fir. Over 55 percent (2,050 acres) of proposed acres meet this classification. The remaining 1,677 proposed acres are a collection of mixed conifers, mixed confers/hardwoods and mixed hardwoods. The Lone Pine analysis area contains portions of the East Fork Coquille River, North Fork Coquille River, Middle Fork Coquille River, and Coquille River 5th Field watersheds (Table III/IV-3).

Table III/IV-3 Analysis area acres by 5th and 6th field watersheds.

Watershed (5th field)	Subwatershed (6th field)	Total Area (mi^2)	Total Area (acres)	Proposed Acres
East Fork Coquille River	Lost Creek	1.3	827	
	Brummit Creek	0.6	413	
	Brewster Canyon	15.8	10,087	268
	Camas Creek	13.2	8,467	120

Watershed (5th field)	Subwatershed (6th field)	Total Area (mi^2)	Total Area (acres)	Proposed Acres
	Yankee Run	24.0	15,334	1,462
	Elk Creek	25	1,608	0
North Fork Coquille River	Johns Creek	25.5	16,343	1,294
	Middle Creek	25.5	16,300	581
	Hudson Creek	6.1	3,891	30
Middle Fork Coquille River	Big Creek	3.7	2,357	
	Sandy Creek	0.2	127	71
	Indian Creek	5.0	3,189	
Coquille River	Hall Creek	3.8	2422	
	Cunningham Creek	0.5	331	133
		127.7	81,696	3,959

Connectivity Blocks

There are three connectivity blocks within the analysis area (Table III/IV-4). The RMP direction for connectivity blocks is to maintain 25-30 percent of each block in late-successional habitat. Currently, all connectivity blocks in the analysis area are above or meet the minimum threshold. Proposed treatment areas Weaver Tie and Weekly fall within blocks 1 and 3 respectively; however, they currently do not contribute to the late-successional percentage.

Table III/IV-4 - Percentage of late-successional habitat in connectivity blocks.

Connectivity Block	Age Class (acres)		Total	% Late-Successional Habitat
	0-79 years	>80 years		
Block 1	1162	1814	2976	61
Block 2	160	52	212	25
Block 3	337	255	592	43
Total	**1659**	**2121**	**3780**	

Treatment Units

The stands included in the proposed treatment units regenerated following timber harvest activities ranging from salvage harvesting following fire disturbance to conventional clear-cutting of old-growth forest. Plant associations in the Port-Orford-cedar or western hemlock series of southwestern Oregon (Aztet *et al.* 1996) primarily describe forested upland stands in the action area; riparian associations account for very little treatment unit area and are not representative of associations described by McCain (2004).

Forest vegetation system (FVS), a growth modeling software (USDA 2010 - http://www.fs.fed.us/fmsc/fvs/), classified treatment units as stand establishment stage (see Figure 2 for definitions) based on field-collected observations and data on stand characteristics (age, tree heights, tree diameters, others). This is a comparable to the stem exclusion stage of structural development following Oliver and Larson (1996).

Using age-based definitions in the 1995 RMP and field data, none of the units in the action area would be classified as "late-successional" forest. None of the units in the action area would meet definitions of "old-growth" forest (FEMAT 1993, Spies and Franklin 1991, USDA 1993).

On stands originating before 1970, it is difficult to tell using aerial photos if stands re-established through planting, seeding, or natural regeneration following harvest. What is evident in almost every case is the lack of snags and down logs following the timber harvest or salvage. Regardless of origin, the stands in the proposed action have been subjected to varying degrees of continued management including inter-planting of understocked areas, pre-commercial thinning, and fertilization. Although regeneration in some stands may be considered natural, the effect of manipulating the original stand through timber harvest excludes them from being considered natural stands. These effects include the almost total absence of snags, down wood, and large residual over-story trees.

Douglas-fir (*Pseudotsuga menziesii*) is the primary over-story tree and the most common species in the proposed treatment area. Over 70 percent of the areas proposed for commercial thinning are densely stocked plantations of 36 to 79 year-old conifer trees with Douglas-fir as the dominant over-story species comprising upwards of 80 percent of the species composition. Western redcedar (*Thuja plicata)*, western hemlock (*Tsuga heterophylla*), and grand fir (*Abies Grandis*) are components in the over-story in some areas. Remnant legacy trees, 80 years and older (mostly Douglas-fir and western redcedar) can also be found very scattered in roughly half of the treatment units. Overall, these stands are characterized by uniform conifer trees averaging more than 230 trees per acre, average stand diameters of 16 inches or less, and relative densities over 55 (Table III/IV-5).

The BLM conducted stand exams on 1,600 acres for this project, which represent conifer stands from 60-79 years of age (Table III/IV-5). Recent exams were completed in the Big Bend, Maintenance Shop, Brownstone, Crosby, Frona, North Coquille Junction, Shuck Mountain, Weaver Tie, Yankee, and Zumwalt project areas. Stand descriptions for conifer stands less than 60-years-old are primarily based on previous stand data compiled for other thinning projects in the area. These include the East Fork Coquille EA (2005), the Weaver-Sitkum EA (2010), and the Cherry Vaughn EA (2012).

Table III/IV-5 - Current conditions of proposed stands for treatment and the results of each alternative. These are broken out into two age classes those aged 30-59 and those aged 60-79. The post-thin is one year after implementation, NA is no action, and PA is the proposed action.

	Avg. Age	TPA*	BA (ft^2/ acre)	Height (feet)	QMD (in.)	RD	Snags > 23" DBH	Canopy Cover (%)
Stands 30-59 years of age								
Current	44	246	211	100	12.8	59	1.8	76
Post-Thin	45	110	136	102	15.8	31	1.8	52
NA + 100 yrs.		99	479	221	30	88	5.4	84
PA + 100 yrs.		73	431	214	32.7	75	6.1	80
Stands 60-79 years of age								
Current	66	236	299	140	15.8	76	0.4	80
Post-Thin	67	64	159	141	21.4	34	0.3	49
NA + 100 yrs.		78	391	189	32.8	70	16.9	68
PA + 100 yrs.		35	330	196	42.0	51	8.5	56

* TPA= trees per acre, BA = basal area, QMD = quadratic mean diameter, RD = residual density

Port-Orford-cedar

Port-Orford-cedar (*Chamaecyparis lawsoniana*) is a regional endemic species, occurring only in southwest Oregon and northern California. On the Coos Bay District, the northern limit of the species is the coastal dunes north of North Bend, within the Coos watershed. Recent inventory of stands in the proposed area indicate that Port-Orford-cedar is limited to occupying the intermediate and suppressed canopy layers in portions of five of the 32 stands (16 percent). Based on FOI data at a larger scale, Port-Orford-cedar occurs as a minor component in less than 4 percent of the of the analysis area.

Hardwoods

The hardwood tree component is patchy within the stands of the project area. Using FOI[4] data, approximately 19.2 percent of BLM lands in the analysis area contain hardwoods. The proposed treatment areas contain five percent of all hardwood acres on BLM lands within the analysis area. Stands with dominant hardwood patches were previously disturbed by past timber removal, grazing, fire, or other disturbances. The areas proposed for hardwood conversion have scattered and clumped conifers growing within them and previously supported conifer. This conclusion is based on timber surveys and historical accounts of the area documented within various watershed analyses.

[4] Forest Operations Inventory, currently housed as a BLM GIS timber database

The East Fork Coquille Watershed Analysis includes recommendations to convert stands within the Yankee Run and Crosby areas while also suggesting that “conversions of hardwood stands, resulting from unsuccessful regeneration, and brushfields should occur as opportunities present themselves” (USDI 2005 *update)*. Within this watershed, the watershed analysis includes the assessment that “ground disturbance from road construction and logging (to a lesser extent) has resulted in hardwood-dominated (red alder) Riparian Reserves” and “management activities have exaggerated their abundance.”

The North Fork Coquille Watershed Analysis identified hardwood conversions in Llewellyn and John’s Creek areas as opportunities for restoration. This analysis also contains the conclusion that alder and brushfield conversions, when applying site-specific recommendations, will “not prevent attainment” of each of the ACS objectives (Table DM-1; USDI 2002).

Red alder (*Alnus rubra*) is the most common hardwood species, occurring in 30 percent of the stands, and is found throughout the elevational range of the area, but most often occurs on lower slopes, drainage bottoms, wet areas, and along roadside areas. The average amount of the total hardwood component in conversion areas is 58 percent of which red alder comprises 95 percent of all hardwoods.

Other hardwoods include Oregon-myrtle (*Umbellularia californica*) on the upper slopes, and scattered bigleaf maple (*Acer macrophyllum*) on lower slopes or drainage bottoms. Relatively small amounts of tanoak (*Lithocarpus densiflorus*) and golden chinkapin (*Castanopsis chrysophylla*) occur along drier ridges and upper south facing slopes. These other hardwoods occur in less than 15 percent of the stands proposed for treatment.

Legacy Structures

Most snags and down trees in the treatment area are the products of suppression related mortality and were recruited from the smaller trees in the stands. Large snags and downed wood in the units are exclusively legacy structures from previous stands, evidenced by advanced decomposition, or blowdown from adjacent older stands. Random events, such as wind damage, and biotic disturbance, such as root rot, are ongoing fine-scale processes that create small gaps, and recruit low numbers of larger snags and down wood across the project area. Conifers in the proposed project area are young enough to exhibit rapid lateral branch elongation in response to the added growing space provided by a gap-creating event. Consequently, canopy gaps created by the death of one or a few trees will disappear within a few years following a gap-creating disturbance for as long as the stands remain in the stem exclusion stage of stand development

<u>No Action</u>

This alternative would leave stands on a development trajectory that would be very different from the pattern followed by the stands that developed into the old-growth forests found in the Coast Range today. Specifically within the treatment units, the no action alternative would entail continued slow growth and suppression mortality in approximately 3,727 ac. of Matrix and RR stands; predicted densities of large snags, canopy cover, and other stand data are presented in Table III/IV-5 for conifer-dominated areas.

Based solely on age, the RMP would define all reserved portions of the treatment areas as late-successional in roughly 40 years. However, the areas would require stand-modifying disturbance to facilitate development of multiple tree canopies, tolerant understories, and large overstory dominants associated with old-growth forest (Poage and Tappeiner 2002). Modeling supports this observation; most treatment units have stagnant FVS-modeled future structural growth in reserved areas under the no action alternative by year 2040 (Figure 2).

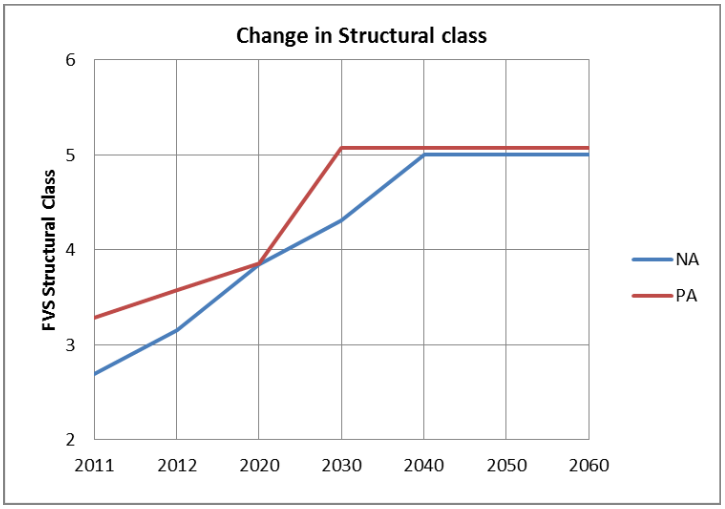


Figure 2 Change in FVS structural class for thinning treatments. This shows that the stands reach OS class by 2040 based on diameters over 25". Without further treatments or disturbance, the stands do not enter the OM class until after 2100. This chart reflects the average of the structural class for all stands. FVS categories are 1 = stand initiation (SE), 2 = stem exclusion (SE), 3 = understory re-initiation (UR), 4 = young forest, multi-strata (YM), 5= old forest, single stratum (OS), 6 = old forest, multi-strata (OM).

Matrix stands in the action area would initially experience growth and suppression, followed by eventual regeneration harvest. Regenerated portions of treatment units would change from stem exclusion or understory re-initiation structural stage to stand initiation stage, supporting 6-8 residual green trees per acre, 1-2 competent snags, and 120 feet of competent downed wood per acre, as directed by the RMP.

Research indicates that stands that develop at very high densities have a limited variation in tree size, which makes them susceptible to diameter growth stagnation and instability (Wilson and Oliver 2000). With the finite site resources being divided among many trees, the individual trees would have slower growth rates, and therefore would be smaller than trees growing in the more open areas of a stand (Oliver and Larson 1996).

Alder stands without a substantial conifer component would be expected to transition into shrub-dominated communities as they reach maturity. These stands would not be fully occupied or contribute to future sustainability objectives for Matrix lands. Stands with only a scattering of surviving conifers or a scattering of long-lived shade-tolerant hardwoods, would likely transition into a very open stand condition with a heavy shrub layer. As the alder component of the stand breaks up, more light reaches the forest floor allowing the shrub layer to become very vigorous (Oliver and Larson 1996). Studies of succession in Coast Range alder stands (Carlton 1988, Henderson 1970) have indicated that shrub dominance (especially by salmonberry) increases with time, and that tree regeneration is generally lacking (Minore and Weatherly 1994). In the absence of a disturbance, the red alder stands with a salmonberry understory would become brush fields when the alder dies (Newton and Cole 1994).

Alder stands with a dominant conifer component, or shade-tolerant conifers that successfully emerged through the alder following a canopy-opening disturbance, would have a somewhat different trajectory. After 130 years, these stands will transition into a low-density conifer stand with large individual trees (Newton and Cole 1994, Stubblefield and Oliver 1978). Without disturbance, a well-established shrub layer under the low-density conifer stand can preclude recruitment of understory trees.

Suppression mortality acting alone in dense stands of shade intolerant Douglas-fir would provide a steady but limited supply of moderate-to-large snags (Table III/IV-5), but would not provide the patchily-distributed high densities of snags and downed wood associated with allogenic[5] disturbance (Franklin *et al.* 2002, Franklin and

[5] Originating from outside the stand. Allogenic disturbances include wind, fire, and harvest.

VanPelt 2004, Garman *et al.* 2003, Rapp 2003). This mortality would provide snags and down wood; however, because of their small sizes, they would only last a relatively short time. Individual tree mortality is closely linked to the relative size of the tree in the stand. Mortality is concentrated on the smaller stems so a few of the largest trees in a stand die because of competition (Peet and Christensen 1987).

Proposed Action

Treatment Units

The Proposed Action would include commercial thinning (CT) in approximately 1,758 acres of Matrix allocation and density management thinning (DMT) in 1,255 acres of RR to meet objectives for these allocations. Snag and downed wood creation would also occur in applicable units (Table II-5); note that created snags and downed wood would be in addition to suppression-induced snags estimated in Table III/IV-5.

Treatments would be predicted to promote the development of individual larger green trees faster over time compared with the no action alternative (Davis *et al.* 2007, Garman *et al.* 2003), as well as increasing stand mean diameter (Table III/IV-5). Additional effects on stand structural diversity include:

- Decreasing variability in "treatment patch" diameters post-thinning as thinning-from-below removes dense understory trees, leaving mostly co-dominant and dominant trees. Note that diameter variability in old stands comes from multiple tree cohorts including tolerant shade trees, *following* suppression. Such later development of variability was not modeled.

- Increasing variability in tree densities within *treatment patches* compared to the no action, as well as increased tree density variability within *units* (Table III/IV-5).

This increase in overstory variability would be predicted to lead to a response in understory and shrub diversity (Harrington *et al.* 2005), development of larger limbs and crowns, epicormic tree branch response, and randomly distributed suppression mortality. Suppression mortality would still occur within untreated areas (7 percent) within units, including areas adjacent to streams.

Using FVS modeling to determine effects, advancement between structural classes in treatment units occurred faster following thinning than in the no action alternative in conifer-dominated stands (Figure 2). This result is consistent with the concept that treatments would increase diversity, individual residual tree growth, and tree diameters, as well as shorten the time to developing large trees (Garman *et al.* 2003, Harrington *et al.* 2005). Barring substantial disturbance, which allows for continued understory development, stand structure would likely plateau at the old forest, single stratum class requiring a century or more to progress into the old forest, multi-strata (OM) class.

Examination of pre-treatment and post-treatment data from previous thinning projects illustrates the expected amount of within stand density variability. Table III/IV-6 is a summary of these data from five stands with a comparison to the proposed action. The plots are stratified into "no competition" (relative density less than 20), "low competition" (relative density from 21 to 34), "high competition" (relative density 35 to 55) and high competition transitioning to "imminent mortality" (relative density greater than 55). As indicted by the data, the relative density of roughly half the plots or patches within a stand correspond to the average competition category of the stand as a whole. However, many other plots will have relative densities that are higher or lower than the stand average. With the exception of the Brummit LSR, Slater Rocks, and Weaver-Sitkum projects, there was no specific goal to achieve variability in these treated areas and a single relative density was the target. The proposed action is expected to be similar to the results depicted with the exception that removal of hardwoods in the conifer stands would create variable-sized gaps and increase the area with lower stocking.

Table III/IV-6 - Comparison of pre and post-thinning percent of plots (patches) by relative density range in typical thinning treatments on the Coos Bay District.

	Site name	Location	Stand Exam date	Total plots	Average RD	Percent plots by relative density range			
						No competition: RD of 0.20 and less	Low competition: RD of 0.21 to 0.34	High competition: RD of 0.35 to 0.55	High competition transitioning to imminent mortality: RD 0.56 and greater
Lone Pine EA	**Pre-treatment Average** (See Table III/IV-5) for unit level data)			338	**.70**	1.8%	2.8%	15.8%	79.6%
Sale Pre-treatment Data	Weaver	.		341	0.65	0%	3%	7%	70%
	Scare Ridge	Sec. 13, T.21S., R.09W.	1991	18	0.59	5.6%	16.7%	22.2%	55.6%
	Mose15	Sec. 15, T.21S., R.08W.	1994	21	0.49	4.8%	23.8%	38.1%	33.3%
	Soup Creek	Sec. 19 & 30, T.23S., R.09W.	1994	11	0.57	0.0%	18.2%	18.2%	63.6%
	Slater Rocks	T.29S., R.09W., T.29S., R10W., T. 30S., R. 9W., T.30S., R., 10W.	2007	383	.60	7%	1%	33%	59%
	Pre-treatment Average				**0.58**	**5.8%**	**12.5%**	**23.7%**	**56.3%**
First Exam Post-treatment	Scare Ridge	Sec. 13, T.21S., R.09W.	1996	46	0.32	17.4%	45.7%	37.0%	0%
	Dora Ridge			19	28	21%	47%	32%	0%
	Brummit LSR	Sec. 19,20,21,29,30,31 T.27S., R.09W.	2009	240	0.23	49%	37%	12%	2%
	Mose15	Sec. 15, T.21S., R.08W.	2002	27	0.30	22.2%	44.4%	33.3%	0%
	Soup Creek	Sec. 19 & 30, T.23S., R.09W.	1998	8	0.39	12.5%	25.0%	50.0%	12.5%
	Post-treatment Average				**0.31**	**24.4%**	**39.8%**	**32.9%**	**2.9%**

After treatment, the percentage of plots with relative densities below 20 increased four times, going from six percent to over 24 percent. Areas at this low stocking level allow enough light into the stand to allow establishment of understory trees, provide for and maintain herb and shrub growth, allow retention of lower live branches, allow some epicormic branching, and maximize individual tree growth. Approximately 36 percent of the post-treatment plots have relative densities greater than 35, a 55 percent decrease from the pre-treatment plots. The amount of light reaching the forest floor under the trees in these plots is not enough to allow any but the most shade-tolerant plants to persist; while thinning increased the amount of light reaching into the canopy, the leave trees would recapture the growing space resulting in the resumption of the effects of overcrowding and density dependent mortality. The 30-foot and 50-foot no-harvest buffers along streams would result in roughly 250 acres remaining in the high competition category (*i.e.* overstocked).

By thinning the proposed units, stand densities would be reduced on 3,727 acres of the 15,561 acres that are 30 to 79 years old in this area; coverage in stands at the highest density class would be expected to decrease from 68 to 52 percent, coverage in medium density would increase from 30 to 40 percent, and coverage in low density would increase from three to eight percent.

The effects of the proposed action on stand densities would be insignificant at the landscape scale due to the limited scope of the project area and these effects would be evident only at the local stand scale; this is consistent with the intent of creating stands that have variable densities and stand structure important to wildlife, while still maintaining adequate stand-level growth rates for timber production.

Thinning would decrease the amount of suppression mortality in treated areas compared to the no action alternative (Table III/IV-5), including decreasing development of snags > 24” DBH. Although the proposed action would not lead to high suppression-induced snag densities in the treated areas of the remaining units, the proposed action would facilitate other ecological benefits (described above). Additionally, current and future mitigation of this deficiency could occur. In the short-term, the proposed action would include creation of 1.5 snags/one piece of downed wood per acre in applicable units. Total post-thinning tree densities would be high enough to facilitate creation of future large snags/downed wood while still meeting stand management goals (such as future regeneration harvest in Matrix and developing late-successional structure in the RR). Suppression would continue in 30-foot and 50-foot overstocked no-treatment zones surrounding streams and overstocked deferred portions of treatment units (Chapter 2) providing suppression-induced snags/downed wood at the densities described for the no action scenario (Table III/IV-5).

Hardwood conversion treatments would reduce the hardwood component on roughly 700 acres, increasing available growing space for conifer trees left on the site and trees planted to fill gaps and open areas. Variable tree density as well as species diversity would occur within individual units by: (1) planting of open areas with 200-300 seedlings per acre, (2) thinning dense areas of conifers, (3) retaining up to eight large hardwoods such as big leaf maple and Oregon-myrtle in RRs, and (4) retaining minor understory trees such as western redcedar. Additionally, no-treatment zones of at least 30 feet along streams would contribute to species and density diversity in all units. Successfully released conifers would contribute to the structural diversity of the new stand. Figures 4 and 5 illustrate a typical hardwood conversion from current conditions to year 2100.

Figure 4 Hardwood conversion stand conditions current (left) and immediately following treatments (right).

