United States Department of the Interior

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IN REPLY REFER TO

5400/1792 (ORC030)
DOI-BLM-OR-C030-2012-0004-EA
Soup Creek VRH Environmental Assessment

July 20, 2015

Dear Citizen:

The Finding of No Significant Impact (FONSI) for the Soup Creek Variable Retention Harvest (VRH) Environmental Assessment (DOI-BLM-OR-C030-2012-0004-EA), released on December 17, 2014, has been withdrawn and revised in its entirety to provide additional clarifying information relating to determining significance.

While revising this FONSI, it came to light that the EA contained several minor numerical errors within the wildlife section. Therefore, the Soup Creek Variable Retention Harvest (VRH) Environmental Assessment (EA), released on December 17, 2014, has also been updated to correct these numerical errors. The result of these changes does not change the results of the analysis and only clarifies the supporting information for the effects analysis. The summary of changes for this July 23, 2015 update of the EA is provided below, followed by the summary of changes made for the EA released on December 17, 2014.

The Soup Creek VRH Environmental Assessment and signed Finding of No Significant Impact (FONSI) have been posted to the district's website: http://www.blm.gov/or/districts/coosbay/plans/index.php. This project has been designed to implement management objectives and direction of the 1995 Coos Bay District Resource Management Plan and ecological restoration principles designed by Drs. Norman Johnson and Jerry Franklin. The Environmental Assessment analyzes a No Action Alternative and a Proposed Action Alternative for conducting variable retention harvest in the General Forest Management Area portion of the Matrix Land Use Allocation (LUA).

The treatments would be implemented through a timber sale contract to be offered in FY 2015. A Decision Document has been prepared and a notice will be advertised in the local paper as of the date of this letter.

EA update (July 23, 2015) **-** Total dispersal habitat acres within the CHU was added in Table III-8, page 52, to reflect the tables additive total of suitable and dispersal-only habitats. The total dispersal habitat (acres) within the watershed (all ownerships) in Table III-9, page 53, was also corrected along with suitable habitat acres and total acres within the action area in Table III-10 on page 53.

Reference to the relevant percent harvest was adjusted in each Table to match these changes. In addition, reference to suitable habitat in Table III-10 was differentiated into two rows to show general regional data with site specific data. Reference to spotted owl site in the title of this table, along with the corresponding row heading, was changed to better reflect the information's intent. Lastly, correlating sentences on page 58 of the effects analysis were changed to reflect the number changes within Table III-8 and III-9.

Upon reviewing public comments from the draft EA and FONSI, released on August 6, 2014, the BLM made some notable changes to the EA to provide additional information. These do not constitute substantive changes or result in different outputs or alternatives; therefore, additional effects analysis is not needed. Additions do not change the proposed action or effects, and only provide additional clarity to the analysis.

The following is a summary of the notable changes to the EA from the draft. Appendix D has been added (p. 112-116) to provide the public comments with detailed response and EA changes.

RMP - There was a comment that the BLM did not adequately consider an alternative to use prescribed fire to manage seral stage diversity as mentioned in the RMP.
Response – We have included additional information on page 5 to clarify why this issue was considered but eliminated from detailed analysis.

Ecological need - There was comment that that the BLM did not adequately consider the entire watershed or the specific watershed historical condition when quantifying the need for high quality early seral ecosystems.
Response – We have included additional information on page 19 to clarify the use of historical information for this analysis, and added information pertaining to RMP decadal projections on pages 1 and 27.

Marbled Murrelets - There was comment about the effects of harvest upon interior habitat near the proposed treatment area and disclosure of survey results.
Response – We have included additional information on page 54 to clarify the proximity of habitat from the proposed action, and provided additional survey information for nearby the project area.

Global Warming - There was comment about the analysis of carbon flux for the alternatives and the recognition of potential influence.
Response – We have included additional information on pages 77 and 78 to clarify short term emissions, and uncertainty involved when making long term flux projections.

None of these changes in the EA invalidated the analysis supporting the FONSI, which I have now signed.

Please direct requests for copies or questions to Coos Bay District BLM, 1300 Airport Lane, North Bend OR 97459-2000, ATTN: Todd Buchholz; call (541) 756-0100; FAX (541) 751-4303, or email to blm_or_cb.mail@blm.gov, ATTN: Todd Buchholz.

Sincerely,

/s/ Todd D. Buchholz
Todd D. Buchholz
Umpqua Field Manager

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IN REPLY REFER TO
1792/5400 (ORC030)
DOI-BLM-OR-C030-2012-0004-EA
Soup Creek VRH Environmental Assessment

REVISED FINDING OF NO SIGNIFICANT IMPACT
for the
Soup Creek VRH Environmental Assessment
DOI-BLM-OR-C030-2012-0004-EA

The Finding of No Significant Impact (FONSI), released on December 17, 2014, has been withdrawn and revised in its entirety within this document to provide