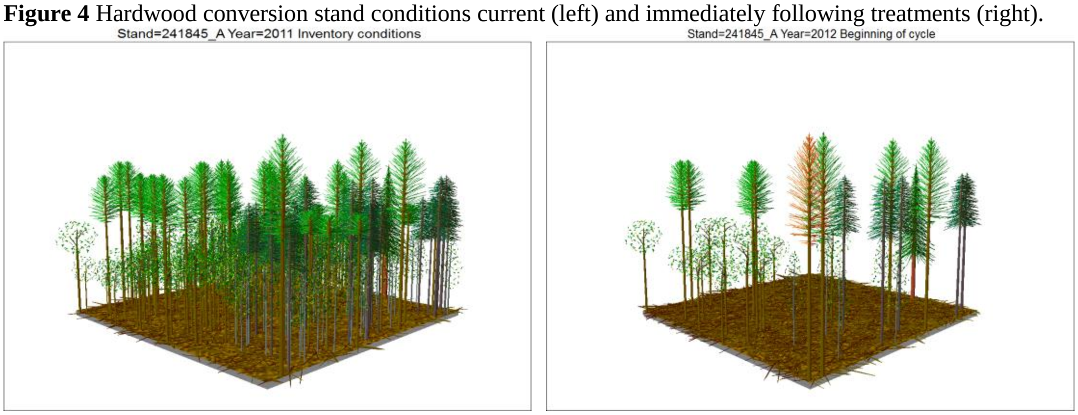
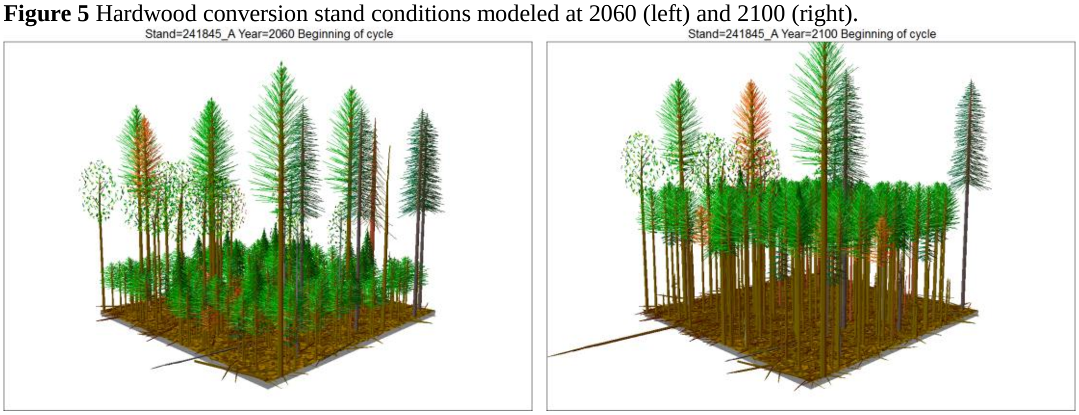


Figure 5 Hardwood conversion stand conditions modeled at 2060 (left) and 2100 (right).



Cumulative

Cumulative effects of the Lone Pine Proposed Action on forest structure include consideration of the effects of implementation of the 1994 FEIS (NWFP) on federally administered portions of the analysis area (including BIA/Coquille Tribal lands), continued harvest on 40-year rotations in privately administered lands, and construction of the Williams Pipeline. The difference between the proposed action and the no action in terms of forest structure would be the conversion of hardwood dominated areas to conifer dominated multi-storied and multi-aged stands in Matrix and RR, thinning of RRs (followed by succession), and the thinning of Matrix stands prior to regeneration harvest.

Wildlife
This action area is based on and delineated around spotted owl home ranges that fall within 1.5 miles of the Lone Pine project areas and any lands within 1.5 miles of unit boundaries. The BLM uses this action area to describe the direct and indirect effects to owls and their habitat from implementation of the project activities. Within the action area, there are 81,695 acres, of which the BLM manages 32,424 acres. The treatment of 3,727 acres constitutes 4.5 percent of the total acreage and 11.5 percent of BLM-managed lands within the action area. This action area also encompasses all unsurveyed suitable marbled murrelet habitat that project activities could affect through disturbance and is large enough to quantify and assess impacts to other terrestrial species.

Threatened and Endangered Species

Northern Spotted Owl (NSO)
Using the method described above, there are four known spotted owl sites (or activity centers) within the Lone Pine analysis area. Based on previous survey information, the BLM assumed the site tagged in our spotted owl database as the "best site" that is the primary site for owl reproduction. Sometimes the database indicates an alternate site that an owl pair uses less frequently. The discussion of effects is on these "best" sites.

Surveys
Because the Lone Pine proposed action contains activities that have the potential to disrupt owl breeding behavior in the form of noise disturbance, the BLM is applying the 2012 revised protocol for surveying for northern spotted owls (USDI 2012 *revision*). This includes surveying three of the four known activity sites as well as any unsurveyed suitable habitat within the disruption distance of harvest units. Private industry already planned to survey the fourth site so to prevent excessive calling and possible harassment of the owl pair, the BLM avoided that area.

The BLM conducted 540 surveys at 90 stations located across the project area during the 2012 breeding season. Surveyors detected spotted owls 13 times; however, only one bird was located during daytime follow-up visits. During that daytime visit, surveyors fed the owl four mice and the surveyors determined it was a non-breeding single male. Females detected during night surveys were not located during any follow-up visits. The majority of spotted owl detections occurred within several known home ranges but surveyors were unable to determine if these owls were the historic (banded) owls. As guided by the 2012 protocol, the BLM is surveying the area again for spotted owls for a second consecutive year in 2013.

Additionally, during surveys for spotted owls there were at least 121 documented detections of barred owl. In some instances, many of these were most likely the same barred owl detected at adjacent stations along a survey route. How proposed silvicultural treatments within Lone Pine units would affect barred owls and how they interact with spotted owls is unknown. The *2011 Revised Recovery Plan for the Northern Spotted Owl* has identified barred owls as a continued threat to spotted owl recovery.

Habitat – Suitable (Nesting, Roosting, and Foraging; NRF)
Suitable spotted owl habitat consists of stands used by owls for nesting, roosting and foraging. The USFWS classifies spotted owl nesting, roosting or foraging habitat (referred to as NRF) as forest stands containing important stand elements such as high canopy closure, a multi-layered, multi-species canopy with larger overstory trees, and a presence of broken-topped trees or other nesting platforms (USDI 2012 *revision*). There is no NRF habitat within the proposed treatment units. There are approximately 219 acres of unsurveyed suitable habitat within 65 yards of units. The USFWS has suggested that loud activities within this distance are enough to disrupt bird behavior to a degree that creates the likelihood of injury. These include noises associated with harvest activities (e.g. chainsaw use).

Habitat – Dispersal

Dispersal habitat consists of forest stands that juvenile owls disperse through while trying to locate NRF habitat on which to establish a territory. Dispersal habitat is defined as "forest stands with an average tree diameters ≥ 11 inches and conifer overstory trees with closed canopies (> 40 percent canopy closure in moist forests and >30 in dry forests) and with open space needed for successful dispersal" (USDI 2012 *revision*). The BLM has determined that all of the stands proposed for treatment (3,727 acres) are dispersal-only habitat. Within the analysis area, there are 22,913 acres of dispersal habitat of which the proposed treatment areas comprise 16.3 percent.

The effects of habitat modification to spotted owl sites in the Coast Range Province are assessed by evaluating habitat availability in generalized nest patches, core areas and home ranges with a radii of 300 meters, 0.5 miles and 1.5 miles respectively (USDI and USDA 2008). Forty percent of the home range and fifty percent of the core in suitable habitat are the USFWS suggested minimum thresholds for preventing impairment of spotted owl life history functions (USDI and USDA 2008). Table III/IV-7 shows the current habitat conditions for the four known sites, the amount of non-federal and BLM ownership, and the contribution of BLM owl suitable and dispersal habitat as related to the total acreage in the activity center. The table also shows the USFWS minima thresholds for supporting spotted owl life history functions. There is no threshold established for nest patches, only cores and home ranges.

Table III/IV-7 - Northern spotted owl activity center ownership allocations, federal suitable habitat and dispersal habitat and federal percentages by owl habitat classification in total acres.

MSNO	Owl Activity Center Classification (Total Acres)	Federal Land (Acres & %)	Non-Federal Land (Acres & %)	Federal Suitable (Acres and % of Total)	Federal Dispersal (Acres & % of Total)	Meet USFW Minima?
2181O	Nest Patch (70)	70 (100%)	-	49 (70%)	70 (100%)	
	Core (503)	393 (78%)	110 (22%)	165 (33%)	335 (67%)	No
	Home Range (4524)	**2,159 (45%)***	2,365 (52%)	933 (21%)	1,744 (39%)	No
2317O	Nest Patch (70)	37 (53%)	33 (47%)	34 (49%)	37 (53%)	
	Core (503)	214 (43%)	289 (57%)	173 (35%)	212 (42%)	No†
	Home Range (4524)	**1,585 (35%)***	2,938 (65%)	885 (20%)	1,140 (25%)	No†
2347O	Nest Patch (70)	64 (91%)	6 (9%)	62 (89%)	64 (91%)	
	Core (503)	349 (69%)	154 (30%)	295 (59%)	349 (69%)	Yes
	Home Range (4524)	**2,178 (48%)***	2,345 (52%)	1,028 (23%)	1,903 (42%)	No
2352A	Nest Patch (70)	70 (100%)	-	40 (57%)	41 (59%)	
	Core (503)	503 (100%)	-	249 (49%)	348 (69%)	No
	Home Range (4524)	**3,265 (72%)***	1,259 (28%)	1065 (23%)	2,292 (51%)	No

*These are the total acres managed by the BLM in these activity centers.

†Using only federal acreages in optimum conditions, this site cannot meet the USFWS suggested minima to support spotted owl life history function.

Critical Habitat

The Brownstone project area (T. 28 S., R. 9 W., sec 17) is located in the Oregon Coast Ranges critical habitat unit 2, subunit 6 (OCR-6; 77 FR 71875). An eight-acre portion of the Weekly Creek area (T. 29 S., R. 11 W., sec 5) also overlaps with OCR-6. This subunit has 81,857 acres of which the BLM manages 80,651. Of the 80,270 habitat-capable acres in this subunit, 41,646 acres (52 percent) are suitable habitat and 27,254 acres (40 percent) are dispersal habitat. The Brownstone project area represents 0.4 percent of the total OCR-6 acres and one percent of the available dispersal habitat within this subunit. The Weekly Creek acres are statistically negligible at any of these scales.

Recovery Action 32 (RA32)

As the Lone Pine unit stands are not structurally complex and do not contain multi-layered canopies, they do not meet the criteria for RA32 retention. There has been intensive management of these stands, they are 30-79 years old and do not contain large snags or down wood. Stand exam data, aerial interpretation and field review corroborates this conclusion.

No Action
In the Matrix, overstocked conifer stands would continue to undergo suppression mortality until the stands reach the culmination of mean annual increment, when the BLM would analyze these stands for regeneration harvest.

The alder-dominated areas would likely take a century to become conifer-dominated (Deal 2006, Newton *et al.* 1968). Where salmonberry is present (a larger portion of these stands) conifer re-establishment may not occur (Carlton 1988, MacCracken 2002, Tappeiner *et al.* 1991). Without treatment, these alder-dominated stands would continue to degrade over the next twenty to forty years as the alder die out and the sites convert to salmonberry brush fields.

Alder deterioration would affect three of the four home ranges within fifty years – degrading current low-functioning dispersal acres to non-habitat incapable of supporting spotted owls or their associated prey base. Table III/IV-8 shows the home ranges for the four owl sites with the resulting habitat acres forecasted for 2060. This date is the same as used in the forest ecology effects analysis and would represent the time for which the alder stands would fully decay and become incapable of supporting spotted owls. While there would be some ingrowth and suppression in the overstocked stands, they would not have enough structural characteristics or multi-layered canopies to be considered owl suitable habitat within this period. There would be a small supply of snags and down wood, but not the randomly-distributed high densities of snags and down wood that are associated with suitable habitat.

Table III/IV-8 - Changes in dispersal habitat from the decay of alder sites into non-functioning owl habitat.

Owl Site Number	Owl Habitat Classification	Current Dispersal %	HWC Acres	No Action 40 Yrs.	
				Final %	Change
2182O	C (core)	66.7			
	HR (home range)	38.5	-	-	-
2317O	C	42.1			
	HR	25.2	5	25.09	-0.41%
2347O	C	69.4			
	HR	42.1	46	41.06	-1.01%
2352A	C	69.2			
	HR	50.7	36	49.88	-0.79%

There would be no change to site 2182O. Sites 2317O and 2352A would result in the degradation of less than one percent of the applicable home ranges and site 2347O would degrade approximately one percent. While these acreage percentages are a statistically small portion of these home ranges, they are still important because they would not contribute to the recovery of the spotted owl. More importantly, all of these sites are already below the suggested dispersal acreage thresholds to prevent impairment to spotted owl life history functions; degradation of these acres would inhibit attainment of these minimum thresholds.

This alternative would not meet any of the recovery actions included in the *Revised Recovery Plan for the Northern Spotted Owl* (USDI). In particular, it would not meet the following in Critical Habitat:

- *Recovery Action 6: In moist forests managed for spotted owl habitat, land managers should implement silvicultural techniques in plantations, overstocked stands and modified younger stands to accelerate the development of structural complexity and biological diversity that will benefit spotted owl recovery* (p. III-19).

While the recovery plan does suggest that managers should restore "lost species and structural diversity (including hardwoods) within the historical range of variability" (USDI 2012 *update*), the BLM has demonstrated that the hardwood stands proposed for treatment are outside the historical range within the action area (see pp. 25-26).

The current trend of barred owls competing for resources and increasing populations within northern spotted owl areas would continue. Demographic studies for 2008 in the Tyee and Klamath study areas (Coast Range and Klamath Province, respectively) showed a continued increase in barred owl detections in both areas and that trend is expected to continue (Lint *et al.* 2009). The Tyee area had a high rate of nest failure in 2008, which could be linked to the dramatic increase in barred owls in the study area. Additionally, spotted owl survival was shown to be declining on all but the Klamath study area and in some cases, the declines occurred primarily in the last ten years or so (Coast Ranges, H. J. Andrews, Tyee, South Cascades). Demographic study reports are available online at http://www.reo.gov/monitoring/reports/northen-spotted-owl-reports-publications.shtml.

Proposed Action

There would be no effect to owls within the disturbance distance of harvest units. This is because surveys may indicate that spotted owls are not currently using the suitable habitat stands and thus there would be no disruption to any specific owl. Alternatively, if surveys indicate owl use in some adjacent suitable stands, then the BLM would apply seasonal restrictions during the critical breeding period (March 1 – June 30) to prevent disturbance. Therefore, there would be no impact to the behavior of spotted owls within 65 yards of harvest activities.

Within the harvest units, implementation of the proposed action would modify, but still maintain the functionality of dispersal and critical habitat. This form of modification refers to activities that alter forest stand characteristics but maintain the components of spotted owl habitat within the stand such that the functionality of the stand for owls remains post-harvest.

The developing conifer stands in the hardwood conversion areas would begin to function as dispersal habitat in approximately forty years. Table III/IV-9 shows the changes in dispersal habitat for the four owl activity centers within the project area within forty years of project implementation. Within forty years of treatment, the regenerated conifer stand would function as higher quality dispersal habitat than the current condition. Therefore, the conversion of this small amount of acreage spread across the action area would not preclude owl movement throughout the area and would have no discernible impact to owls.

In Riparian Reserves, the treated thinning stands would reach a more advanced structural stage (Appendix D) and facilitate faster achievement of structurally complex forest condition and connectivity between older forest types. These treated stands would develop into likely roosting and foraging (possibly nesting) habitat following density management treatments. Table III/IV-9 shows this increase in suitable habitat for the applicable owl activity centers.

For the short-term, snag and down wood creation would provide habitat for prey species.

Table III/IV-9 - Changes in suitable and dispersal habitat as a result of the Lone Pine project in 40 years. Note – this table does not include ingrowth of younger stands or other disturbance events – it is a representation of the acreages included in the Lone Pine proposal.

Owl Site Number	Owl Habitat Classification	Current Suitable %	Current Dispersal %	DMT Acres	HWC Acres	Proposed Action 40 Yrs.			
						Suitable Habitat		Dispersal Habitat	
						Final %	Change	Final %	Change
2182O	C	32.8	66.7						
	HR	20.6	38.5	77		22.3	+1.7%		
2317O	C	34.6	42.1						
	HR	19.6	25.2	26	5	20.1	+0.5%	25.8	+0.6%
2347O	C	58.6	69.4	16		62.2	+3.6%		
	HR	22.7	42.1	345	46	30.4	+7.7%	43.1	+1.0%
2352A	C	49.5	69.2						
	HR	23.5	50.7	34	36	24.3	+0.8%	51.47	+0.8%

While these are relatively small changes (< 2 percent) in the total amount of suitable habitat in the home range, one site does improve to having 30 percent suitable, only 10 percent away from the suggested minima.

Conclusion
Over time, these treatment units in critical habitat and Riparian Reserves would provide a benefit to spotted owls by accelerating the development of late-successional characteristics such as large diameter trees, multiple canopy layers, and foraging perches. Creating snags and down wood would provide a short-term supply of these features relied upon by owl prey species, such as the northern flying squirrel.

Marbled Murrelet
There are 45 delineated murrelet occupied sites with an associated 4,045 acres of occupied habitat out of 9,051 acres of murrelet suitable habitat within the action area. There are 303 acres of unsurveyed suitable and 175 acres of occupied habitat within 100 yards of harvest units. The USFWS has suggested that loud activities within this distance are enough to disrupt bird behavior to a degree that creates the likelihood of injury. These include noises associated with harvest activities (e.g. chainsaw use, helicopters).

None of the stands are considered suitable habitat (i.e. nesting) and none of the proposed harvest units are located within designated critical habitat.

No Action
Within the riparian stands, while there would be some ingrowth and suppression in the overstocked stands, they would not have enough structural characteristics or multi-layered canopies to be considered marbled murrelet suitable habitat over time. As shown in the timber resources section (p. 29), most areas would have stagnant future structural growth by year 2040 (Figure 2). The USFWS identified in the recovery plan that "simply growing large trees is not sufficient to obtain marbled murrelet habitat" (USDI 1997).

In the Matrix, overstocked conifer stands would continue to undergo suppression mortality until the stands reach the culmination of mean annual increment, when the BLM would analyze these stands for regeneration harvest.

Proposed Action
There would be no effect to murrelets within the disruption distance of harvest units. This is because of the implementation of the project design feature that restricts activities during the critical breeding period (April 1-August 5) specifically to prevent disturbance impacts. Daily timing restrictions would be applicable from August 6-September 15. Therefore, there would be no impact to the behavior of murrelets within 100 yards of harvest activities.

In the Matrix stands, trees would improve growth rates until trees reach the culmination of mean annual increment, when the BLM would analyze these stands for regeneration harvest.

Within Riparian Reserve stands, as the BLM has designed these treatments to provide late-successional conditions on a faster trajectory than current conditions, marbled murrelets could begin to use these stands for nesting (as suitable habitat) earlier. With treatments designed to provide complex structure including larger limbs, nesting platforms would be available earlier. This would meet recovery action 3.2.1.3 "Use silvicultural techniques to increase speed or development of new habitat" (USDI 1997).

Other Special Status Species
Implementation of either alternative would have no measurable affect to several species that could occur within the terrestrial action area. These include the foothill yellow-legged frog, bald eagle, American peregrine falcon, fringed myotis bat, or Townsend's big-eared bat. There is no habitat within the treatment units for these species. There are no suitable large snags for bats, nesting habitat for peregrine falcons/bald eagles, or $\geq 4^{th}$ order streams for frogs. Table WL-C in the wildlife report (incorporated by reference) contains a list of all the special status species that are rare or the BLM has not documented within the analysis area.

Pacific Fisher

Fisher presence in the analysis area is highly unlikely. The dispersal habitat in the analysis area is low quality based on the overall low number of snags, down wood and fragmented late-successional habitat. Currently, fisher populations are under review by the USFWS who is likely to list this species as threatened in 2014.

Historically on the west coast, fishers were most abundant in low to mid-elevation, conifer-dominated forests with relatively continuous canopies and complex physical structure near the forest floor (Aubry and Lewis 2003). The presence of large conifers and hardwoods is a significant predictor of fisher occurrence (Powell and Zielinski 1994). However, low densities of fishers have been associated with second-growth forests and fragmented landscapes (Aubry and Lewis 2003). Fishers generally avoid clearcuts, stands with less than 4 percent canopy cover, and openings more than 25 meters across. The average home range of male fishers is about 10,000 acres, nearly three times the size of female home ranges that are 3,705 acres on average (Powell and Zielinski 1994) Fishers are difficult to detect because of their large home ranges, low densities, and elusive behavior.

There are two known small, disjoint populations in Oregon, an indigenous population in the Siskiyou Mountains and a reintroduced population in the southern Cascades (Aubry and Lewis 2003). In 1991, two BLM staff reported incidental sightings near Middle Creek and Daniel's Creek (east of North Bend, OR). BLM biologists conducted surveys for marten and fisher in the Coquille, Umpqua and N. Fork Chetco river drainages from 1994 to 1997. The BLM did not detect any marten or fisher; however, definitive conclusions cannot be made because few data points were taken. Protocol surveys were conducted in 2005-06 in LSR 261 (T26S R10W and T27S R10W). No fishers or martens were detected. Recent fisher surveys conducted on district lands in 2012-13 near the California border detected fishers at five remote camera stations. To date, camera surveys have not documented any fisher north of the Rogue River. It is possible that fishers are elsewhere on district; however, there is no documentation of fisher presence in the analysis area.

The proposed action is not expected to have an effect on fisher because of the low likelihood of their presence within the action area. Development of enhanced stand structures and creation of down wood in the riparian areas would increase the quality of habitats utilized by fishers over the long-term.

<u>Survey & Manage Compliance/Exemptions</u>

On December 17, 2009, the U.S. District Court for the Western District of Washington issued an order in *Conservation Northwest, et al. v. Sherman et al.*, No. 08-1067-JCC (W.D. Wash.), granting plaintiffs' motion for partial summary judgment and finding NEPA violations in the BLM and USFS Record of decision eliminating the Survey and Manage mitigation measure. Judge Coughenour deferred issuing a remedy in his December 17, 2009 order until further proceedings, and did not enjoin the BLM from proceeding with projects. Plaintiffs and Defendants entered into settlement negotiations that resulted in the 2011 Survey and Manage Settlement Agreement, adopted by the District Court on July 6, 2011.

The Ninth Circuit Court of Appeals issued an opinion on April 25, 2013, that reversed the District Court for the Western District of Washington's approval of the 2011 Survey and Manage Settlement Agreement. The Ninth Circuit Court has remanded the case back to the District Court for further proceedings. This means that the December 17, 2009, District Court order which found National Environmental Policy (NEPA) inadequacies in the 2007 analysis and records of decision removing Survey and Manage is still valid.

Previously, in 2006, the District Court (Judge Pechman) had invalidated the agencies' 2007 RODs eliminating Survey and Mange due to NEPA violations. Following the District Courts' 2006 ruling, parties to the litigation had entered into stipulation exempting certain categories of activities from the Survey and Manage standard (hereinafter "Pechman exemptions").

Following the District Court's December 17, 2009 ruling, the Pechman exemptions remain in place. Judge Pechman's order from October 11, 2006 directs:

"Defendants shall not authorize, allow, or permit to continue any logging or other ground-disturbing activities on *project to which the 2004 ROD applied unless such activities are in compliance with the 2001 ROD (as the 2001 ROD was amended or modified as of March 21, 2004, except that this order will not apply to:*

a) Thinning projects in stands younger than 80 years old;
b) Replacing culverts on roads that are in use and part of the road system, and removing culverts if the road is temporary or to be decommissioned;
c) Riparian and stream improvement projects where the riparian work is riparian planting, obtaining material for placing in-stream, and road or trail decommissioning; and where the stream improvement work is the placement of large wood, channel and floodplain reconstruction, or removal of channel diversions; and
d) The portions of projects involving hazardous fuel treatments where prescribed fire is applied. Any portion of a hazardous fuel treatment project involving commercial logging will remain subject to the survey and management requirements except for thinning in stands under 80 years old under subparagraph a. of this paragraph."

The Lone Pine thinning treatments (3,266 acres) meet Exemption A because this project consists of thinning only in stands less than 80 years old (BLM stand exam data, LiDAR p. 28).

The 461 acres of hardwood conversion do not meet the Pechman Exemptions. Therefore, the BLM has applied the provisions of the last valid Record of Decision, the 2001 ROD without annual species reviews, and is conducting surveys for those species within the hardwood conversion stands proposed for treatment.

Red Tree Vole

There are 384 confirmed red tree vole (vole) nest locations documented in the analysis area; most of which were located during project clearance for the gas pipeline. Important habitats for the vole are mature and older mixed-age conifer forests containing Douglas-fir, grand fir, Sitka spruce, etc. Typically, in Douglas-fir forests west of the cascades, mature forests begin between 80-130 years of age, and old-growth forests at 180-220 years old. Of the 32,424 acres managed by the BLM within the analysis area, only 10,015 acres (31 percent) are 80 years old or greater and existing late-successional forest is not evenly distributed across the area at the sub-watershed scale. It is assumed that all conifer forest ≥ 80 years of age is moderate to high quality vole habitat and contains active sites.

Stands proposed for commercial thinning (3,727 acres) are less than 80 years old and are not considered high quality vole habitat, although survey results in these stand types elsewhere indicate that RTV may be present. Stand conditions following thinning are expected to result in short-term negative impacts, including the loss of voles at the site level. In the long-term, conditions in treated stands are expected to improve habitat conditions for voles. If the stand is thinned and most of the defective trees are removed, it is unknown if the vole would persist following thinning, or if voles would re-populate the stand if the population was removed because of the proposed action. The modification of this habitat type is very common across the landscape, and the proposed action is not expected to affect the persistence of the species as a whole.

Migratory Birds

In the recently signed Memorandum of Understanding to Promote the Conservation of Migratory Birds between the Bureau of Land Management and the U.S. Fish and Wildlife Service, the BLM would evaluate the effects of planned actions on migratory bird populations. The 2008 Birds of Conservation Concern for the Northern Pacific Forest (http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf) includes the following species that the project could affect: Northern goshawk, olive-sided flycatcher, and rufous hummingbird.

Northern goshawks are associated with late-seral stands. Because thinned stands in the analysis area are expected to achieve old-growth structure sooner than overstocked stands (Bailey *et al.* 1998, Bailey and Tappeiner 1998), thinning is likely to benefit this species over the long-term.

Olive-sided flycatchers are associated with conifer forest, especially where burns have left scattered large snags and live trees. It is unclear why this species is declining in an era of increasingly fragmented forests when it prefers edge habitat, but some types of harvested forests could be acting as "sinks" where nesting success is poor. However, in one study, this species responded positively to thinning, possibly because thinning creates the uneven canopy needed for foraging (Hagar and Howlin 2001)

Reasons for population declines in the rufous hummingbird are unclear. This species was one of a group of Neotropical birds that did not respond to thinning as a whole (Hagar and Howlin 2001). Because rufous hummingbirds seem to prefer a high canopy and well-developed understory for breeding (Patterson 2003,2006) they would likely benefit from thinning over the long-term. Thinning would increase light to the understory, promoting shrub growth and increasing nectar availability from flowering plants.

White-footed Vole

There are no documented observations of white-footed vole on district. The BLM has not listed the white-footed voles as either an S&M species or a BLM special status species so pre-clearance surveys are not required. While there are limited studies on the species, white-footed voles have been known to be associated with the presence of red alder. Manning *et al.*(2003) concluded, "capture of white-footed voles in the southern Oregon cascades supports a stronger association of this species with alder trees and hazel shrubs." Therefore, removal of 461 acres of red alders could directly affect individuals of this species population within the project area, if they are present. However, as stated on p. 28, the stands with dominant hardwood patches were previously disturbed and previously supported conifer. As these stands were historically conifer-dominated, they would not have provided habitat for the white-footed vole. Untreated red alder stands would ensure population persistence where they occur within the project area.

Snags and Down Wood

These stands are currently providing for < 30 percent cavity nester potential because they are lacking large snags mainly because of past harvest. The proposed action includes the creation of approximately 3726 snags (≥ 11" DBH) and 1331 down wood pieces. For the short-term, these complex structures would provide habitat for owl prey species, particularly the northern flying squirrel as well as benefit cavity nesters. At 11" DBH, snags would be suitable for some woodpecker foraging (Wildlife report, Appendix WL-D).

Water Resources

The proposed harvest units are located in the East Fork Coquille, North Fork Coquille, Middle Fork Coquille, and Coquille River Watersheds. Watershed is defined as the 5th field hydrologic unit level. Subwatershed refers to a smaller, 6th field hydrologic unit which varies from about 20 to 50 square miles for the affected subwatersheds. In portions of this analysis, the subwatershed scale is used to better detect potential effects of the project near the site of proposed actions. The rationale is that adverse (or beneficial) effects to water resources are easier to detect in smaller catchments (Bosch and Hewlett 1982) and as one nears the treatment site. Table III/IV-10 below shows the location and scale of the project by subwatershed. These eight subwatersheds comprise the hydrologic analysis area.

Table III/IV-10 Location and Area of Harvest Units by Watershed (includes NTZ acres)

Watershed (5th field)	Subwatershed (6th field)	Area (mi^2)	Area (acres)	Project Acres	Percent of Subwatershed
East Fork Coquille River	Brewster Canyon	26.6	17,052	268	1.6
	Camas Creek	22.2	14,207	120	0.8
	Yankee Run	25.7	16,431	1,462	8.9
North Fork Coquille River	John's Creek	29.3	18,772	1,294	6.9
	Middle Creek	50.7	32,454	581	1.8
	Hudson Creek	36.0	23,009	30	0.1

Watershed (5th field)	Subwatershed (6th field)	Area (mi^2)	Area (acres)	Project Acres	Percent of Subwatershed
Middle Fork Coquille River	Big Creek	26.0	16,647	71	0.4
Coquille River	Hall Creek	37.6	24,068	133	0.6
Totals		**254.1**	**162,640**	**3,959**	**2.4**

Stream Flow

The analysis area is within the Southern Oregon Coastal Basin and has a Mediterranean type of climate characterized by cool, wet winters and warm, dry summers. The majority of precipitation is in the form of rain; however, some snow is likely at higher elevations in most years. Precipitation across the area averages about 58 - 70 inches per year. Most of the yearly precipitation total occurs between November and March, and the volume of stream flow closely parallels the precipitation pattern. Peak stream flows occur from November to March, and low stream flow is typical from July to October. Small first order headwater streams are generally intermittent and have no surface flow during the dry season in most years. Intermittent and small perennial streams are located within or adjacent to the proposed treatment areas.

Peak Flows and Forest Harvest

Peak flows in this analysis are defined as greater than or equal to the 1-year recurrence interval flood unless noted otherwise. This threshold is used because flows below this level are not likely to affect stream channel morphology (Grant *et al.* 2008). Large peak flows in the analysis area occur during midwinter after the soil moisture deficits are satisfied. These mid-winter storms are the flows that tend to modify stream channels while transporting most of the sediment (Grant *et al.* 2008, Ziemer 1981). The mechanism by which harvest affects peak flows depends on the peak-flow generating process in a watershed. Peak flow processes are categorized into three zones as rain-dominated, rain-on-snow, or snowmelt (WPN 1999). These zones are largely a function of elevation in a particular region. For the analysis area, the rain-dominated zone occupies the coastal lowlands and the rain-on-snow zone occurs above approximately 2,000 feet.

The greatest potential for forest harvest to change peak flows is by altering the amount of snow accumulation and subsequent melt rates in the rain-on-snow zone. Approximately 53 acres of the proposed harvest area, in the Brownstone and Weaver Tie areas, is within the rain-on-snow zone.

In rain-dominated areas, large rainfall events with several inches in a day cause peak flows. However, a recent synthesis of forest harvest effects on peak flows (Grant *et al.* 2008) based primarily on small, paired-watershed studies, concluded that rain-dominated regions are less susceptible to peak flow increases compared with those in the rain-on-snow region. When flow increases did occur, they primarily affected smaller peak flows. The outcome of several other paired-watershed studies in various climate regimes have found that the first precipitation events and consequent peak flows in the fall are usually small and are inconsequential to channel morphology (Grant *et al.* 2008, Ziemer 1981). The forest soils of the Coast Range experience large moisture deficits during the summer. Forest harvest can reduce this soil moisture deficit (increase water stored in the soil) at the site level by removing trees that transpire water. This makes more water available for runoff as streamflow during the first fall precipitation events and can thereby increase these small peak flows. Statistical increases to small, peak flow events in the fall have not been proven to modify stream channel form or increase risks to flooding.

The Grant *et al.* (2008) synthesis set the minimum detection levels for peak flows for rain-dominated watersheds at about 29 percent of the watershed harvested. The authors recommended using an Equivalent Clearcut Area (ECA) approach to determine whether a proposed harvest would approach this 29 percent threshold. This is a very conservative number. The authors state that the "…first detectable reported value [in the paired watershed studies] occurs at 40 percent. The response line for mean reported change crosses the detection limit at 45 percent harvest." In addition, study results of harvest treatments for the rain-dominated zone included the effects of older, adverse road building and other harvest practices (primarily through soil compaction) that could also increase peak flows (see peak flow and roads below). They suggest there would be even a higher threshold for harvest alone without the influence of these older roads.

No Action

Harvest of private forest lands would continue, with about a 40-year rotation. While new harvests occur, older harvest areas would continue to recover hydrologically. Small-scale regeneration harvest or hardwood treatments planned on BLM lands would not be enough to affect the ECA at the watershed or subwatershed scale. The ECA should remain below the 29 percent harvest level for the near future. Therefore, there would be no change to peak flows for the near future.

Proposed Action

The proposed harvest would not affect peak flows. Approximately 53 acres (1.3 percent) of the proposed harvest area, in the Weaver Tie and Brownstone areas, are within the rain-on-snow zone. These areas are proposed for commercial thinning, so no large openings for snow accumulation would be created. Most rain-on-snow studies have found the greatest effects are from clear-cut areas that create large openings in the forest canopy (Berris and Harr 1987, Harr 1986, Harr and Coffin 1992, Satterlund and Adams 1992). Research suggests that forest thinning treatments maintain patterns of snow accumulation that are similar to mature forests and have little effect on snowmelt rates during rain-on-snow events (Poggi *et al.* 2004). Therefore, there would be no effects to peak flows due to rain-on-snow events from proposed treatments.

The rest of the proposed harvest area (98.7 percent) is within the rain-dominated zone. An ECA calculation conducted for this analysis (Table 4; Hydro report) resulted in an increase in the ECA from 0.1 to 3.2 percent in the affected subwatersheds from the proposed project. The cumulative ECA (including this project) shows percent harvested would range from 10.4 to 18.9 percent in the affected subwatersheds (Table 5; Hydro report. This level of harvest is well below the minimum threshold (29 percent) suggested by Grant *et al.*(2008) to reach a detectable level of increase in peak flow for rain-dominated catchments. As explained above, this 29 percent level is a very conservative number. As the Lone Pine project will not even approach this conservative number, the proposed harvest would not affect peak flows.

Peak Flows and Roads

Roads have the potential to increase peak flows (Beschta 1978, Wemple *et al.* 1996). Mid-slope roads can intercept surface and subsurface water and divert it into the road drainage system. This can effectively extend the stream channel network and speed up delivery of water to streams. Most roads in the analysis area are mid-slope roads and many of these roads have sections where their drainage systems connect directly to stream channels.

A method for assessing the potential risk of the road network to cause an impact on stream flow was developed for the Governors Watershed Enhancement Board (GWEB). The assessment assigns a "threshold of concern" for hydrologic impacts based on the percentage of area covered by roads. The threshold levels are 0-4 percent low risk, 4-8 percent moderate risk, and above 8 percent high risk (WPN 1999).

Based on GIS data, there is an average of 3.0 percent of the action area covered by roads, with a range of 2.6 – 3.3 percent (Table 4; Hydro report). Therefore, according to the GWEB method, the analysis area currently has a low risk (< 4 percent road area) of hydrologic impacts due to roads. However, as stated by the authors, the condition of roads and the design of drainage systems may be just as important in determining the impact of roads on stream flow. The drainage systems of many roads in the analysis area are directly connected to stream channels.

No Action

Other roads would be constructed in the analysis area to access private forest lands. It is unknown whether there would be enough road construction to exceed the GWEB threshold described above to cause impacts to flow regimes. However, new road design and construction practices required by the Oregon Department of Forestry

(ORS 2011) have greatly improved since the construction of legacy roads in the 1960s and 1970s. These new roads are less likely to be connected to streams or to increase peak flows.

Other planned federal projects in the analysis area (Table III/IV-1) contain road construction and renovation. These proposed projects include design features similar to those in this EA that would reduce road connection with the stream network.

Proposed Action

The approximately 13.9 miles of new road construction would not affect peak flows. Using the GWEB analysis described above, total road area in the subwatersheds would still be below the threshold of concern (< 4 percent road area). Engineers would design the new roads with adequate cross drains so that road drainage to stream channels would be negligible. The roads would be decommissioned at the completion of project activities. Decommissioning would incorporate design features, including adequate waterbars, which effectively disconnect the roads from the drainage network. These cross drains would route water intercepted by the road surface is to the forest floor where it can infiltrate back into groundwater. Additionally, improving road drainage would effectively disconnect some roads proposed for renovation and improvement from the stream network. Road work is analyzed in more detail below under Water Quality/Sediment/*proposed action*.

Water Quality

Forest management would most likely affect the water quality parameters of sedimentation and stream temperature. The Oregon Department of Environmental Quality (ODEQ) develops water quality standards that protect beneficial uses of rivers, streams, lakes, and estuaries. Timber harvest could affect beneficial uses for streams that include domestic water supplies and fish/aquatic life. The State of Oregon places water bodies that do not meet water quality standards on the 303(d) list as Water Quality Limited (ODEQ 2010). In the analysis area, Alder Creek, Cherry Creek, Coquille River, East Fork Coquille, Elk Creek, Middle Creek, North Fork Coquille, and Woodward Creek have all or portions listed for high stream temperature. ODEQ has not listed any water body in the analysis area for sedimentation.

Stream Temperature

A lack of stream shading due to timber harvest adjacent to stream channels can cause elevated water temperatures. A reduction in shade increases the amount of solar radiation reaching the stream surface (Brazier and Brown, 1973).

Approximately half of the proposed treatment area is located in the North Fork Coquille Watershed (Table III/IV-10). The BLM developed the North Fork Coquille River Water Quality Restoration Plan (WQRP) to address water quality limited water bodies on federally administered lands in the Watershed. A modeling study of riparian conditions for the WQRP showed that shade was at or near target levels (maximum shade) on federally administered lands (USDI 2001). Existing modeled shade on BLM lands was above 90 percent on most streams. Some streams were at target shade. The difference between existing and target shade ranged from zero to four percent with an average of two percent. This difference is probably below any current models confidence limits. Overall, the model results indicated that there is little potential for improvement in average shade conditions on BLM lands within this watershed. Existing shade values on BLM lands are similar in the rest of the analysis area.

No Action

Other planned federal timber sales in the analysis area (Table III/IV-1), which include those covered in the Cherry Vaughn EA, incorporate similar no-treatment buffers along streams. The BLM does not expect any effects to stream temperature for those projects.

The Oregon Forest Practices Act does not require retention of shade buffers along non-fish-bearing streams on private lands (ODF 2007). Therefore, some shade-providing trees could be removed along non-fish-bearing, perennial streams where harvest occurs on private lands in the analysis area. Temperature increase would be dependent on the length of stream affected, stream width, topography, orientation and other factors. A recent study of stream temperature effects from contemporary forest management in the Oregon Coast Range (Groom *et al.* 2011) found that there was no change in maximum temperatures from harvest in state-managed streams while privately managed forest streams had temperature increases from harvest at the study sites that averaged about 0.7 °C (range -0.9 to +2.5 °C).

In the areas proposed for density management, the un-thinned stands would continue to have unfavorable height to diameter ratios that increase the risk of blow down (Smith 1962), and subsequent exposure of the stream to solar heating. In addition, the un-thinned condition would delay establishment of understory trees and shrubs with their associated multi-canopy layers that could provide shade in the event that some or all of the overstory shade is lost due to a catastrophic event (Levno and Rothacher 1969) cited in (Adams and Ringer 1994).

Research also indicates that stands that develop at very high densities have a limited variation in tree size, which makes them susceptible to diameter growth stagnation and instability (Wilson and Oliver 2000). Without treatment at the appropriate time, these dense stands rapidly decline in growth and vigor resulting in a stagnant stand that becomes more susceptible to wind, insects, disease, and fire disturbances.

Proposed Action

There would be no effect to stream temperature in intermittent streams from density management thinning or hardwood conversion treatments of trees outside the 30-foot no-treatment zone (NTZ). By definition, intermittent streams have little or no surface flow during the summer when elevated stream temperatures can occur.

There would be no effect to stream temperature in perennial streams. The 50-foot NTZ buffers, and 40 to 60 percent canopy outside the NTZ, would maintain stream shade. Authors of a recent study of stream temperature effects from contemporary forest management in the Oregon coast range stated that they “detected no differences between pre-harvest and post-harvest stream temperature on state forests, indicating that state forest riparian buffers prevent harvest-related increases in shade and stream temperature” (Groom *et al.* 2011). This is the largest, most recent, most site-specific study with similar treatments to those in the proposed project. The study found that with minimum 25-foot (8 m) NTZ buffers, and limited harvest outside this zone, there was no change in stream temperature. The NTZ buffers in the proposed project are twice the width of those studied that showed no change in stream temperature. Density management and hardwood conversion treatments proposed outside the buffers would maintain approximately 40 to 60 percent canopy closure. The 50-foot NTZs and limited harvest outside this zone to the edge of Riparian Reserves (at least 200 feet) would maintain stream shade. Therefore, we would not expect a change to stream temperature in perennial streams from density management.

In order to improve or maintain stream temperatures in the watershed, the North Fork Coquille River Water Quality Restoration Plan (USDI 2001) proposes two main management actions: (1) passive restoration to allow riparian vegetation to grow to target shade values, and (2) active restoration to maintain and increase shade and achieve other Aquatic Conservation Strategy objectives. Objectives and proposed actions would be similar in other watersheds in the analysis area. Active restoration actions would include:

- Thinning stands in Riparian Reserves to maintain or enhance the growth of conifers, and the development of deep crowns.
- Thinning stands in Riparian Reserves that are overstocked to reduce the risk of blowdown and the risk of crown fire, which is associated with high canopy continuity.
- Thinning followed by under planting or natural seeding to develop complex multi-species and multi-canopy stands.
- Planting under-stocked Riparian Reserves to restore hardwood and conifer species.
- Converting some hardwood stands to conifer.

As described above, density management thinning near streams would result in favorable height to diameter ratios of the remaining trees and would decrease the risk of blow down and subsequent exposure of the stream to solar heating. In addition, thinning would encourage establishment of understory trees and shrubs with their associated multi-canopy layers that could provide shade in the event that some or all of the overstory shade is lost due to a catastrophic event. Growth and vigor would improve in the thinned stands making them less susceptible to wind, insects, disease, and fire disturbances.

Sediment

Sediment input to stream channels is a result of both natural and management related processes. Primary sediment sources include episodic landslides, debris flows usually associated with intense winter storms (Townsend *et al.* 1977), hill slope erosion, stream bank erosion, and roads. Forest management related increases in sedimentation are most often the result of poorly designed and/or poorly maintained forest roads. These roads can be a major contributor of fine sediment to streams (Reid and Dunne 1984).

Approximately 72.3 miles of the proposed haul route would be gravel, 3.1 miles is paved, and 17.0 miles would be natural surface limited to dry-season haul. A field inspection of the proposed haul route showed several areas of potential sediment delivery where roads crossed stream channels. This review resulted in identifying John's Creek Road (29-12-1.1) and Weekly Creek Road (28-11-30) as problem areas. The BLM will renovate these roads outside the proposed project with deferred maintenance funds. Other portions of the haul route not renovated by deferred maintenance were judged to have some potential for sediment delivery during timber haul in the wet season. Many private and BLM-managed roads in the analysis area, not part of the haul route, also show evidence of surface erosion and inadequate drainage. These roads are also likely to provide excess fine sediment to adjacent streams.

No Action

Natural sedimentation levels within the analysis area would remain constant over the long term but may vary considerably from year to year. Management related sediment sources, primarily from roads, might decrease in the future. Even while some new roads are constructed, road design and construction practices have been greatly improved since the legacy roads were constructed in the 1960s and 1970s. As compared to these legacy roads, new road construction practices require greater protection of water quality. At the same time, older legacy roads are likely to be improved or decommissioned.

Other planned federal projects in the analysis area (including those analyzed in the Cherry Vaughn EA) include road construction and renovation. These proposed projects include design features similar to those in this EA that would reduce stream sedimentation from roads.

Proposed Action

<u>Road Construction</u>

The 13.9 miles of new road construction would have a negligible effect on sediment delivery to stream channels. The proposed new roads would be primarily located on or near ridge tops and would incorporate design features that include avoiding fragile or unstable areas, minimizing excavation and height of cuts, endhaul of waste material where appropriate, and construction during the dry season (USDI 1995). There would be two new, temporary stream crossings on small intermittent streams. These crossings would be located on spur roads Fox Bridge-NC1 and Steel Cherry-NC2. The temporary stream pipes would be pulled and the roads decommissioned at the completion of project activities. The amount of sediment delivery would be similar to the other new stream pipes replaced because of road renovation (see below).

Approximately 8.9 miles of the new roads would be natural surface and used in the dry season only. Approximately 5.0 miles would be rocked to allow all-season harvest. The roads would be maintained prior to winter rains if they are needed the following year. Seasonal maintenance may include but is not limited to providing adequate water bars and seeding/mulching bare soil areas with wood chips or straw. All of the newly constructed roads would be decommissioned when project activities associated with each road are completed.

With the implementation of the road management project design features, these roads would have a negligible increase in sediment delivery to stream channels. Engineers would design road drainage features so that any sediment-laden surface water would quickly infiltrate into forest soils. Therefore, the proposed roads would not affect water quality.

Road Renovation/Reconstruction/Improvement

Renovation and improvement of approximately 85 miles of the haul route would minimize sediment delivery to streams during and after project operations. Renovation of these roads to standards required for new construction (USDI 1995), would divert road drainage away from stream channels towards the forest floor where it could re-infiltrate. Renovation may include, but is not limited to surfacing with rock, stabilizing cutbanks and fill slopes, restoring outslope or crown sections, and providing adequate drainage. Installation of several new cross drains would route road water onto the forest floor and away from streams. In some areas, adding rock to the road near stream crossings would reduce sediment created by haul. In other areas, the road crown would be graded and shaped to prevent water from flowing down the road to stream crossings. At the completion of project activities, renovation and improvement activities would reduce the potential for stream sedimentation from the roads.

Road renovation and improvement would occur in the dry season for any activities requiring soil displacement. Treatment of bare soil areas after renovation and before onset of winter rains, if needed, would prevent sediment delivery to streams. Therefore, renovation or improvement would have a negligible potential, compared to natural erosion processes occurring during winter rains, for short-term (first winter) increased sediment delivery to stream channels. In contrast, road renovation and improvement would provide a slight, long-term (many years) benefit to flow routing and water quality in the affected areas.

Decommissioning/Full Decommissioning

Decommissioning of these roads would reduce their potential to deliver sediment to stream channels or alter flow routing in the analysis area. Approximately 30.8 miles of road would be decommissioned at the completion of project activities. This includes approximately 5.7 miles of road currently decommissioned that would be renovated and then decommissioned again at the completion of project activities. Therefore, the proposed project would result in a net increase of 11.2 miles of decommissioned roads (30.8 miles decommissioned – 13.9 miles new construction – 5.7 miles previously decommissioned). Decommissioned roads would be closed to vehicles on a long-term basis (> 5 years) but may be opened and maintained for periodic future use. The roads would be left in an erosion–resistant condition. Decommissioning would include installation of a suitable barrier to block access. In addition, installation of water bars where necessary would provide road drainage and treatment of bare soil areas would prevent erosion. The two new spur roads with temporary stream crossings would also have the stream pipes removed during decommissioning.

Approximately 1.5 miles of the proposed haul road would be fully decommissioned at the completion of project activities. The ID team determined that there was no future administrative need for these roads; therefore, these roads would receive similar treatment after closure as decommissioned roads. In addition, these roads may be sub-soiled if needed to restore natural hydrologic flow. In total, this would result in a net decrease of approximately 12.7 miles of open roads (11.2 miles decommissioned + 1.5 miles fully decommissioned).

Haul Activities and Road Maintenance

The amount of fine sediment introduced to streams during timber haul would be negligible, compared to natural erosion processes occurring during winter rains, and would have no impacts to downstream resources. During the dry season, since there is little or no flowing water on road surfaces, there would be a negligible amount of sediment delivery to streams because of haul. During the wet season, there would be no sediment delivery from the paved portion of the haul route because paved roads are not likely to produce sediment (Reid and Dunne 1984).

Wet season haul on gravel roads has the largest potential to deliver sediment to stream channels. However, several design features listed in Chapter 2 (design features for the proposed action) would minimize the potential for increased sediment delivery from haul activities and road maintenance. These design features would be in place before winter haul and may include (1) applying an additional lift of rock to stream crossings if there is a potential for road sediment delivery to a stream, (2) containing any offsite movement of sediment from the road or ditch flow near streams with a suitable sediment filter, (3) monitoring road conditions during winter use to prevent rutting of the rock surface and (4) suspending haul during very wet conditions. Road maintenance during the life of the project would minimize road drainage problems and reduce the possibility of road failures and increased sediment delivery to streams.

Private timber companies use a majority of gravel-surface haul routes in the analysis area extensively throughout the year. Though some minor sedimentation may result from the additional proposed haul activities, occurrence should only take place during prolonged rainfall events (until haul is suspended as noted above). Additional sediment from winter haul should be negligible and not outside levels that presently occur during such rainfall events.

Treatment in Riparian Reserves

Approximately 1,581 acres of the proposed treatment area is within Riparian Reserves. The 30-foot NTZ buffers on intermittent streams and 50-foot NTZ on perennial streams are intended to protect shade, bank stability, and prevent sediment delivery to streams from adjacent harvest operations. Rashin and others (2006) found that stream buffers were most effective at preventing sediment delivery when keeping timber falling and yarding activities at least 10 meters from streams and outside of steep inner gorge areas. The NTZ would provide an adequate sediment filter strip because non-compacted forest soils in the Pacific Northwest have very high infiltration capacities and are not effective in transporting sediment by rain splash or sheet erosion (Dietrich *et al.* 1982). In the long-term, large wood contributed to the stream channel because of density management, has the potential to create additional capacity for sediment storage.

Yarding Corridors

Yarding corridors would be placed to minimize disturbance of the stream channel and prevent sediment delivery. Design features include requiring full suspension of logs when feasible, using natural openings to the extent possible, minimizing the width (est. < 12 feet) and number of corridors and crossing channels at a perpendicular angle when possible. In addition, trees felled within the NTZ area to provide yarding corridors would be felled parallel to the stream channel, if feasible, and left on-site to provide bank armoring. Therefore, due to these design features and the small area disturbed, there should be no increase in sediment because of these yarding corridors.

Fisheries

The analysis area is located within the federally listed threatened Oregon Coast coho, *Oncorhynchus kisutch*, evolutionarily significant unit (ESU). The National Marine Fisheries Service (NMFS) published the listing determination and coho critical habitat (CCH) designation for Oregon Coast coho February 11, 2008 effective May 12, 2008 (73 FR 7816). Additionally, the Magnuson-Stevens Fishery Conservation and Management Act designated streams as Essential Fish Habitat for a variety of species. The species with designated EFH found within the analysis area include coho and chinook salmon. The Magnuson-Stevens Act defines EFH as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (67 FR 2343)."

Aquatic sensitive species on the BLM special status species list found in the analysis area include Oregon Coast coho (federal threatened), Oregon Coast steelhead (sensitive), Pacific Coast chum salmon (sensitive), and the foothill yellow–legged frog (sensitive). The foothill yellow-legged frog analysis is discussed on page 38.

The analysis area includes the Coquille River, North Fork Coquille River, East Fork Coquille River, and Middle Fork Coquille River 5th field watersheds. The 6th field watersheds include Hall Creek, Johns Creek, Hudson Creek, Middle Creek, Yankee Run, Brewster Canyon, Camas Creek, Big Creek, and Indian Creek. This analysis used a watershed-based approach to determine the analysis area based on the location of the proposed units and road activities.

Fish Habitat

The term fish habitat as used below includes coho critical habitat, habitat for BLM-sensitive fish, and essential fish habitat.

Human activities have influenced fish habitat within the analysis area. Many stream channels in the lower valleys are down-cut and not connected with a floodplain. Road development near streams has caused channelization and reduced stream meander. Past harvest practices near streams have caused a loss of in-stream large wood and a diminished recruitment of future large wood. For a detailed description of fish habitat in the analysis area, refer to the East Fork Coquille Watershed Analysis (USDI 2005 *update*, pp. IV 4 –V44, Appendix H, and Appendix G, the North Fork Coquille Watershed Analysis (USDI 2002, Ch. 8 pp. 1-8), the Middle Main Coquille, North Coquille Mouth, Catching Creek Watershed Analysis (USDI 1997, pp. 20-26 and Fish Appendix), and the Middle Fork Coquille Watershed Analysis (USDI 2007 *update*, pp. 15-25).

Natural barriers or steep stream gradients within the analysis area limit anadromous fish distribution. A portion of the analysis area is located upstream of Brewster Gorge, a natural barrier in the East Fork Coquille River located in T28S R10W section 9. The gorge is a passage barrier to coho and chinook. Steelhead can move upstream through the gorge during certain flow conditions (USDI 2005 *Update*).

The water quality restoration plan lists Middle Creek, Cherry Creek, and other streams in the watershed as deficient in large wood and down-cut to bedrock along several reaches (USDI 2002). The lack of large wood and disassociation from the floodplain caused increased stream velocities to continually scour stream channels and remove substrate during high flows (USDI 2002). Large wood serves an important role in creating and maintaining stable and functional stream channels, reducing stream energy, retaining stream sediments, maintaining lower width/depth rations, and allowing floodplain development (USDI 2002). A stable stream channel is one that maintains its pattern, profile, and dimension over time and neither aggrades nor degrades (USDI 2002). The interaction of large wood with streams is essential for creating juvenile and adult fish habitat.

Landslides are an important source of wood for streams and fish habitat. Logging and road construction altered landslide rates by destabilizing steep slopes within the analysis area. Instead of a single short period of intense land sliding which would have normally been associated with large-scale fires, repeated sliding results from moderately severe storms (USDA and USDI 1998). Landslides generated in logged areas mainly introduce sediment without large logs. These streams lack complex habitat consisting of step/pool profiles with multiple side channels produced by logjams. Instead, many channels in heavily logged watersheds have become simple bedrock chutes (USDA and USDI 1998).

BLM and the Coquille Watershed Association, through log and boulder placement in fish-bearing streams on private and BLM land, have increased the amount of in-stream wood in the analysis area. Streams within the analysis area that received treatment include Middle Creek, Cherry Creek, Little Cherry Creek, Big Creek and tributaries, Steel Creek, Hantz Creek, Weekly Creek, and Yankee Run and tributaries. The placed in-stream logs will improve fish habitat; however, the riparian areas are lacking long-term large wood recruitment (see Riparian Reserve condition discussion below). Boyer *et al.* (2003) suggest wood placement can expedite improvement of degraded streams, however these approaches are likely to prove even more effective when designed to complement long-term riparian forest management objectives that focus on recovery of a sustainable source of wood for streams.

Water quality parameters such as temperature, dissolved oxygen, and sediment can affect fish survival. Cherry Creek, Coquille River, East Fork Coquille River, Middle Creek, and North Fork Coquille River are the streams within the fisheries analysis area listed on the Oregon Department of Environmental Quality 303(d) list for elevated water temperatures (ODEQ 2010). Conifers and hardwoods such as big leaf maple, myrtle, and alder provide ample shade for small streams within the proposed units. ODEQ has not listed any streams in the analysis area for other water quality parameters such as dissolved oxygen or sedimentation.

Natural surface and rocked roads within the analysis area with surface erosion, inadequate drainage, inadequate stream crossings or unstable cut banks and fill slopes contribute sediment to stream channels and potentially fish habitat where there is a connection between the road and a stream channel. Adjacent streams have been subject to episodic or chronic fine sediment input due to poor road design and lack of maintenance. Properly designed, surfaced, and maintained roads in the analysis area do not contribute sediment to stream channels. Roads with proper drainage features (such as cross drains) direct sediment-laden water onto forest soils and not directly into streams and fish habitat.

Riparian Reserve Condition Including Large Wood Recruitment

Riparian Reserve stands within the proposed units range from 30-79 years old. Past management practices and other disturbance events have, in some cases, resulted in stands that are lacking the desirable species components that will lead to the development of late-successional habitat (USDA and USDI 1998). Riparian Reserve stands in proposed units range from conifer dominated to hardwood dominated. The conifer dominated stands within the units have uniform structure, low species diversity, slow growth rates, low stand vigor, small diameter trees, and are in an over-stocked condition. The average QMD across all stand types ranges from 12-17” DBH.

Red alder currently dominate many riparian areas in the region managed under the Northwest Forest Plan (Cunningham 2002). The proposed units dominated by alder had a greater conifer component prior to a disturbance event (USDA and USDI 1998). Poor establishment of conifer regeneration and severe suppression by the hardwood canopy has put these stands on a different trajectory than was present prior to disturbance (USDA and USDI 1998). Alder-dominated Coast Range riparian areas have limited opportunity for natural regeneration of trees because of high shrub cover, especially salmonberry (Hibbs and Giordano 1996). The probability of recruiting large wood to streams is low in areas dominated by alder (MacCracken 2002). In addition, McDade *et al.* (1990) found source distance the least in mature hardwoods where hardwoods were commonly shorter than conifers. The benefits alder provide to streams in terms of leaf litter, increased abundance of insects, or nitrogen input may be outweighed by decreases in large wood input and wood residence times resulting in overall loss of fish habitat in alder dominated areas (Johnson and Edwards 2002).

“Decomposition rates of large wood in streams vary widely and depend on tree species, piece size, wood quality and condition, and location within the riparian/aquatic system” (Boyer *et al.* 2003). “…Conifers provide the most desirable structural elements in streams and rivers because they are resistant to movement and decompose slowly” (Boyer *et al.* 2003). Alder can function as in-stream wood but it is short-lived due to its small size and is more susceptible to washing downstream. Keim *et al.* (2000) found tree-length alder with rootwads anchored to the bank was effective in trapping woody debris and forming accumulations; however, its effectiveness was short-lived. By the third year after treatment, the pulled-over alders were losing structural integrity due to advancing decay and breakage. Conifers are longer lasting in streams as compared to hardwoods (Naiman *et al.* 2000). Compared to conifers, red alder is short-lived, does not attain as large a size, cannot withstand hydrological forces at high flows, and decomposes rapidly (MacCracken 2002).

The following analyses will group all harvest prescriptions (thinning, conversion, and mixed) and refer to them as harvest, unless otherwise stated.

No Action

Without treatment, the conifer dominated stands would decline in growth and vigor resulting in stagnant stands more susceptible to wind, fire, insects, and disease. Low species diversity generally results in less nutrient availability to streams. Suppression mortality would eventually release conifers for growth, at a delayed timeframe. Recruitment of large diameter logs to stream channels would remain deficient for a longer time if left untreated. Wood recruitment would remain at its current level until trees in riparian stands grow to larger sizes and eventually fall into stream channels. Untreated stands would produce dead trees because of suppression mortality; however, these trees are too small to be suitable for long-lasting large logs in stream channels. Dead trees resulting from suppression mortality have a smaller diameter and a decreased value in terms of their function in streams. Field observations in the units found trees that appeared to have died from suppression mortality ranged from approximately 4-6" DBH. Rosenfeld and Huato (2003) indicated that for pool formation to occur and persist, the size of wood is important. While smaller wood can be functional in streams, it is more susceptible to being displaced downstream during high flows and it is less resistant to decay than larger wood (Harmon *et al.* 1986, Spence *et al.* 1996) and is not as effective at storing sediment and nutrients and trapping small debris. Greater mortality rates from self-thinning (suppression mortality) in early successional stands produce only small dead trees and hence smaller pieces of LWD, which can be quickly moved downstream (Bragg *et al.* 2000).

Hardwood dominated stands would continue to exclude most conifer species including Douglas-fir from becoming the dominate species until a single large disturbance or the accumulation of small-scale disturbances create opportunities for conifer establishment. The alder stands with a salmonberry understory, will become salmonberry brush fields, not conifer stands, when the alders die (Cunningham 2002, Hibbs and Giordano 1996, USDI 2002). Salmonberry brush fields are "climax communities" that are unable to contribute wood to the streams (USDI 2002). Trees cannot establish in a salmonberry brush field without a disturbance that frees growing space (USDI 2002). "As alder dominated stands senesce, only a significant natural or man-made disturbance will allow reestablishment of a tree overstory" (Hibbs and Giordano 1996).

Road maintenance, renovation, reconstruction, decommissioning, and full decommissioning would not occur under this alternative. Sediment delivery to streams and fish habitat from some roads would continue without the proposed road activities. Chronic sediment input to streams reduces spawning production, juvenile rearing survival, and insect production (Everest *et al.* 1987, Hicks *et al.* 1991, Meyer *et al.* 2005, Waters 1995). The stream culverts and cross drains proposed for replacement or removal would remain a risk for failure.

Proposed Action

Riparian Reserve Condition Including Large Wood Recruitment

Harvest

The harvest in riparian stands would begin to restore historic landscape-level vegetation patterns. Increasing stand and species diversity as well as placing the stands on a trajectory towards developing late-successional characteristics would be attained through the treatment prescriptions, snag and down wood creation, retaining some hardwoods in riparian stands, retaining minor conifer species, and leaving no-treatment zones adjacent to streams. Late-successional characteristics include multi-level canopies, future recruitment of large in-stream wood, and diverse species and structural composition. The no-treatment zones would serve to maintain stream bank stability, shade, provide nutrient input to streams, and provide a concentrated, short-term source of smaller woody material available to enter stream channels. No-treatment zones adjacent to some streams were expanded based on a Topographic Position Index (TPI) analysis. The TPI analysis assisted foresters in identifying mesic and wet conditions in riparian areas where historically alder had a high likelihood of occurrence. Post-harvest canopy closure across all prescription types would range from 40-60 percent.

Thinning riparian stands would result in increased growth rates in trees, which would produce larger down logs sooner in the long-term. Thinning riparian stands can accelerate the time required to reach desired stand conditions by concentrating growth on fewer stems (Boyer *et al.* 2003). Larger trees would be available for recruitment in a shorter period than would occur without thinning. Thinning would increase brush and deciduous tree growth, which would increase nutrient availability to stream channels. Converting alder stands to conifers can accelerate the processes that result in large conifers in streams (MacCracken 2002).

The no-treatment zones would retain the original number of trees per acre (TPA), which would remain available for recruitment into streams. Trees remaining post-harvest in riparian areas would be available for in-stream wood recruitment. The current average TPA across all stand types ranges from 150 to 295. Following harvest in riparian stands, the average TPA across all stand types would range from 72 to 140. The average post-treatment tree height in riparian stands would range from 104-140 feet. Trees located greater than 140 feet from streams would not reach the channel at their current height.

Density management thinning would reduce suppression and competition mortality. The smaller trees in a stand often die from suppression (Harmon *et al.* 1986). Dead trees resulting from suppression mortality would have been smaller and have a decreased value in terms of their function in streams. Smaller logs decompose faster, are more likely to be moved downstream or repositioned on the stream banks, and do not form as large of pools. Suppression mortality, as well as other agents of mortality, would still occur within the no-treatment areas resulting in dead trees available for in-stream wood recruitment. Tree mortality could occur over time within the thinned portion of the riparian area due to factors such as wind, fire, insect, or disease (Harmon *et al.* 1986).

In-stream wood sources from slide prone areas would remain available because of the no-treatment zones. Trees felled within the no-treatment zones for yarding corridors would remain on site. These zones include 30-foot no-harvest buffers on intermittent streams, 50-foot buffers on perennial streams, areas excluded from vegetation treatment based on a TPI analysis, and areas excluded from treatment based on field review by a BLM soils scientist. Not all of these areas are slide prone, but the no-treatment zones encompass slide prone areas within the units. Harvest would not increase the likelihood of slides occurring; however if slides occur trees occupying the site could be delivered to streams. The treatment units excluded areas subject to frequent fluvial disturbances such as floods and landslides. These areas are generally dominated by moisture-tolerant and disturbance/colonizer species such as shrubs, low-growing woody vegetation (willow, vine maple) and hardwoods (alder, ash, maple, and myrtle) (USDA and USDI 1998).

Creating snags and down wood in riparian stands would improve structural diversity in the short and long-term and increase late successional characteristics. Snag and down wood creation would not occur within the no-treatment zones. The portion of a tree reaching a stream channel would improve in-stream conditions at the site scale.

Sample tree falling would occur in the proposed units, including in riparian stands. Design features guiding harvest in riparian stands would apply to sample tree falling. Sample tree falling would not affect current or future large wood recruitment because trees selected would be located outside of the no-treatment zones and would be a subset of those already identified in the prescription for removal. If the timber sale did not proceed, the felled sample trees would contribute to down wood because they would remain onsite.

The proposed action includes constructing yarding corridor across perennial and intermittent streams. No corridors would be constructed across fish bearing streams. Yarding corridors would not cause a reduction in current or future recruitment of wood to fish habitat because the corridors would not be located directly over fish habitat, trees felled within the no-treatment zones would be left on site, trees ≥ 24” DBH felled in riparian stands for corridors would be left on site, corridors would only be 12 feet wide, and corridors would be dispersed across eight 6^{th} field sub-watersheds located in four 5^{th} field watersheds.

Road Construction

The proposed action includes constructing approximately 1.05 miles of new roads in riparian stands. The new road construction in riparian areas would consist of 19 separate road segments. Constructing new roads in riparian areas would not reduce current or future wood recruitment to fish habitat because a minimal number of trees would be removed, which would leave an adequate supply of future large wood. No new roads would cross fish-bearing streams. One road, MS_NC1 would be within the Riparian Reserve of a fish-bearing stream; however, the road would be 410 feet from the stream. Any trees removed for this road would not have reached the stream channel due to the distance (410 feet). The clearing limit for the new roads would be 30 feet. All new roads in riparian areas would be decommissioned or fully decommissioned following use. The new roads would be located on stable non-slide prone slopes that would not deliver wood to fish habitat. The new roads would be short discontinuous segments spread across four 5th field watersheds and seven 6th field sub-watersheds.

Sediment

Harvest

The no-treatment zones would maintain a buffer between harvest activities and stream channels. This area of non-compacted soils would filter fine sediment before it would reach streams. Ground-based equipment would not cross through stream channels and would not operate within the no-treatment zones. The majority of yarding corridors would achieve full suspension over steam channels. No corridors would be located over fish bearing streams. Approximately four crossings over intermittent streams would not achieve full suspension, ranging from 0.3 to 1.4 miles to fish habitat. Yarding corridor segments, which do not have full suspension, would have areas of soil disturbance. The segments of soil disturbance would be short and discontinuous and would not result in a measurable amount of sediment delivery to stream channels. Trees felled within the no-treatment zones to facilitate yarding would be felled toward the channel and left on-site. These trees would armor the stream banks and reduce the amount of contact logs being yarded have with the stream bank and channel. Sediment entering the intermittent streams at the corridor crossings not achieving full suspension would not result in a measurable amount delivered to fish habitat because the distance (0.3 to 1.4 miles) would allow sediment to filter out and settle. Stream channels in the units have material such as woody debris and rocks sufficient to trap and store sediment.

The harvest would not increase the likelihood of slides occurring and subsequent sediment delivery to fish habitat. A BLM soils scientist field review and a TPI analysis identified slide prone areas. Expanded no-treatment zones encompass potential slide prone areas.

Sample tree falling would not result in sediment entering stream channels because trees selected for falling would be located outside of no-treatment zones and project design features guiding harvest in riparian areas would apply to sample tree falling.

Road Construction

The new roads would be primarily located on or near ridge tops and would incorporate design features that include avoiding fragile or unstable areas, minimizing excavation and height of cuts, end haul of waste material where appropriate, seeding and mulching bare soil, and construction during the dry season. All newly constructed roads would be decommissioned or fully decommissioned following use. There would be two new, temporary stream crossings on small intermittent streams. The crossings would be 0.15 miles from fish habitat in the North Fork Coquille River and 0.6 miles to fish habitat in Hantz Creek. The temporary stream culverts would be removed and the roads decommissioned at the completion of project activities. Sediment input from new road construction would not be measurable in fish-bearing streams because:

- New roads would be designed and constructed with proper drainage features so that any sediment-laden surface water would quickly infiltrate into forest soils,
- New stream culverts would be placed and removed during the in-water work period when little or no water would be present in the intermittent streams,

- Sediment created from the installation and removal of the temporary culverts would settle out and dissipate prior to reaching fish habitat, and
- New construction would implement project design features to reduce or eliminate erosion and sediment input to streams.

Haul

During summer haul, there is little or no flowing water on road surfaces or ditch lines. However, sediment generated from summer haul could move off-site during winter rains. Hauling on natural surface roads would only occur during the dry season. During the wet season, there would be no sediment delivery from the paved portion of the haul roads because paved roads are not likely to produce sediment (Reid and Dunne 1984). All-season haul on gravel roads has the potential to deliver sediment to stream channels. All-season haul would be suspended based on weather, road conditions, and/or the potential of sediment delivery to streams. Road maintenance during the life of the project would minimize road drainage problems and reduce the possibility of road failures and sediment delivery to streams. In addition, several project design features would eliminate or minimize the amount of sediment delivery with the potential to affect fish habitat directly or indirectly.

The installation of sediment filters would prevent or minimize sediment delivery to stream channels. A field review was conducted to determine locations for sediment filters per the design feature that states "As part of the renovation/maintenance activities, contractors would place sediment filters at designated locations on the following two roads: 27-11-35 (H59) and 27-11-35.1 (H55)." Additional sediment filters may be placed per the design feature: "Depending on road conditions after renovation and maintenance, the BLM contract administrator may require placement of additional sediment filters to prevent sediment from entering stream channels from road ditch lines." A design feature concerning hauling could also require additional sediment filters "Depending on road conditions during winter haul, additional sediment filters may be required to prevent sediment from entering stream channels from road ditch lines."

Sediment derived from haul would be primarily directed to ditch lines and then out of the ditch lines via ditch relief culverts to the forest floor. Sediment directed to hillsides by ditch-relief culverts would filter into the soil before reaching stream channels. Brake *et al.* (1997) found that on established logging roads within the Oregon Coast Range, the maximum observed distance sediment traveled below a ditch relief culvert with vegetation filtering or a stream crossing culvert with stream material present (LWD, boulders, debris, etc.) was typically not more than 6.21 meters. Road work completed prior to haul and road work conducted after haul would further reduce the amount of off-site sediment movement after hauling. Any sediment generated because of the haul would be immeasurable and not outside levels that presently occur during rain events. The amount of sediment, which could reach fish habitat from haul, would be insignificant and indistinguishable from background levels and would not cause a measurable affect to fish habitat.

Road Maintenance, Renovation, Improvement, and Reconstruction

Road work including maintenance, renovation, reconstruction, and improvement would minimize sediment delivery to streams during and after harvest activities. This road work would divert road drainage away from stream channels and toward the forest floor where it could infiltrate. Renovation may include, but is not limited to surfacing with rock, stabilizing cutbanks and fill slopes, restoring out slope or crown sections, and providing adequate drainage. Installation of new cross drains would route road water onto the forest floor and away from streams. In some areas, adding rock to the road near stream crossings would reduce sediment created by haul. In other areas, the road crown would be graded and shaped to prevent water from flowing down the road to stream crossings. The road work would occur in the dry season for any activities requiring soil displacement. Treatment of bare soil areas before onset of winter rains, if needed, would prevent sediment delivery to streams. In addition, the inclusion of several design features in the proposed action for road maintenance, renovation, reconstruction, and improvement would reduce the amount of sediment entering streams. At the completion of project activities, because of the road work, the potential sediment input to streams roads would be reduced in the short- and long-term. Cleaning plugged stream and ditch relief culverts would reduce the risk of culvert and road failure. The maintenance, renovation, reconstruction, and improvement would provide a slight, long-term (many years) benefit to flow routing and water quality.

The maintenance, renovation, reconstruction, and improvement would result in sediment run-off during the first winter, but the amount of sediment to reach fish habitat would be insignificant, short-term, and indistinguishable from background levels because sediment derived from road work would be primarily directed to ditch lines and then out of the ditchlines via ditch relief culverts. Where roads connect to streams, sediment could enter stream channels. However, well-vegetated ditchlines found within the majority of the analysis area would capture and store sediment and reduce the amount of sediment reaching stream channels. The design feature "existing drainage ditches that are functioning and have a protective layer of non-woody vegetation would not be disturbed" would reduce the total length of ditchline disturbance and reduce sediment input to streams. Where soil disturbance occurs, vegetation would become established in a short period. Installation of sediment control devices would trap and store sediment, which would further reduce the amount of sediment delivered to streams.

The road activities would include stream culvert replacement and/or installation (see Table II-7). Other culverts may be identified for replacement while the timber sale contract is prepared. Stream culvert replacements would not occur on streams containing fish habitat. Only one culvert is located on a perennial stream, which is 0.5 mile from fish habitat in Hantz Creek, all other culvert replacements are located on intermittent streams. Replacing the culverts would reduce the risk of culvert failure and subsequent sediment input to streams containing fish habitat. Sediment input from culvert replacements to fish habitat is expected to be immeasurable and insignificant because:

- The distance (all culverts are located 0.4 to 1.1 mile from fish habitat) would allow most if not all suspended sediment to filter out by woody debris and rocks in the small streams before reaching fish habitat.
- Stream culvert replacements would follow ODFW in-stream timing guidelines, which is from July 1 – September 15. During this time there would be very little if any flow in the streams proposed for culvert replacements.
- When replacing stream culverts, stream flow would be diverted around the work area, sediment would be contained using appropriate filters or barriers, and turbid water would be pumped from the excavation site onto a vegetated terrace or hill slope.

Decommissioning and Full Decommissioning

In addition to decommissioning and fully decommissioning existing roads, all new road construction would be either decommissioned or fully decommissioned. The roads would be left in an erosion–resistant condition, which would reduce the potential for sediment delivery to streams. Decommissioning would include installation of a suitable barrier to block access. In addition, installation of water bars where necessary to provide road drainage and treatment of bare soil areas would prevent erosion. Roads proposed for full decommissioning are those roads determined to have no future need and would receive similar treatment after closure as decommissioned roads. In addition, the roads may be subsoiled if needed to restore natural hydrologic flow.

Approximately three culverts on existing roads would be removed. Stream culverts on roads to be fully decommissioned would be removed. These culverts range from 0.22 to 1.4 miles to fish habitat. Two new roads would have temporary stream crossings removed during decommissioning. The stream crossings would be located 0.15 mile to 0.6 mile to fish habitat. The distance of the culvert removals would allow most if not all suspended sediment to filter out by woody debris and rocks in the small streams before reaching fish habitat.

The decommissioning and full decommissioning would result in negligible sediment input to streams where they are hydrologically connected, primarily during the first winter after the stream culverts are removed. The amount of sediment reaching fish habitat would be immeasurable because of the distances and implementation of design features. Decommissioning would result in a long-term reduction of erosion and sediment input to streams, because this work would leave the roads in an erosion-resistant condition.

Sediment generated from road related activities would not have a measurable direct or indirect effect to fish habitat. The amount of sediment reaching stream channels would not cause a reduction in macroinvertebrate production, which is a food source for fish. The proposed road related activities would not cause a change in embeddedness, interstitial spaces, or pool depth. A long-term reduction in sediment entering streams would occur following road maintenance, renovation, reconstruction, decommissioning and full decommissioning because these road activities would improve road drainage and therefore reduce surface erosion.

Cumulative effects of past land management practices on private and BLM lands have contributed to the current degraded fish habitat within the analysis area. Areas of short-term localized sediment input to steams would occur because of the harvest and road-related activities; however, this input would not affect fish habitat. Long-term sediment reduction due to the proposed roadwork would improve localized stream conditions and benefit fish habitat within the analysis area, although at a site-specific scale. The harvest would increase future large wood recruitment to fish habitat. There would be no cumulative effects to coho or any fish habitat from harvest or road activities at the 6^{th} or 5^{th} field watersheds. The potential increase of sediment from the harvest and road related activities, when added to non-federal actions, would not affect fish habitat at the 6^{th} or 5^{th} field watershed scale. The cumulative effects are within the scope of anticipated effects to aquatic resources including fisheries analyzed in the Coos Bay District PRMP EIS (USDI 1994).

Soil Resources

Soils within the proposed harvest units have been classified into approximately 30 different soil types that developed mainly from sandstones and siltstones of the Tyee formation. Most of these soils are well suited for timber production. However, some of these soil types have a low resistance to compaction, especially when wet, or are easily erodible where steep (NRCS).

Some proposed units that include gentle terrain have small wet areas, due to high ground water tables or poor drainage, that could be easily compacted (Schuck Mt., S area of Frona, John's Creek, and Steel Cherry). Other units have areas with slopes in excess of 65 percent that may be prone to erosion or landslides. Some of these steep areas within proposed units are classified by BLM as fragile soils (Rock Prairie, Schuck Mt., Dora, Steel Cherry, Weaver Tie and Brownstone), and a portion are so steep or rocky that they have been withdrawn from the timber base. A few areas, primarily in headwater stream channels, were buffered out of proposed units due to existing slides or slope instability (Dora, Weaver Tie, and Brownstone).

Most of the proposed harvest area was logged 40-70 years ago. Old skid trails are apparent in some units and caused some level of compaction. However, most of the area compacted by skid trails has largely recovered since the last harvest due to natural processes. Freezing-thawing, wetting-drying, growth of plant roots, soil organisms and other biological activity (Adams and Froehlich 1984) reduce compaction over time.

No Action

Soil compaction from previous logging in the project area would continue to recover. Since the project area is within the Matrix LUA, timber harvest would occur sometime in the future. The effect to soils from future harvest and road building activities would be analyzed at that time.

Proposed Action

The primary forest management concern for soil resources is to maintain soil productivity for future tree growth. Loss of soil through erosion or landslides or by a change in soil properties from intense burning or soil compaction can cause adverse effects to soils from forest management.

Limiting most soil-disturbing activities to the dry season only would minimize erosion from harvest activities. These activities include road construction, renovation, and ground-based harvest. Bare soil areas would be seeded and mulched, or protected with a cover of slash, before winter rains. Since overland flow is rare on un-compacted forest soils in the analysis area (Dietrich *et al.* 1982, Heilman *et al.* 1981), erosion would be negligible except for that which typically occurs on compacted road surfaces during winter rains. Drainage and erosion control measures, including water barring of skid trails and yarding corridors where necessary, would be applied to bare soil areas following use and prior to winter rains (USDI 1995). Operators would block access points for skid trails with logging debris to prevent vehicle access after harvest operations are completed.

Design features for the proposed project would protect soils from increased landslide risk. As noted above, some areas with steep, unstable, or fragile soils were withdrawn from harvest units to reduce landslide risk and soil loss. In the past, poor road building practices have also caused an increase in landslides (ODF). However, implementation of design features for road construction would minimize soil disturbance and risk of slides. These design features include construction during the dry season, avoiding unstable areas, end-haul of waste material to stable locations and ensuring proper road drainage.

Controlling fire size and intensity would minimize adverse effects to soils from fuel treatments. Some burning would be required to reduce excess fuel loads and allow planting of hardwood conversion areas. Burning slash piles could adversely affect soils in approximately three to five percent of the hardwood conversion areas. Intense burns can change soil texture and structure, reduce soil nutrients and lower infiltration of water. However, light burns do not greatly affect soil structure (Heilman *et al.* 1981). Implementation of design features would protect soils from fire intensity and duration. Excess fuels would be machine or hand-piled, and there would be no broadcast burning. Machine piling would be limited to the dry season to minimize compaction. Fire intensity in the piles would be reduced by yarding to landings all material ≥ 8” diameter and ≥ 6’ in length. Piles would be as few as possible, free of soil and rock material and limited to a size of 100 ft^2 (~ 10’ × 10’). Large accumulations would be offered as firewood. Burning would occur in late fall or winter when soil moisture is higher. In addition, removing excess fuels would reduce the chance of a catastrophic fire that could adversely affect soils over a much wider area. Sufficient woody material would remain to assist in soil development. As conditions permit, some slash would be scattered in the units to cover and protect any bare soil areas.

The proposed harvest would result in some additional compaction, but compacted area would remain well below the threshold recommended in the district ROD/RMP. Compaction can degrade pore spaces in soils, prevent infiltration of water, and reduce productivity. Compaction of soils can also affect watershed function as soil properties affect the capture, storage, and beneficial release of water. Typically, road construction or poor ground-based harvest practices cause compaction. The district ROD/RMP (USDI 1995, p. D-5) recommends the objective of having less than 12 percent of area compacted during harvest activities in order to minimize these adverse effects to soils.

Approximately 27 acres (16 ft. width × 14 miles) or 0.7 percent (27/4,000 acres total) of the harvest area would be compacted because of 14 miles of new road construction. Ground-based equipment would create some additional compaction during harvest. Ground-based equipment would be used to harvest approximately 200 acres or five percent (200/4,000 acres) of the project area. However, implementation of appropriate harvest techniques and other project design features would protect soil productivity. In order to minimize compaction, ground-based equipment would be restricted to slopes less than 35 percent and would operate only during the dry season when soil moisture is below 25 percent. Ground-based equipment are prohibited in no-treatment zones or in other small wet areas identified within units. The contract administrator would designate skidding trails with the objective of having less than 12 percent (24 acres of 200 ground-based acres) of the ground-based harvest area affected by compaction. Existing skid trails would be used to the extent practical (USDI 1995). If available, ground-based logging operations would utilize slash layers created by the harvesting process to limit bare soil exposure and compaction. A skyline cable system capable of achieving one-end suspension would be permitted to operate during the wet season in ground-based areas.

There would be some soil disturbance from cable yarding but additional compaction would be negligible. Cable yarding would require one-end log suspension in cable yarding areas. Cable yarding on sites identified as fragile would require full suspension. If full suspension were not feasible, seasonal restrictions (yarding during dry season only) would be required. In general, no harvest would occur on very steep or rocky areas within units that have been withdrawn from the timber base. However, some trees may be cut to provide yarding corridors. Corridors would be a maximum of 12 feet wide and a 75-foot lateral yarding capability would be required. The contract administrator would specify the location, number, and width of corridors prior to yarding, and use natural openings as much as possible (USDI 1995).

There would be some additional compaction and adverse effects to soils from mechanical piling and burning of slash. As noted above, mechanical and hand piling would be used to reduce heavy fuel loads after harvest in some hardwood conversion units. However, project design features for fuels treatments would minimize adverse effects. Mechanical piling would be under the same restrictions and project design features as other ground-based equipment used for harvest. Equipment would not enter no-treatment zones, would be limited to ≤ 35 percent slopes, and could only operate in the dry season when soil moisture was below 25 percent.

Botany

In general, the thinning units are single-storied conifer plantations dominated by Douglas-fir (*Pseudotsuga menziesii*) although the overstory of some proposed units has a large portion of grand-fir (*Abies grandis*). Western hemlock (*Tsuga heterophylla*) joins Douglas-fir as a dominate overstory species in the higher elevation units on the eastern end of the project area (Brownstone and Weaver Tie); elsewhere it is also present but ranges from absent in the overstory to only a minor component of the overstory. Western red-cedar (*Thuja plicata*) and Port-Orford-Cedar (*Chamaecyparis lawsoniana*) are also present but only as minor overstory/understory species and not in every unit. Other tree species restricted to the understory and not common in most units include tan oak (*Lithocarpus densiflorus*) and golden chinkapin (*Chrysolepis chrysophylla*). Red alder (Alnus rubra) with varying amounts of myrtlewood (Umbellularia californica) and big leaf maple (Acer macrophyllum) primarily dominate the hardwood conversions areas. All three of these species are present in the thinning units, but are more widely scattered and concentrated in riparian areas. Most of the western units are fairly low elevation (about 1,000 feet or lower) and have a dense understory of evergreen huckleberry (*Vaccinium ovatum*), salmonberry (*Rubus spectabilis*), and western swordfern (*Polystichum munitum*). On the drier ridgetops, upper slopes, and south and west aspects rhododendron (*Rhododendron macrophyllum*), Oregon grape (*Berberis nervosa*) and salal (*Galtheria shallon*) join the understory plant community. Poison oak (*Toxicodendron diversilobium*) is a common understory species, which can be quite dense at lower elevations on south facing aspects.

Down, large logs with intact bark, creek areas, openings, rocky outcrops, and hardwood trees harbor the majority of the bryophyte diversity. Bryophyte diversity is lowest in units with few snags or downed large logs or in units where all the snags and large downed wood is fire-charred. Lichens are typically most abundant on the edges of these units, in areas where there is a hardwood component, and where there are canopy gaps that allow sunlight to penetrate into the lower canopy and onto the forest floor. Green-algal and alectorioid lichens dominate the lichen community in all these units. Cyanolichens range from uncommon to common in the lower elevations in the western units and are most abundant in and adjacent to riparian areas.

There are no federal threatened and endangered (T&E) plant species known or suspected to occur in the Lone Pine analysis area.

There are 25 Bureau sensitive plant species suspected of possibly occurring in the analysis area (Appendix E). This determination is based on the proposed project overlapping the known or suspected range of a species as well as the likelihood that potential habitat is present. Aerial photographic interpretation, review of information on each species habitat requirements, and proximity of known site locations help determine potential habitat. Policy recommends conducting surveys if BLM sensitive species are known or suspected to occur in a proposed unit. The five BLM sensitive fungal species suspected of occurring in the project area are all considered impractical to survey for (Cushman and Huff 2007); thus, there are 20 Bureau sensitive species for which surveys are recommended (Appendix E). The BLM does not conduct surveys for Bureau strategic species; however, occurrence data is collected if they are incidentally encountered during formal surveys.

Using the Pechman Exemptions (Exemption A), there is no requirement to survey in stands under age 80 for proposed thinning projects. However, surveys are required in the hardwood conversion portions of the Lone Pine project.

No Action

The proposed Jordan Cove Energy and Pacific Connector Gas Pipeline Project would run through the analysis area. Project proponents have completed surveys for Bureau sensitive and S&M vascular plants, lichens, bryophytes, and fungi. Table III/IV-11 has a list of Bureau sensitive and S&M species found during these surveys.

Table III/IV-11 BLM-designated plant species found within the Lone Pine analysis area along the Pacific Gas Connector Pipeline project area.

Species	Designated Category	Sites Located Within Clearing Limits	Sites Located Outside Clearing Limits
Lichens			
Chaenotheca chrysocephala	S&M "B"	1	4
Bryophytes			
Metzgeria violacea	Bureau Sensitive	1	
Fungi			
Clavariadelphus occidentalis	S&M "B"	1	
Phaeocollybia attenuata	S&M "D"	1	1
Phaeocollybia kauffmanii	S&M "D"	3	
Phaeocollybia olivacea	S&M "D"		1
Ramaria araiospora	S&M "B"		1
Ramaria celerivirescens	S&M "B"		1

Pipeline construction would likely extirpate the lichen site located within the clearing limits as the tree or snag boles *Chaenotheca chrysocephala* grow on would be cut and the corridor would be permanently cleared of trees. This clearing would not negatively affect those sites present outside the clearing limit since the trees they grow on would not be disturbed. The bryophyte site of *Metzgeria violacea* is not expected to be negatively impacted by the pipeline because the overstory riparian habitat and plant substrate shrubs (salmonberry) would be maintained at the site (FERC 2009). All fungal sites within the clearing limits would likely be damaged or extirpated; those outside the clearing limits may or may not survive the adjacent clearing. The pipeline corridor would clear 36 acres of late-successional forest in the Lone Pine analysis area, 11 acres of which pipeline maintenance would permanently maintain in early-successional conditions.

The Cherry Vaughn EA project area occurs within the Lone Pine analysis area. Botanists surveyed all proposed thinning units in the Cherry Vaughn project area for BLM sensitive species in 2010 and 2011 and they did not find any sites. Botanists also surveyed hardwood conversion units for S&M plant species as well as Bureau sensitive species and no sites were located.

The Fairview EA project area occurs within the Lone Pine analysis area. Lichen and bryophyte surveys are ongoing and the BLM expects completion by August of 2014. Currently there are three Bureau sensitive lichen species (*Hypotrachyna revoluta, Erioderma sorediatum, Bryoria subcana)* that have been located in this project area and one Bureau sensitive liverwort species (*Metzgeria violacea*). All these sites and any future ones found would be buffered such that the species would persist at the sites with one exception, *Hypotrachyna revoluta* in the Blue Ridge area, where it is so common that thinning through the area would not negatively affect species persistence.

Proposed Action

<u>*Special Status Species*</u>

To date, surveyors have found the Bureau sensitive lichen, *Hypotrachyna revoluta*, in two locations: one in a hardwood conversion site and another in a riparian area. As this is also an S&M species, the BLM would manage the site according to applicable survey and manage policy. Surveyors have also found two sites of a Bureau sensitive liverwort, *Metzgeria violacea*, in a different hardwood conversion area and directly adjacent to a perennial creek. All sites would be buffered to protect the microsite so that these species would persist in these areas. These protections would minimize the likelihood and need for listing of these two species under the ESA.

<u>*Survey and Manage*</u>

As described on page 40, the Lone Pine thinning treatments meet Exemption A of the Pechman Exemptions because they do not involve regeneration harvest and consist of thinning in stands less than 80 years old (BLM stand exam data).

The hardwood conversion treatments do not meet the Pechman Exemptions. Therefore, the BLM applies the survey and manage species list (2001 ROD without annual species reviews) for surveys in hardwood conversion treatments. Thus, the BLM meets the provisions of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer and the Mitigations Measures Standards and Guidelines*. While surveys are ongoing, botanists have found one species of lichen, *Hypotrachyna revoluta*, in a hardwood conversion unit. The BLM would ensure persistence of the species at this site through application of buffers.

<u>*Fungi – Survey and Manage, Special Status Species*</u>

As S&M/SSS fungi are not practical to survey for, the BLM used the *Conservation Assessment for Fungi Included in Forest Service Regions 5 and 6 Sensitive and BLM, California, Oregon and Washington Special Status Species* Program (Cushman and Huff 2007) to assess effects. As outlined by this conservation assessment, thinning these proposed units would not cause actions that intensively or extensively remove or consume the woody substrate, forest floor litter, or shrub hosts with which the individual species are associated nor would thinning cause actions that would remove or destroy a fungal organism. The Lone Pine treatments are in early and mid-successional aged forest stands, which are not the older-aged habitat these S&M/SSS fungal species associate with so it is unlikely that surveyors would find any fungal species in these young stands. Finally, thinning prescriptions for the proposed units would not result in forest canopy covers less than 40 percent, which would allow for some S&M/SSS fungi (if present) to persist on-site.

Hardwood conversion areas are units or portions of units dominated by red alder, myrtlewood, and big leaf maple. These hardwood patches do not provide habitat for any S&M/SSS fungi suspected of occurring on the project area (ISSSSP website). Survey and manage fungal species are thought to be closely associated with late-successional and old-growth forests (USDA and USDI 2000). Thus, it is highly unlikely there would be any negative effects to S&M/SSS fungal species in the hardwood conversion areas.

While conducting surveys for lichens and bryophytes, botanists found four sites of the Bureau sensitive fungi, *Phaeocollybia californica*, in three different thinning units. In coordination with the Oregon/Washington BLM State Office, the Coos Bay BLM would conduct a monitoring project to determine if current buffering mechanisms actually do ensure species persistence following thinning treatments. A full description of this monitoring project is located in Appendix F – Botany Monitoring Proposal. Since this monitoring project would verify whether protection mechanisms are adequate, individual specimens may be extirpated (or not) at some locations. However, this action would not cause the need for listing of this species. The information gleaned from this monitoring project would be valuable for future management and protection of this species across its range.

Recreation
As stated in Chapter 1, approximately half of the proposed treatment areas do not have legal road access for the public. Appendix A lists the roads and affected areas. For the other areas, dispersed recreation opportunities include (but are not limited to) driving for pleasure, hiking, hunting, camping, bird watching, and vegetative gathering.

No Action
There would be no change to the amount or quality of dispersed recreation opportunities within the action area. The construction of the pipeline and harvest of planned timber sales would alter some of the characteristics of the vegetative condition in individual project areas. However, there would be no discernible impact to dispersed recreation opportunities within the action area because timber harvest is a predominant activity in the checkerboard ownership. The construction of the pipeline would have some short-term impacts (such as traffic control) during construction to specific activities (driving for pleasure).

Proposed Action
Implementation of the proposed action would change the vegetative characteristics of treated stands. However, there would be no impact for dispersed recreation opportunities in the short-term because the PRMP EIS determined that "timber harvest would not adversely affect either dispersed or existing developed recreation site opportunities under any of the alternatives" (USDI 1994). In addition, "proposed timber management actions under Alternatives C, D, E, and the PRMP would not adversely impact either dispersed or developed recreation opportunities within the short or long term." This is because "the planning areas extensive land base is more than adequate to satisfy the demand for dispersed picnicking, nature study, and wildlife viewing in undeveloped settings." This is applicable to all types of dispersed recreational pursuits within the action area.

Climate Change
Substantive new information has been produced regarding climate change since publication of the 1994 PRMP FEIS (USDI 1994), to which this EA tiers. Considering information produced since the completion of the 1995 RMP, it is unequivocal[6] that global temperatures have increased (approximately 1°C since late 1800's); it is also likely that temperatures in the Pacific Northwest have increased (CIG 2004, Clark *et al.* 2004, IPCC 2007) by a similar amount (OCCRI 2010). Human influence on this climatic change, through production of greenhouse gasses, disturbance and land cover change, is likely (IPCC 2007). Temperature increases in the west over the next century may range from 2°C at the low end of the uncertainty range to 6°C at the upper end of the uncertainty range (IPCC 2007, Miles and Lettenmaier 2007, OCCRI 2010). This increase is well (> 2 standard deviations) outside of historic conditions. For context, the shift from the last ice age to the current climate was approximately 9°C. There have also been increases in winter precipitation since 1930 over much of the western United States (US), although patterns vary in different regions within the west (Clark *et al.* 2004, Salathe *et al.* 2009). Precipitation changes in the western US over the next century are complex and more uncertain than temperature changes. Western states precipitation may increase by as much as 6 percent by 2100 (CIG 2009, Hidalgo *et al.* 2009). This increase would be well within 20^{th} century variability in precipitation (< 1 SD from historic mean), and would again be expected to differ widely by region within the western US.

Indirect changes in western US ecosystems attributable to changes in temperature and precipitation cycles have also been predicted. Most modeled changes describe potential broad shifts in vegetation types (Lenihan *et al.* 2006, Millar *et al.* 2006), fire behavior (CIG 2004, Mote *et al.* 2003) or hydrological cycle (Furniss *et al.* 2008, Hidalgo *et al.* 2009). These shifts would have to be considered speculative at the scale of western Oregon and would almost surely be obscured by local conditions at the scale of the analysis area.

There is uncertainty in climate change model predictions due to uncertainty in how the climate actually works as well as uncertainty in future socio-economic and political responses (CIG 2004). Uncertainty in global climate

[6] Discussion in this section uses terminology for certainty developed in IPCC (2007, pg. 27).

model predictions attributable to physical processes increases at smaller spatial scales, due to the importance of regional climatic patterns (such as ENSO[7]) and local topography (such as the Coast Range) (CIG 2009). Predictive models of temperature and precipitation have been downscaled for the Pacific Northwest, but have not been developed specifically for the Coast Range Province or for the Lone Pine analysis area. Application of larger-scale model results to the analysis area directly would be predicted to induce bias, and to have low accuracy. Extrapolating such models to predict future vegetation or animal response would increase bias even further, and would probably have limited utility in describing the cumulative effects of the proposed action or in differentiating between alternatives.

Secretarial Order #3226 (2001, amended 2009) directs all departments to "consider and analyze potential climate change impacts when undertaking long-range planning exercises." The 1994 RMP FEIS (Appendix V, p. 217) considered climate change effects as part of long-term planning efforts at the plan-scale (western Oregon). Although the 1994 RMP FEIS analysis recognized the possibilities of increased incidence of wildfire, insect outbreaks, shifting range of species (including Douglas-fir), and forest species composition, it found "no scientific consensus about the extent or rate of global warming nor the probable effect on forest ecosystems in western Oregon" (USDI 1994, p. 217). Although new information has been produced since this FEIS, it is still not possible to reasonably foresee or quantify the specific nature or magnitude of changes in the affected environment. Although it is not speculative that changes in the affected environment will occur due to climate change, it is not possible to reasonably foresee the specific nature or magnitude of the changes (2008 RMP FEIS, p. 488). Consideration of predicted changes in vegetation, fire, hydrological cycles, or other responses due to climate change would be speculative at the plan scale; predictions at the scale of the analysis area would be more uncertain. Therefore, potential changes in the analysis area attributable to climate change were not incorporated in the Lone Pine EA.

Carbon Stores and Carbon Flux

Carbon flux is the rate of exchange of carbon between pools, the net difference between carbon removal and carbon addition to a system. For the atmosphere, this refers to carbon removed by plant growth and other processes balanced by carbon added through respiration, biomass decay, burning, volcanic activity and other volatilization processes. Forest management can be a source of carbon emissions through deforestation and conversion of lands to non-forest condition, or stored carbon through forest growth or afforestation (USDI 2008, p. 220).

Analysis of carbon flux quantifies the net effect of the proposed action on greenhouse gas (GHG) levels by comparing changes in carbon storage that would occur under the proposed action to the carbon storage that would occur under the no action alternative, as suggested in IM-2010-012 (USDI 2010). Specifically, this analysis estimates the carbon flux associated with implementation of the proposed action roughly fifty years from the present, incorporating differences in carbon storage in live and dead carbon pools as well as the mid-term flux from wood products produced by the proposed action through this period.

The BLM used the Fire and Fuels Extension (FFE) to the Forest Vegetation Simulator (FVS), for the analysis of carbon flux associated with changes in live and dead pools attributable to the proposed action. FFE-FVS considers changes due to succession and forest management in all major live and dead carbon pools within the action area (treated units). This FVS model does not directly incorporate microclimatic effects, dynamics of herb and shrub understory layers, stable soil pools, or the C flux associated with actual harvest equipment. Herb and shrub carbon pools are relatively small when compared to total stores, and are similar between young and mature stands (USDI 2008, App-29). Soil carbon represents 9-20 percent of total site carbon but is the most stable C store, and the least likely to respond to thinning disturbance. For example, 60-year-old forest stands and 450-year-old forest stands have similar soil carbon storage (Harmon *et al.* 1990). The BLM input site-specific data from stand exams into the FVS Growth and Yield Model (Dixon 2002) and modeled the proposed action and no

[7] ENSO is the El Nino southern oscillation.

action alternative prescriptions. The BLM then used the FFE-FVS output to determine the amount of carbon that each alternative would release or sequester and the resulting net carbon balance. The values presented in this analysis are estimates based on modeled outputs and should be considered approximations. Values, in terms of carbon stored and carbon released, are expressed as tonnes (metric tons). Scientific literature most commonly uses tonnes to express carbon storage and release. One tonne of carbon is equivalent to 3.67 tons of carbon dioxide (EPA 2005). The BLM has selected fifty years as the analysis period of carbon storage for this project, because it encompasses the duration of the direct and indirect effects on carbon storage. In fifty years, stands in the project area would have nearly returned to current carbon storage levels, and carbon storage would have offset carbon emissions resulting from harvest. The 10-year period for short-term impacts would encompass the duration of all of the direct emissions from the proposed action.

No Action

The decay of snags, woody debris, and dead vegetation would release carbon to the atmosphere; however, the growth of forest vegetation would also sequester carbon. Carbon stored in live trees would not be converted to the harvested wood carbon pool and a portion of the carbon currently stored in live trees would be converted over time through ongoing processes of tree mortality. After 50 years of growth, live tree carbon would increase 194,070 tonnes.

Proposed Action

Short-term Impacts (0-10 years after timber harvest):

Treating approximately 3,727 acres of forest would volatilize some carbon, move carbon from live tree pools to detritus, and store some carbon in forest products. Removing live trees would decrease live tree carbon from 317,864 to 174,160 tonnes, and transfer 143,704 tonnes of live tree carbon storage to other pools. Using the FVS model, the BLM predicted the stands would transfer approximately 60 percent of tree carbon to wood product storage. Life cycle assessment (LCA) mill survey data shows that approximately 50–70 percent of the aboveground biomass in a sustainably managed forest is currently utilized in product processing mills to make solid wood products along with paper and biofuel co-products (Lippke *et al.* 2011). Fuels treatments to burn logging slash would create some short-term emissions totaling 3,643 tonnes during post-harvest periods. Emissions from equipment activities necessary to harvest these units ("secondary emissions"[18]) have been estimated at 0.1429 MG CO^2/ Mbf (WRI 2010). Although the forecast of harvest equipment emissions is highly uncertain and speculative, applying this equation to the proposed action suggests an additional 10,432 tonnes CO^2 release attributable to the proposed action. This is consistent with Sonne (2006), who predicted a relatively small C flux associated with harvest equipment.

Carbon emissions and storage over the 50-year analysis period resulting from the alternatives are displayed in Table III/IV-12.

Table III/IV-12 Carbon emissions and storage, comparison of proposed action and no action alternatives.

Source	Proposed Action (MTC*)	No Action Alternative (MTC)	Notes
Live tree storage, 2062	403,123	511,934	50 years of stand growth
Live tree storage, 2012 (current conditions)	317,864	317,864	51 year average age, 2012
Net change, live trees	85,259	194,070	Live tree carbon from growth 2012 -2062
Harvested wood storage	86,222	0	60% of harvested tree carbon
Total storage	**171,481**	**194,070**	**Storage: live trees and harvested wood**
Emissions, 2012-2062	3,643 10,432		Fuel treatments (pile/broadcast burning) Secondary emissions†
Net Carbon Storage††, Proposed Action	**157,406**	**194,070**	**Storage minus emissions, 2012-2062**

* Metric tonnes carbon

† Secondary emissions are defined as emissions from equipment consuming fuel employed to harvest, yard, load, and haul logs to a mill.

†† Net storage represents an estimate of potential direct sequestration for the action but does not include a life cycle analysis of wood product storage, carbon offset, or substitution strategies, as research in this area of analysis is incomplete.

<u>*Long-term Impacts (11-50 years after timber harvest):*</u>
Making a set of very broad assumptions and using the FFE-FVS carbon model and assumptions similar to those developed in the 2008 RMP FEIS (USDI 2008), comparing the no action alternative to the proposed action would result in a carbon flux of 36,664 tonnes over the time period from thinning until the period just prior to regeneration harvest of Matrix areas (50 model years).

Cumulative effects
At the scale of western Oregon, considering the cumulative effects of both forest succession (a carbon sink) and harvest (a carbon source) under the NWFP in the plan area, carbon stores would be predicted to increase by 2106, from 427 to 596 million tonnes (USDI 2008). This sequestration is less than under a "no harvest" scenario, but does represent a gain in carbon storage. U.S. annual CO^2 emissions are over 6 billion MG (EPA 2010). The flux of carbon associated with the proposed action (over 50 years) would represent .00062% of this yearly flux. The difference in carbon storage in 50 years between alternatives would be too small to lead to a detectable change in global carbon storage, and existing climate models do not have sufficient precision to reflect the effects on climate from such a small fractional change in global carbon storage (USDI 2008). Currently, federal thresholds for carbon flux related to individual actions have not been established. Uncertainty associated with all estimates of carbon flux in this analysis would be predicted to be quite high (circa 30%: USDI 2008).

It should be emphasized that, as in most non-empirical carbon modeling exercises, estimates of carbon sequestration or flux are useful mostly for broad generalizations or comparisons, appropriate to convey relative sizes, but not very accurate for specific places and situations (Sharrow 2008). This analysis also does not address substitution: i.e., without change in global demand for wood products, the no action alternative would necessitate harvest in another location resulting in a comparable (or larger) carbon flux.

This EA is tiered to the 1994 RMP FEIS, which considered carbon flux and climate change at the plan scale. The 1994 RMP FEIS considered carbon flux speculative and did not consider the indirect effects of carbon flux associated with the Plan on aspects of the affected environment including wildlife, economies, human health, and other resources (Appendix V, p. 217). The 1994 RMP FEIS concluded that with implementation of any of the alternatives at the Plan level, "the overall impact on the global atmospheric carbon dioxide balance would be much less than 0.01 percent of the total" (pp. 4-1). Based on the small estimated permanent flux of carbon that would be associated with the cumulative effects of the proposed action following the 1995 RMP, the high uncertainty in any such estimate of carbon flux (and other sources of GHGs), and the response of global climate to these GHGs, conclusions in the 1994 FEIS remain valid and applicable to the cumulative effects of the proposed action.

Components of the Aquatic Conservation Strategy

There are four components to the Aquatic Conservation Strategy (ACS): Riparian Reserves (RRs), key watersheds, watershed analysis, and watershed restoration. A "fifth" component is the standards and guidelines for management activities located in the Coos Bay District RMP.

1) Riparian Reserves

The RR widths within the analysis area are two site potential tree heights for fish bearing streams and one site potential tree height for perennial and intermittent streams. A site potential tree height in the Coquille River 5th field watershed is 200 feet, 220 feet in the East Fork Coquille 5th field watershed, 240 feet in the North Fork Coquille 5th field watershed, and 200 feet in the Middle Fork Coquille 5th field watershed.

2) Key Watersheds

A portion of the proposed action is located in the North Fork Coquille, Cherry Creek Tier 1 Key Watershed.

There would be no net increase of new road construction in the Cherry Creek Key Watershed; there would be a net decrease of 0.12 miles. The proposed action includes new construction of approximately 0.34 miles of new roads in the Key Watershed, which would all be fully decommissioned. Approximately 0.12 miles of existing roads in the Key Watershed would be fully decommissioned. The Western Oregon Transportation Management Plan states "Only the full decommission and obliteration categories are appropriate to meet the Management Direction of a reduction or no net increase in the amount of roads within Key Watersheds" (USDI 2010 *update*). The proposed action also includes decommissioning a total of 0.25 miles of existing roads in the Key Watershed. These roads would not count toward the net reduction of roads within the Key Watershed because they would not be fully decommissioned.

3) Watershed Analysis

Applicable Watershed Analyses include the East Fork Coquille Watershed Analysis (USDI 2005 *update*), the North Fork Coquille Watershed Analysis (USDI 2002), the Middle Main Coquille, North Coquille Mouth, Catching Creek Watershed Analysis (USDI 1997), and the Middle Fork Coquille Watershed Analysis (USDI 2007 *update*). Incorporated into the proposed action are recommendations from these analyses and they include silvicultural treatments within the RRs and road management.

4) Watershed Restoration

The Coos Bay RMP states the most important components of watershed restoration are control and prevention of road-related run-off and sediment production, restoring the condition of riparian vegetation, and restoring in-stream habitat complexity. Harvest in RRs, road maintenance, renovation, improvement, reconstruction, decommissioning, and full decommissioning would accomplish watershed restoration.

5) Management Actions/Direction

The following is a list of management actions/directions within RRs applicable to the proposed action:

<u>Roads Management</u>

- Completing watershed analysis including appropriate geotechnical analysis prior to construction of new roads or landings in RRs.
- Minimizing road and landing locations in RRs.
- Preparing road design criteria, elements, and standards that govern construction and reconstruction.
- Preparing operation and maintenance criteria that govern construction and reconstruction.

- Minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.
- Restricting side casting as necessary to prevent the introduction of sediment to streams.
- Reconstructing roads and associated drainage features that pose a substantial risk.
- Closing and stabilizing roads based on ongoing potential effects to the ACS objectives and considering short-term and long-term transportation needs.

Timber Management

- Applying silvicultural practices for RRs to control stocking, re-establish and manage stands, and acquire desired vegetation characteristics needed to maintain ACS objectives.

Existing Watershed Condition

Existing conditions in the Coquille 5th field watershed include (USDI 1997):

- The BLM administers 2,735 acres out of 111,607 acres or 2.5 percent of the land within this 5th field watershed.
- Approximately 1,307 acres or 47.8 percent of BLM land in this 5th field watershed is in RRs.

Existing conditions in the East Fork Coquille 5th field watershed include (USDI 2005 *update*):

- The BLM administers 45,448 acres out of 85,785 acres or 53 percent of land within this 5th field watershed.
- Approximately 25,047 acres or 55.1 percent of BLM land in the 5th field watershed is in RRs.
- The watershed contains approximately 44 miles of anadromous and resident fish-bearing streams and an additional 105 miles of resident only fish-bearing streams. Brewster Gorge is located on the main stem of the East Fork Coquille (T. 28 S., R. 10 W., section 9) and is a long-standing natural barrier, which limits anadromous use in the watershed.

Existing conditions in the North Fork Coquille 5th field watershed include (USDI 2002):

- The BLM administers 36,861 acres out of 98,467 acres or 37.4 percent of the land within this 5th field watershed.
- Approximately 19,275 acres or 52.3 percent of BLM land is in RRs.

Existing conditions in the Middle Fork Coquille 5th field watershed include (USDI 2007 *update*):

- The BLM administers 63,065 out of 197,607 acres within this watershed or 32 percent of the land within the 5th field watershed.
- Approximately 27,373 acres or 43.4 percent of BLM land is in RRs.
- The BLM controls approximately 385 miles of road or 31percent of all road miles within the watershed.
- There are 278 miles of fish-bearing streams within the watershed. Several long-standing barriers limit anadromous salmonids to 79.7 miles of this total or 27 percent of available fish-bearing stream miles.

See the fisheries and water resources affected environment sections on pages 41-56 for more information about the existing conditions within the analysis area.

Aquatic Conservation Strategy Objectives

The site scale for this analysis is the stream reaches within or adjacent to a proposed treatment unit or road activity. The watershed scale is the 5th field watershed.

The analysis below will group all harvest prescriptions (thinning, conversion, and mixed) and refer to them as "harvest," unless otherwise stated.

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.

Microclimate, water quality, stream bank stability, sediment regimes, and habitat provided for riparian associated species are the watershed and landscape-scale features used for this analysis. Microclimate will be addressed under ACS objective 1; water quality under objectives 3 and 5; stream bank stability and sediment regimes under objectives 4, 6, and 7; and providing habitat for riparian associated species under objectives 2, 8, and 9.

Site Scale: Short- and Long-Term

Microclimates found in riparian areas are important components of watershed and landscape-scale features needed to ensure the protection of the aquatic systems. Microclimates adjacent to streams would remain unchanged or within the range of natural variability at the site scale across all treatment types (including HWC), because:

- A minimum 50-foot no treatment zone (NTZ) would be retained adjacent to perennial and fish bearing streams; intermittent non-fish bearing streams would have minimum 30-foot NTZs.
- Trees, including hardwoods, ≥ 24” DBH would be retained.
- Approximately four to eight hardwoods per acre would be left. These leave trees would be clumped potentially adjacent to NTZs or scattered throughout the RR, depending on site conditions and tree locations. Preference would be given to the largest hardwoods in the following order: big leaf maple, golden chinquapin, madrone, Oregon myrtle, tanoak, and alder.
- Any scattered conifer within HWC areas would be left.
- The harvest outside the buffers would maintain approximately 40-60 percent canopy closure.
- Sample tree falling would not occur in the NTZs and those trees selected would be a subset of trees identified for removal.

MacCracken (2002) found treatment effects on microclimate variables analyzed were small and extremes in air temperature at conversion sites were similar. The 50-foot NTZ on perennial and 30-foot NTZ along intermittent streams would generally encompass the slope break and riparian vegetation. Either Anderson *et al.* (2007)found buffer widths determined by the change in riparian to upland vegetation or by the topographic slope breaks were sufficient in maintaining microclimate post-harvest. These authors also found that microclimate gradients in headwater riparian zones were strongest within 10 meters of the stream center, “a distinct area of stream influence within broader riparian areas.” Chan *et al.* (2004) found the greatest change in microclimate occurs between stream center and 15 meters regardless of buffer size or upland treatment.

The proposed yarding corridors in RRs would not measurably alter the microclimate at the site scale because the width of each corridor would be minimal (12 feet), the distance between skyline corridors would be a minimum of 150 feet apart at the widest point where feasible, and corridors would be perpendicular to streams as much as possible to minimize the total length of openings created by yarding corridors along stream channels. In addition, corridors in RRs would be spread out across eight 6^{th} field subwatersheds located in four 5^{th} field watersheds, corridors would be discontinuous, and the majority would be located across intermittent streams.

The proposed action includes constructing approximately 1.05 miles of new roads in RRs, consisting of 19 separate road segments. The proposed road construction in RRs would not measurably alter microclimates because the roads would have a narrow clearing width (average 35 feet) and the portions in RRs would be short segments spread across a large area (four 5^{th} field watersheds and seven 6^{th} field sub-watersheds). All new constructed roads in RRs would be either decommissioned or fully decommissioned.

5^{th} Field Watershed Scale: Short- and Long-Term

There would be no changes to microclimate in riparian areas at the watershed scale because there would be no measurable changes at the site scale.

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

Site Scale: Short and Long-Term

The use of RRs as migration corridors for riparian and aquatic dependent species would be maintained post-harvest in the short-term at the site scale because of the following (1) snag and down wood creation, (2) NTZs adjacent to streams, (3) canopy closure in RRs (post-harvest) across all prescription types would range from 40-60 percent, (4) minor conifer and some hardwood species would be retained, (5) four to eight hardwoods per acre would be left, and (5) trees ≥ 24" DBH would be retained. Trees felled in the NTZs and trees ≥ 24" DBH in RRs felled to facilitate yarding corridors would be left on-site, providing down wood for riparian and aquatic dependent species.

The harvest would improve the functions of the RRs in the proposed units as migration corridors in the long-term at the site scale by advancing late successional characteristics. Specifically in the long-term, the RRs would have increased structural and species diversity, an understory shrub layer, large conifers available for in-stream wood, upslope down wood and large snags. The harvest would increase the stand mean diameter and promote the development of individual larger trees faster when compared to a "no-treatment" scenario. The harvest would increase the structural diversity including overstory variability within the units. An increase in overstory variability would to lead to a response in understory and shrub diversity, development of larger limbs and crowns, epicormic tree branch response, and patchily distributed suppression mortality. Suppression mortality would still occur in NTZs that would provide snags and down wood.

The harvest in RRs would maintain riparian-dependent species. For example, retention of both dense patches of forest with fungi and suppression-induced downed wood, as well as areas retaining hardwood trees and shrubs such as hazel (Corylus cornuta) would be predicted to support life history requirements for the white-footed vole, *Arborimus albipes* (Manning et al. 2003). The retention and creation of downed woody debris as well as buffered microclimates would maintain well-distributed populations of plethodontid salamanders (Pilliod and Wind 2008).

The increase in LWD would lead to the eventual reconnection of stream channels to floodplains in the long-term at the site scale. Some stream channels within treatment units have limited floodplain connectivity because they are constrained by hill slopes or by roads.

The proposed action would not alter migration routes at the site scale in the short or long-term because no effects to water quality, including temperature, would occur. The proposed new road construction does not include new stream crossings over perennial or fish bearing streams; therefore, these streams would remain physically unobstructed and available for migration routes. New road construction would cross two intermittent streams. The culverts at these locations would be removed following use. These culverts would be in place a maximum of three years.

5th Field Watershed Scale: Short- and Long-Term

The spatial and temporal connectivity within and between watersheds at the 5th field in the short and long-term would remain unchanged following the proposed action. The small amount of BLM land and the relatively small treatment area would not result in a measurable beneficial change to these components at the 5th field scale.

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

Site Scale:

Short-Term

The proposed action would not adversely modify stream channels or aquatic habitat, nor remove any wood from stream channels. The proposed sample tree falling and harvest combined with the implementation of design features would maintain bank stability, shorelines and bottom configurations. The NTZs would encompass the trees providing bank stability due to root strength. Activities more than half a crown width from the edge of the stream bank are unlikely to reduce the effectiveness of root strength on stream bank stability (USDI 2002).

The majority of yarding corridors would achieve full suspension over steam channels. Approximately four corridors across intermittent streams would not achieve full suspension. Trees felled within the NTZs for yarding corridors would be gelled toward the channel and left on-site where yarding corridors cross streams. These trees would armor and protect stream banks and prevent or minimize direct contact of yarded logs with the stream channel and banks.

The new road construction would include two crossings over intermittent streams. The culverts would be in place a maximum of three years and then removed. The new culverts would be properly sized based on the stream size and drainage area and would not result in bank erosion. New roads would be constructed with proper drainage features such as out sloped road beds or properly spaced cross drains and would be decommissioned or fully decommissioned after use. New roads would not increase the amount of water in stream channels and would not cause an increase in bank erosion.

Long-Term

Development of late successional characteristics in RRs would increase the potential for LWD recruitment to stream channels at the site scale in the long-term. LWD in stream channels provides channel structure and complexity, which improves bank stability. Increased amounts of large wood would improve stream bank stability in the long-term because the logs would reduce flow velocity and bank shear stress (USDI 2002).

A reduction in bank erosion would occur in the long-term at the site following road maintenance, renovation, reconstruction, improvement, decommissioning, and full decommissioning because improved road drainage would decrease the amount of water directed to stream channels.

5th Field Watershed Scale: Short- and Long-Term

As there would be no noticeable impact to the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations at the site scale, there would be no change at the 5th field scale in the short- or long-term. The beneficial effects to stream banks of LWD recruitment would not be measurable at the 5th field scale because of the relatively small amount of acres treated.

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

Site Scale: Short- and Long-Term

Water quality would remain within the range that maintains the biological, physical, and chemical integrity of streams. The proposed action would not result in chemical input to streams.

Incorporated by reference is the water resources report located in the analysis file. The analysis in the water resources report (pp.12-13) determined the harvest would not increase stream temperature at the site scale in the short or long-term. The proposed yarding corridors in RRs would not result in an increase in stream temperature because of the minimal width (12 feet) of the dispersed corridors with the majority proposed across intermittent streams, which have no stream flow during the summer heating periods. Constructing yarding corridors across perennial streams would not result in an increase in water temperature because the corridors would be a maximum of 12 feet in width leaving little area for direct solar heating of the stream, trees adjacent to the corridors would continue to provide shade, and the corridors would be dispersed across a large area (four 5th field watersheds and eight 6th field watersheds).

The majority of new roads are located greater than 50 feet from intermittent streams and the two new roads with intermittent stream crossings have no probability to affect stream temperature. One new road (JC_NC4) would be perpendicular to a perennial stream, but would not decrease stream shade because the road would be 190 feet from the channel. There is no probability the new road construction would result in an increase in temperature because there would be no new roads crossing perennial streams, would have a narrow clearing width (average 35 feet), the portions in RRs would be short segments, and would be no closer than 190 feet from a perennial stream.

The analysis in the water resources report (p. 13) determined there would be a long-term improvement to temperature resulting from the harvest. Long-term improvements to riparian stand conditions and in-stream large wood from the harvest would decrease water temperature because of the following:

- Improved pool frequency conditions would help restore the groundwater and floodplain connection and increase the groundwater and stream interaction with an expected increase in cool water refugia (USDI 2002).
- Aggraded channels (due to large wood) also have the potential to increase summer stream flows, which would contribute to lower stream temperatures (USDI 2002).
- Improved width to depth ratios resulting in narrower channels would result in decreased stream temperatures (USDI 2002).

Slight increases in turbidity would occur in the short-term in localized areas because of road activities. Implementation of the road-related design features would reduce or eliminate the amount and duration of sediment entering stream channels. Any increase in turbidity would not change the biological, physical, or chemical integrity of streams. The proposed action would maintain the aquatic and riparian-dependent species' survival, growth, reproduction, and migration at the site scale in the short and long-term. The proposed road maintenance, renovation, improvement, reconstruction, decommissioning, and full decommissioning would improve road drainage and reduce turbidity in the long-term.

5th Field Watershed Scale: Short- and Long-Term

There would be no change to water quality at the 5th field scale in the short- or long-term because there would be no noticeable changes at the site scale.

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

Site Scale:

<u>Short-Term</u>

The proposed action would maintain, at the site scale in the short-term, the sediment regime under which aquatic ecosystems evolved. Furthermore, the proposed action would maintain the timing, volume, rate, and character of sediment input, storage, and transport.

Ground-based equipment would not cross stream channels and would not operate within 30 feet of intermittent streams and 50 feet of perennial streams. The NTZs would protect bank stability and prevent sediment delivery to streams from adjacent harvest activities. The analysis in the water resources report (p. 16) concluded these buffers would provide an adequate sediment filter strip because non-compacted forest soils in the Pacific Northwest have very high infiltration capacities and are not effective in transporting sediment by rain splash or sheet erosion. Trees selected for sample tree falling would be located outside of the NTZs and design features guiding harvest in RRs would apply to sample tree falling. Based on the above discussion the harvest and sample tree falling would not result in sediment delivery to streams.

The construction and use of yarding corridors would maintain the sediment regime because full suspension of logs would occur when feasible, natural openings would be used to the extent possible, corridors would cross channels at a perpendicular angle when possible, and the proposed action would minimize the width (< 12 feet) and number of corridors. Existing brush and the duff layer would filter sediment. The majority of yarding corridors would achieve full suspension over steam channels, however approximately four corridors over intermittent streams would not achieve full suspension. Trees felled within the NTZs for yarding corridors would be felled toward the stream channel and left on-site where yarding corridors cross streams. These trees would armor and protect stream banks and prevent or minimize direct contact of yarded logs with the stream channel and banks.

Short-term sediment movement would occur because of the proposed road related activities; however, implementation of design features and best management practices would minimize or eliminate sediment from reaching stream channels. The short-term localized sediment input to streams resulting from road activities would be indiscernible beyond natural erosion processes expected to occur during winter rains. Refer to the sediment analysis on pp. 41-56 for detailed discussions.

New road construction would be primarily located on or near ridge tops and would incorporate design features that include avoiding fragile or unstable areas, minimizing excavation and height of cuts, end haul of waste material where appropriate, and construction during the dry season. There would be two new, temporary stream crossings on small intermittent streams. The temporary stream culverts would be removed and the roads decommissioned at the completion of project activities. The sediment input to streams from construction would be undetectable because:

- New roads would be decommissioned or fully decommissioned after use,
- New roads would be designed with proper drainage features so that any sediment-laden surface water would quickly infiltrate into forest soils,
- New stream culverts would be placed and removed during the in-water work period when little or no water would be present in the intermittent streams,
- New construction would implement design features, which include measures to reduce or eliminate erosion and sediment input to streams.

Long-Term

The proposed road maintenance, renovation, improvement, reconstruction, decommissioning, and full decommissioning would result in a net reduction in sediment delivery to stream channels at the site scale in the long-term. Natural surface and rocked existing roads within the analysis area with surface erosion, inadequate drainage, inadequate stream crossings or unstable cut banks, and fill slopes are currently contributing sediment to stream channels. The proposed action would reduce sediment delivery to streams by improving road drainage with these road improvements and decommissioning.

The proposed harvest activities would not result in sediment delivery to stream channels at the site scale in the long-term. The harvest would improve large wood recruitment in the long-term leading to additional sediment storage capacity and routing (USDI 2002). Stream channels in the Coast Range are typically gravel-poor, which makes them dependent on large wood for retaining substrate (USDA and USDI 1998).

5th Field Watershed Scale: Short- and Long-Term

As there would be no noticeable impact to the sediment regime at the site scale from harvest, there would be no change at the 5th field watershed scale in the short- or long-term.

The expected sediment delivery at the site scale in the short-term from road activities would not be measurable at the 5th field scale in the short- or long-term. The proposed road activities would provide a negligible benefit of reduced sediment delivery to stream channels at the 5th field scale because of the relatively small amount of BLM roads compared to the total road miles within these watersheds.

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

Site Scale: Short- and Long-Term

The proposed action would maintain at the site scale (short and long-term) sufficient in-stream flow to create and sustain riparian, aquatic and wetland habitat. The proposed action would also maintain the patterns of sediment, nutrient, and wood routing in addition to the timing, magnitude, duration and spatial distribution of peak, high, and low flows at the site scale in the short- and long-term.

The water resources analysis (pp. 9; Hydro report) concluded there would be no effect to peak flows from the harvest. The analysis found the cumulative increase in annual yield for the analysis area would likely be below the detectable level (pp. 5-7). If instruments could detect this change, it would be most noticeable as an increase in summer and early fall streamflow, when evapotranspiration is high and precipitation is low. An increase in summer stream flows could also occur in the long-term due to an increase of in-stream large wood. Aggradation of the channel due to large wood has the potential to increase summer stream flows (USDI 2002).

The water resources report included an analysis of the potential risk to stream flow from the proposed road construction. The new road construction, including the 1.05 miles in RRs, would not affect peak flows (p. 11; Hydro report). The total road area in the subwatershed would still be below the threshold of concern (< 4 percent road area), according to the GWEB analysis (p. 11; Hydro report). In addition, engineers would design new roads with proper drainage features such as cross drains or they would be out sloped as necessary. This would disconnect the roads from stream networks. All of the new road construction would be decommissioned or fully decommissioned at the completion of project activities. Decommissioning would incorporate design features, including constructing adequate water bars, which effectively disconnect the roads from the drainage network. The road surface would route intercepted water to the forest floor where it can infiltrate back into groundwater.

Road renovation, reconstruction, improvement, maintenance, decommissioning, and full decommissioning of existing roads would improve road drainage and reduce the amount of water roads direct to stream channels.

5th Field Watershed Scale: Short- and Long-Term

The maintenance of in-stream flows as well as the timing, magnitude, duration and spatial distribution of peak, high and low flows at the site scale in the short- and long-term would ensure no changes at the 5th field scale.

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

Site Scale: Short- and Long-Term

The proposed action would not affect the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands at the site scale in the short- or long-term. The interaction of water with wetlands and meadows would be unaffected at the site scale both in the short- and long-term. The layout foresters buffer out meadows and wetlands from the units. The proposed action does not include water diversions or well drilling, activities usually associated with lowering water tables.

A long-term site scale improvement to the groundwater table and floodplain water storage would occur following the harvest because of an increase in pool frequency and aggradation of the channel due to an increased amount of in-stream large wood (USDI 2002).

5th Field Watershed Scale: Short- and Long-Term
Because there would be no noticeable impact to the timing, variability, or duration of floodplain inundation and water table elevation in meadows or wetlands at the site scale there would be no change at the 5th field watershed scale in the short- or long-term.

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.

Site Scale: Short- and Long-Term
The proposed action would maintain the species composition and structural diversity of plant communities in riparian areas and wetlands at the site scale in the short- and long-term. The harvest in RRs would promote forest health, promote development of large conifers, increase structural diversity, and improve species composition. The harvest in RRs would lead to a response in understory and shrub diversity, development of larger limbs and crowns, epicormic tree branch response, and patchily distributed suppression mortality.

All HWC activities[8] and planting would return stands to a historically appropriate species composition. The NTZs encompass mesic and wet conditions in RRs as determined by the TPI analysis. Alder historically found in these areas would remain in the NTZs. The NTZs would maintain species composition, structural diversity, and would maintain patchily distributed suppression mortality.

The NTZs and the number of trees left per acre in RRs (which includes four to eight hardwoods per acre and all trees ≥ 24" DBH) within the treated portion of the units would maintain the short-term supply of in-stream wood at the site scale. The harvest would reduce suppression mortality, which would result in fewer snags and down logs in the short-term. These snags and down logs would have been smaller which have a decreased ecological value as described in the fisheries section (pp. 51). The harvest would lead to an improved source of large wood recruitment at the site scale in the long-term. See the fisheries section for a detailed analysis (pp. 48-56).

Sample tree falling would not affect current or future large wood recruitment because trees selected would be located outside of the NTZs and would be a subset of those already identified in the prescription for removal. If the timber sale is not implemented the trees would contribute to down wood because they would be left on site.

The proposed yarding corridors and road construction in RRs would not decrease species composition or structural diversity of plant communities to the extent that the values listed in ACS objective eight provide riparian areas. Factors leading to this conclusion include (1) roads and corridors would be relatively short segments dispersed across a large area, (2) newly constructed roads would be decommissioned or fully decommissioned following use, (3) yarding corridors would be 12 feet wide, (4) trees felled to facilitate yarding corridors within the NTZs would be left on-site, and (5) trees ≥ 24" DBH felled in RRs to facilitate yarding corridors would be left on site.

The proposed DMT would increase brush and deciduous tree growth, which would improve nutrient availability in RRs. Thinning would increase light levels received by vegetation and result in greater understory vegetation vigor and growth. "Thinning treatments that lead to greater stand complexity next to a stream will increase the array of niches for insects and other arthropods, and for epiphytes. This in turn leads to a greater variety in types of organic matter that can fall into the stream" (USDI 2002).

All proposed HWC activities would maintain nutrient supply to streams from adjacent riparian vegetation including alder because of the NTZs and the retention of four to eight hardwoods per acre.

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[8] Includes HWC and Mixed stands

5th Field Watershed Scale: Short- and Long-Term

Because there would be no adverse impacts to species composition or structural diversity of plant communities in riparian and wetland areas at the site scale there would be no change at the 5th field scale in the short- or long-term. Benefits would not be measurable at the 5th field scale because of the relatively small amount of acres treated.

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

Site Scale: Short- and Long-Term

Habitat needed to support riparian-dependent species (including plants, invertebrates, and vertebrates) would be maintained at the site scale in the short- and long-term. A more diversified array of microclimates, structures, species, and habitat would result following harvest. The NTZs would maintain areas of undisturbed litter, structure, vegetation, and microclimates. Density management thinning would provide conditions favorable for the development of diversified layers of herbs, shrubs, and pockets of shade tolerant trees. Creating snags and down wood in RRs would improve the structural diversity in the short- and long-term at the site scale and increase late successional characteristics in RRs. An increase in stand complexity would increase insect abundance and diversity at the site scale in the short- and long-term. All HWC activities (along with the retention of four to eight hardwoods per acre) and subsequent planting would return stands to a historically appropriate species mix.

Zobrist and Hinckley (2005) conducted a literature review of thinning and compiled the following discussion of the effects of thinning to understory plant species: "Thinning opens up the stand and allows light to reach the forest floor. This provides for better-developed understories with greater richness, diversity, and cover (Bailey *et al.* 1998, Curtis *et al.* 1997, Thomas *et al.* 1999, Thysell and Carey 2000). Studies have found that thinned stands have greater herbaceous cover (Carey and Wilson 2001, Muir *et al.* 2002), greater understory trees and shrubs (Bailey and Tappeiner 1998, Muir *et al.* 2002, Tappeiner and Zasada 1993), and greater density, survival, and growth of conifer seedlings (Bailey and Tappeiner 1998, Brandeis *et al.* 2001, DeBell *et al*. 1997, Muir *et al.* 2002)".

5th Field Watershed Scale: Short- and Long-Term

Because there would be no noticeable adverse impacts to habitat for riparian-dependent species at the site scale, there would be no change at the 5th field watershed scale in the short- or long-term. Benefits would not be measurable at the 5th field scale because of the relatively small size of the project.

Resources Not Analyzed in Detail

Due to a lack of concern by scoping respondents, adequacy of best-management practices and policy and the limited intensity and scope of effects on the affected resource, the items below are excluded from comparative analysis as directed by CEQ regulations § 1500.0(b), 1500.2(b) and other sections. The analysis file includes the analyses pertaining to these conclusions, which is hereby incorporated by reference.

Air Quality

Smoke from prescribed fire burning of landing piles along road systems would contribute minor short-term increases in particulate matter in the air shed near the project area. With the prescribed fire activities in the region being conducted in compliance with the Oregon Smoke Management Plan, (OAR 629-43-043) burning activities are not expected to result in adverse effects over a widespread area. Based on guidance from Oregon Smoke Management, the BLM would only permit burning of slash when atmospheric conditions would allow for quick dissipation of smoke away from smoke sensitive receptor areas (local communities).

Annual Yield, Low Flows and Forest Harvest

The proposed commercial thinning and density management treatments would have a negligible effect on annual yield and low flows. In an overview of several studies, Satterlund and Adams (1992) found that the effect on streamflow is generally proportional to the amount of vegetation removed. They found that "[l]esser or non-significant responses occur [to water yield]… where partial cutting systems remove only a small portion of the cover at any one time." Where individual trees or small groups of trees are harvested, the remaining trees will generally use any increased soil moisture that becomes available following timber harvest. Therefore, there would be no change to annual yield and low flows from commercial thinning or density management.

The proposed hardwood conversion treatments would have a negligible effect on annual yield and low flows. These treatments could theoretically increase water yield as evapotranspiration and interception of water would be reduced when large patches (up to several acres) of hardwood are removed and replanted with trees. Models have been developed to assess the cumulative effects of vegetative disturbance and subsequent hydrologic recovery on evapotranspiration. Equivalent Clearcut Area (ECA; see (Reid 1993)) has been used to calculate the change in water yield for a catchment from past and future harvest activity. The ECA model generates the cumulative effect of harvest by comparing the total vegetative disturbance in a catchment to an equivalent clearcut area.

The increase in ECA for the proposed hardwood treatments ranges from 0.0 percent in Brewster Canyon to 3.2 percent in John's Creek (Table 4; Hydro report). This equates to an increase in available water of between 0.0 and 0.6 inches for the first year after harvest or an increase of 0.0 to 1.7 percent in annual yield. A ten percent change in runoff is often used as the minimal detectible level. Therefore, the change in annual yield from the proposed hardwood treatments would be below the detectible level.

The cumulative increase in annual yield for the analysis area would also be below the detectible level. The cumulative, post-project annual yield is between 2.1 and 3.8 inches more available water or a cumulative increase between 5.2 and 8.9 percent (Table 5; Hydro report). This is below the minimum ten percent detectible level. Therefore, implementation of the Lone Pine project would have no discernible impact to annual yield and low flows.

Cultural Resources

A review of project documentation and a records check show one known cultural resource site within the Lone Pine project area. This prehistorical site is located at the Schuck Mt. helipond, which is adjacent to the Schuck Mt. proposed treatment area. Previous regeneration harvest and construction of the helipond in 1987 has effectively destroyed this cultural resource site, which excavated the entire archaeological site to create a berm for the pond. Since then, OHV use has heavily affected this area. Recent field observations (2013) have documented continued OHV use in the archaeological area. As past management practices have effectively "destroyed" this archaeological site, the loss of context has severely reduced the utility of this prehistoric site to provide information about prehistory. While this site is not located directly within a Lone Pine harvest area, associated activities (e.g. timber hauling) would avoid the area to prevent any more damage to the site.

Drinking Water Protection Areas

Under the requirements and guidelines of the Federal Safe Drinking Water Act, ODEQ prepares Source Water Assessments for public water supplies in Oregon. One drinking water source for the City of Coquille is the Coquille River. All of the proposed project units are located within the headwaters of the Coquille River and are, therefore, part of the Drinking Water Protection Area (DWPA) for Coquille. One drinking water source for the City of Myrtle Point is the North Fork Coquille River. Some of the proposed units are located in the headwaters of the East Fork/North Fork Coquille River and are therefore part of the DWPA for Myrtle Point.

Managed forest lands in the DWPAs are listed as one of the potential contaminant sources in the Source Water Assessments for both cities (ODEQ a&b 2003). Activities listed that could have potential impacts are cutting and yarding of trees, improper use of pesticides or fertilizers, road building and maintenance, and road usage. Impacts from harvest operations and road work are analyzed by alternative under water quality/sediment. This project does not include pesticide use.

Some fertilizer would be used to prevent soil erosion in disturbed areas. However, there would be a negligible effect to water quality or drinking water. Even with whole - forest fertilization, studies have shown that neither drinking water standards nor aquatic toxicity thresholds are exceeded in most applications (Bisson *et al.* 1992). The proposed project would require a one-time application to disturbed areas during summer or fall. Disturbed areas include new and reconstructed roads, decommissioned roads, and landings. These areas would be seeded, mulched and fertilized to prevent soil erosion and increased sediment. Fertilizer would be applied at the rate of approximately 32 lbs. available nitrogen + 40 lbs. available phosphoric acid per acre. This is estimated to be the minimum amount necessary to help establish the grass.

Most of the disturbed sites have no connection to stream channels and the growing vegetation would rapidly take up fertilizer. Only a few sites adjacent to stream channels, where some fertilizer would be spread in areas of road work, has the potential to reach streams. Disturbed areas near stream banks would be approximately 25 feet wide. Grass and native vegetation would take up most of this fertilizer. A negligible amount may reach stream channels during the first winter rains. However, this small amount of fertilizer spread out over the estimated six-year span of the project over a large geographic area would not adversely affect water quality and would not be measureable or detectable in drinking water supplies. Implementation of this project would have no impacts to drinking water.

Environmental Justice
For the areas of activity in connection of the Lone Pine project, the BLM does not know this area to be used by, or proportionately used by minority or low-income populations for specific cultural activities at greater rates than the general population. This includes their relative geographic location and cultural, religious, employment, subsistence or recreational activities that may bring them to the action area. Thus, BLM concludes that no disproportionately high or adverse human health or environmental effects would occur to Native Americans and minority or low-income populations from implementing the project.

Fire Regime Condition Class
A fire regime condition class (FRCC) is a classification of the amount of departure from the natural (historical) regime (Hann and Bunnell 2001, Hardy *et al.* 2001, Schmidt *et al.* 2002). The departure is measured in three classes and are based on low (FRCC 1), moderate (FRCC 2) and high (FRCC 3). Most of the analysis area shows a moderate degree of departure, and is FRCC2. Mechanical treatments such as logging in conjunction with activity fuel treatments would assist in maintaining the same FRCC or help shift the analysis area towards a FRCC 1 condition.

Forest Fuels
Under the proposed action, there would be a short-term increase in surface fuel loadings escalating the risk of damage if a wildfire occurred. Although the probability is low, there is a risk that fires could start where logging equipment is involved. However, local fire protection agencies regulate equipment operations and operating restrictions are implemented and enforced as fire danger levels rise. In addition, project design features mitigate these potential hazards. Shortly after harvest activities are completed, the fuel continuity would be broken up and fuel loadings reduced with slash piling. This would eliminate heavy concentrations of fuels, but would leave sufficient amounts of woody material to contribute nutrients to the soil. These piles would be burned during the time of the year when soils are saturated and fuels moistures are high.

Hazardous Materials
Activities resulting from the proposed action would be subject to State of Oregon Administrative Rule No. 340-108, *Oil and Hazardous Materials and Spills and Releases*. This specifies the reporting requirements, cleanup standards and liability that attaches to a spill or release or threatened spill or release involving oil or hazardous substances. Normal contract administration would also include site monitoring for solid and hazardous waste.

When needed, the BLM would apply the Coos Bay District hazardous materials contingency and spill plan for riparian operations when a release threatens to reach surface waters or is in excess of reportable quantities.

Port-Orford-cedar

The Lone Pine project area is within the range of Port-Orford-cedar; therefore, all management activities would conform to the guidelines specified in the *2004 Final Supplemental Environmental Impact Statement (FSEIS) for Management of Port-Orford-Cedar in Southwest Oregon* where applicable (USDI 2004).

Areas within 50 feet of streams or roads were determined to be at high risk of infection, and those areas greater than 50 feet away from roads and streams were determined to be at low risk of infection by Port-Orford-cedar root disease (*Phytophthora lateralis*) (p. 3&4-42). The answer to all three questions in the risk key provided in the 2004 FSEIS (pp. 2-18) which gives direction for assessing risk and controlling spread of *P. lateralis*, was "no." Because of this low risk, there is no requirement for additional Port-Orford-cedar management practices.

Noxious Weeds

The BLM is required to develop a noxious weed risk assessment when it is determined that an action may introduce or spread noxious weeds or when known habitat exists (USDI 2007) The analysis file contains the completed Lone Pine assessment. Prevention measures identified as a result of this assessment not already applied on district lands as part of routine activities (USDI 1997) have been incorporated into the project design features to minimize the potential for introducing weeds to the project area and/or spreading existing weed infestations.

Water Rights

According to information from the Oregon Water Resources Department, there are several surface water rights for private domestic use within 1/4 mile downstream of treatment units in the proposed project. The BLM notified these water right holders of the proposed project. Harvest unit boundaries would be adjusted in two areas to protect private surface water rights for domestic use. One point of diversion is in SW ¼ of SW ¼ of section 28-12-13 (Barron, permit 51898). The other is in SE ¼ of NE ¼ of section 28-11-7 (Follansbee, permit 52736). Implementation of this project would not affect downstream users.

Wildland Urban Interface (WUI)

The National Fire Plan addresses WUI criteria. Harvest areas meeting the WUI criteria would be further evaluated to determine the appropriate mitigating measures to protect and provide for public health and safety. Depending on site-specific conditions following harvest, the following project design features may be used adjacent to private land boundaries in WUI areas: pullback and removal of ladder and surface fuels and roadside hazardous fuels reduction.

Unaffected Resources

None of the following critical elements of the human environment is located in the project area or within a distance to be affected by implementation of either alternative:

- Areas of Critical Environmental Concern
- Farmlands, Prime or Unique
- Flood Plains (as described in Executive Order 11988)
- Wild and Scenic Rivers

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Chapter 6 List of Preparers

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Chapter 7 List of Agencies and Persons Contacted

The BLM informed the public of the planned EA through the publication of the Coos Bay District's planning update and a scoping notification on the District's web site.

The BLM directly notified the following public agencies and interested parties:

American Forest Resources Council
Cascadia Wildlands
Confederated Tribes of Coos, Lower Umpqua, and Siuslaw
Division of State Lands
Friends of the Coquille
Klamath-Siskiyou Wildlands Center
NW Environmental Defense Council
Oregon Dept. of Environmental Quality
Oregon Dept. of Forestry
Oregon Wild
Rep. Peter Defazio
Umpqua Watersheds
Association of O&C Counties
Coast Range Association
Coos County Commissioners
Coquille Indian Tribe
Douglas Timber Operators
Governor's Natural Resource Office
NOAA National Marine Fisheries Service
Ocean Coastal Program
Oregon Dept. of Fish and Wildlife
Oregon Water Resources Department
Plum Creek Timberlands
U.S. Fish & Wildlife Service
Numerous Private Citizens

All adjoining landowners and water rights permittees within 0.5 miles (72 total individuals/corporations)

Appendix A Road Access

Because of the checkerboard ownership within western Oregon of BLM lands, the majority of BLM-administered lands are intermingled with private lands. The resulting reciprocal right-of-way agreements, easements, and unsecured access rights will affect recreation use by the public within portions of the Lone Pine area. Unsecured legal public access includes public access rights that the United States has not secured on particular roads or road systems. Administrative access is legally and physically available to the BLM; however, the right-of-way agreements or easements do not include legal access rights for public casual use.

Within the Lone Pine area, the public does not have any legal road access by virtue of locked gates on private roads or unsecured reciprocal right-of-way agreements (administrative closures) for several project areas. The following table (Table A-1) shows the areas for which there is no legal road access for the public and the applicable road systems, which have restricted use.

Table A-1 - Project areas with restricted road access to the public.

Project Area	Legal description not accessible (T-R-S)	Roads with restricted public access	Access Restriction Type
Brownstone	28-9-17	All accessing section 17	Administrative – Reciprocal ROW for timber management only
Crosby	28-11-19 and 31	28-11-30.2, 28-11-19.6	Locked gate and Tank Traps
Frona	Portions of 28-11-9; Most 27-11-2	BPA access road	Locked gate and Tank Traps
John's Creek	29-12-12 SENE	29-11-7.2	Administrative – Reciprocal ROW for timber management only
Llewellyn	28-12-35	29-12-4.0	Locked gate, Reciprocal ROW for timber management only
Maintenance Shop	27-11-21 SE and SENE	All accessing section	Administrative – Reciprocal ROW for timber management only
Rock Prairie	All east of river in 27-12-35	All accessing section	Locked gates
Steele Cherry	27-11-26 and 35; 28-11-1	All accessing project areas	Administrative – Reciprocal ROW for timber management only
Yankee	28-11-17 SESE; All 28-11-7	28-11-20.1; All accessing section 7	Administrative – Reciprocal ROW for timber management only

The following clause is included in many standard reciprocal right-of-way agreements signed between private timber companies and the BLM: "To the United States and its licensees, pursuant to 43 CFR 2812.3-1(b), the rights to use roads and rights-of-way owned or controlled by the permittee across hereinafter described lands for the management and removal of timber and other forest products from lands of the United States." The agreement defines this further as "The rights of the Unites States and its licensees to use roads owned or controlled by the Permittee shall be nonexclusive." Nonexclusive means the BLM does not have the authority to extend permission for other entities (e.g. the public) to use these roads for a purpose other than for timber management.

Appendix B Sample Tree Falling

Background

The Code of Federal Regulations requires the BLM to sell timber on a tree cruise basis (43 CFR 5422.1) and to have an accurate appraisal at the time BLM offers the sale (43 CFR 5420.0-6). The Lone Pine projects would be sold as lump-sum timber sales. In a lump-sum sale, timber cruisers assess the standing timber and give it a specific value. This value becomes the BLM cruise estimate and is the minimum bid for the removal of the timber in the advertised sale. The winning bidder pays the exact amount of the winning bid to the BLM.

Conversely, the Forest Service in western Oregon normally uses a log-scale sale process. The Forest Service does provide perspective purchasers an appraisal of the timber; however, they make a bid on the average stumpage. The logs removed from the sale are scaled and assessed a value using the average stumpage bid by the purchaser. The final price of the sale is determined <u>after</u> cutting the trees (Howard and DeMars 1985).

The Forest Service does not use sample tree falling, because they do not need as accurate a cruise before the sale is offered since they use log-scaling. However, the Forest Service has used validation falling in the past. The BLM needs a more accurate cruise to prepare the best appraisal for the minimum lump-sum bid price, **before** the sale advertisement.

It is in the public interest that the BLM maintains accurate and reliable timber cruises. This practice maintains accurate and reliable timber cruises. This practice provides statistically reliable data available in no other way. It helps ensure the public receives fair market value for the timber sold as required by Congress through FLPMA.

Other Cruise Methods

The BLM has frequently used visual timber cruises but this technique does not allow the BLM to check the accuracy of the final cruise. The pure ocular cruising method makes many assumptions about the trees being measured:

- The cruiser selects the correct form class/bark thickness ratio/volume equation.
- The cruiser accurately measures the tree height and DBH.
- The form of the tree and merchantable height fit the measured form class/volume equation.
- Tree defect is apparent by visible indicators.
- The cruiser assumes the correct amount of hidden defect and breakage.

Although form class and bark thickness can be obtained by climbing the tree, these other variables are estimated which are subject to inherent measurement bias.

Accuracy of Sample Tree Falling

Conducting sample tree falling removes the measurement bias inherent in making visual estimates. Through checking measurements directly by felling a sample tree, cruisers can make corrections to their estimates. This is because sample tree falling provides the direct measurement of form class, bark thickness, taper, defect, breakage, volume and value without bias. This is a statistically valid sampling methodology (Bell and Dilworth 1997 (Revised), Iles 2003, USDI 1989) where cruisers select a portion of the cruise trees to be felled, bucked (cut-to-length) and scaled. By felling a sample tree and substituting the scale of the tree for the cruise in the volume calculations, it eliminates the measurement bias created through ocular estimation. Cruisers can apply the measurements gained by felling, such as form class, bark thickness, and stump to DBH ratio, to the remaining standing trees and incorporate that information into district databases.

The BLM Manual Supplement Handbook 5310-1, 1989 states, "In addition to meeting sample error standards, the volume estimates of all 3P and variable plot methods must be checked by felling a portion of sample trees. The following minimum number of sample trees must be felled, bucked, and scaled to minimize technique error through an on-site check of merchantable tree height, form class/bark thickness, defect deduction, and grade estimation." Thinning in young stands (such as these) has 85-99 percent log recovery; therefore, cruisers need to fell only 10 percent of sample trees to minimize sampling variability and maintain a low sampling error.

Because of the statistically valid cruise design, cruisers can reliably extrapolate the sample results to the rest of the unit.

STF as a connected action

The BLM includes sample tree falling in the Lone Pine EA as a project design feature and thus analysis of the proposed action includes the impacts of sample tree felling. There is no CEQ requirement that a federal agency must issue a single decision for actions considered and analyzed in the same EA document. Sample tree felling is a ground-disturbing activity that must occur prior to the offering of a timber sale.

All of the proposed timber sales could proceed without sample tree falling. In addition, sample tree falling does not depend on the larger action (the timber sales) for its justification. Sample tree falling can proceed without taking other actions. The BLM might not choose to offer these sales. However, the volume tables gained from conducting sample tree falling could be used to assess the final cruise volume in sales that occur within the same watershed and have similar stand characteristics.

Other timber sale preparation activities occur before a timber sale decision is made. These include tree marking, flagging of sale boundaries, surveying property lines and biological surveys. Unlike sample tree falling, these activities are not ground disturbing and occur as part of routine timber sale preparation. Nor do these activities justify that a timber sale goes forward. The BLM has conducted many of these activities for a sale and the sale has never gone forward. Therefore, issuing a decision to conduct sample tree falling does not itself constitute a decision to offer a timber sale.

Appendix C Wildlife Timing Restrictions

Table C-1 - Seasonal restrictions to avoid disturbance to T&E wildlife species on applicable project areas

Project Area	Northern Spotted Owl		Marbled Murrelet		
	Suitable Habitat within 65 yards (acres)	**Seasonal Restrictions**	**Occupied Habitat within 100 yards (acres)**	**Suitable Habitat within 100 yards (acres)**	**Seasonal/ Timing Restrictions**
Big Bend	6	Yes	-	10	Yes
Brownstone	9	Yes	-	2	Yes
Crosby	3	Yes	-	-	-
Dora	23	Yes	30	30	Yes
Fox Bridge	-	-	-	-	-
Frona	6	Yes	1	8	Yes
John's Creek	20	Yes	6	28	Yes/No
Llewellyn	-	-	-	-	-
Maintenance Shop	-	-	-	-	-
North Coquille Jct.	20	Yes	-	31	Yes
Rock Prairie	3	Yes	-	4	Yes
Schuck Mtn.	-	-	-		-
Steele Cherry	31	Yes	40	35	Yes
Weaver Tie	13	Yes	22	21	Yes
Weekly	25	Yes	40	43	Yes
Wimer	6	Yes	-	10	Yes
Yankee	29	Yes	-	12	Yes
Zumwalt	9	Yes	-	14	Yes
Totals	**203**		**139**	**248**	

Northern Spotted Owls

Seasonal restrictions would limit noise-disrupting activities during the critical breeding season (March 1 to June 30). These restrictions apply to project areas within 100 yards of suitable habitat. However, protocol surveys are ongoing in all suitable habitat within 65 yards except for the Crosby and Rock Prairie areas. If northern spotted owls did not use any of the adjacent stands, then restrictions would not apply in those project areas as per the protocol (USDI 2012). Since these overlap with marbled murrelet restrictions, this only extends the harvest season for the additional month of March.

Marbled Murrelets

Seasonal restrictions would limit noise-disrupting activities during the critical breeding season (April 1 to August 5). These restrictions apply to project areas within 100 yards of occupied or suitable murrelet habitat. From August 6 to September 15, daily timing restrictions would prohibit activities from occurring earlier than two hours after sunrise or occurring after two hours before sunset.

Appendix D Stand Information

This table shows the current condition within the stands for which stands exams were conducted. This also shows the FVS modeling results for immediately post-treatment, the no action alternative within 50 years and the proposed action within 50 years. The column headings abbreviations are:

TPA – Trees per Acre
BA – Basal Area
DBH – Diameter at Breast Height
RD – Relative Density

The Scenarios are current condition, post thin is the first year after harvest, NA +100 is the no action alternative stand condition in 100 years, PA +100 is the proposed action alternative stand condition in 100 years

Table D-1 - Stand exam information.

Project Area	Scenario	TPA	BA	DBH	RD	Canopy Cover	Large Snags/acre >23 in. DBH
Big Bend	Current	211	269	15.3	69	72	0
	Post Thin	54	143	21.9	30	45	0
	NA +100	57	396	35.7	66	56	20
	PA +100	28	344	47.4	50	51	11
Brownstone	Current	202	267	15.5	68	76	0
	Post Thin	58	110	18.6	26	39	0
	NA +100	37	400	44.6	60	54	29
	PA +100	29	345	47.0	50	50	12
Crosby	Current	221	295	15.6	75	76	0
	Post Thin	56	172	23.7	35	47	0
	NA +100	66	395	33.1	69	59	15
	PA +100	31	338	44.6	51	52	7
Frona (744)	Current	283	300	14.0	80	75	0
	Post Thin	55	169	23.7	35	46	0
	NA +100	112	385	25.1	77	64	14
	PA +100	32	311	42.0	48	52	7
Frona (757)	Current	100	274	22.4	58	68	1
	Post Thin	54	189	25.3	37	51	1
	NA +100	33	392	46.7	57	54	17
	PA +100	27	357	49.4	51	51	11
Maintenance Shop	Current	304	336	14.2	89	90	0
	Post Thin	93	209	20.3	47	61	0
	NA +100	97	396	27.3	76	72	16
	PA +100	45	363	38.7	58	58	11
North Fork Coquille	Current	250	376	16.6	92	85	0
	Post Thin	61	195	24.3	40	52	0
	NA +100	88	398	28.8	74	63	15
	PA +100	55	330	41.9	51	54	8
Schuck Mtn.	Current	233	288	15.1	74	81	0
	Post Thin	58	116	19.2	27	42	0
	NA +100	48	400	39.0	64	59	25
	PA +100	30	335	45.2	50	53	10
Weaver Tie	Current	150	251	17.5	60	73	0
	Post Thin	65	176	22.2	37	50	0
	NA +100	72	365	30.4	66	65	11
	PA +100	38	317	38.9	51	52	8
Zumwalt	Current	404	280	11.3	83	91	0
	Post Thin	76	112	16.4	28	48	0
	NA +100	165	383	20.7	84	82	6
	PA +100	49	281	32.5	49	59	4

Appendix E Special Status Species – Botany

List of all Bureau sensitive botany species possibly occurring within the Lone Pine analysis area. Low ≤ 2 known sites, Moderate 3-9 sites, and High ≥10 sites on District. For species with known sites nearby the project area, likelihood is increased; species with sites away from the area and primarily coastal zone, likelihood is decreased.

Table F-1 - Special status botany species and the likelihood of presence within the action area.

Scientific and Common Name	Documented (D) or Suspected (S) on Coos Bay District	Likelihood of Occurring in the Project Area
VASCULAR PLANTS		
Adiantum jordanii (California maidenhair fern)	D	Low. Known from Bear Creek Recreation Site
Erigeron cervinus (Siskiyou daisy)	S	Low. Preferred habitat is scarce in the project area.
Iliamna latibracteata (California globe mallow)	D	Low. One known site on district; prefers areas with more light - openings in the forest, recent burns, roadsides, etc.
Pellaea andromedifolia (Coffee fern)	D	Moderate. Has been found close to the project area.
Polystichum californicum (California sword fern)	D	Low. Rare on district, but could potentially show up almost anywhere in the project area.
Romanzoffia thompsonii (Thompson's mist maiden)	D	Low. Preferred habitat is scarce in the project area.
Scirpus pendulus (drooping bulrush)	S	Low. Preferred habitat is scarce in the project area.
Trillium kurabayashii (=*T. angustipetalum*)(giant purple trillium)	D	Low. Only one site on district.
LICHENS		
Bryoria subcana	D	Moderate. Has been found close to project area.
Calicium adspersum	S	Low. Scattered legacy trees provide habitat in project area.
Heterodermia leucomela	D	Low. All district sites found on immediate coast so far.
Hypotrachyna revoluta	D	High. One site found in Lone Pine project area.
Leptogium cyanescens	S	Low. No known sites on district.
Niebla cephalota	D	Low. All district sites on immediate coast, but could be found inland.
BRYOPHYTES		
Codriophorus depressus (*Racomitrium depressum*)	S	Low. Scattered legacy trees provide habitat in project area.
Cryptomitrium tenerum	S	Low. No known sites on district.
Metzgeria violacea	D	High. Several sites on district close to project area.
Porella bolanderi	S	Low. No known sites on district.
Schistostega pinnata	S	Low. No known sites on district.
Tetraphis geniculata	S	Low. No known sites on district.
FUNGI (surveys not practical)		
Arcangeliella camphorata	D	Moderate. Three sites have been found on district.
Boletus pulcherrimus	S	Low. Recent site from Blacklock Point area of Curry County.
Cortinarius barlowensis (=C. azureus)	S	Low. No known sites on district.
Phaeocollybia californica	D	High. Four sites found in Lone Pine project area.
Rhizopogon exiguus	S	Low. Habitat is present – site near Mapleton on Siuslaw N.F.

Appendix F Botany Monitoring Project

Because there is little information on specific buffer sizes for individual Bureau sensitive fungal species, a monitoring project would be initiated at the four Bureau sensitive fungal sites of *Phaeocollybia californica,* which were incidentally found during lichen and bryophyte surveys on three of the commercial thinning units on the proposed Frona timber sale area. Two of the four sites would be buffered using a buffering criterion Coos Bay BLM developed to protect the underground fungal mycelia network as well as protecting the microclimate around the mycelial network (USDI 2002). The other two sites would remain unbuffered.

Surveys would be done at each site by a Botanist familiar with this fungal species three times, with surveys at least 10 days apart, during the fall fruiting period (approx. mid-October through mid-December) to try to re-find sporocarps of *Phaeocollybia californica*. Since sporocarps are not necessarily present every year, botanists would conduct monitoring each fall for five years after completion of the thinnings.

In addition, if funding were available, a soil sampling technique using genetic markers specifically developed for *Phaeocollybia californica* would be used pre- and post-thinning to determine if genetic material persists at each site (Gordon 2012). These monitoring techniques would be helpful in determining if a known *Phaeocollybia californica* site could persist in a thinning without a buffer and/or if *Phaeocollybia californica* persists in a thinning in which the site and adjacent microsite have been buffered.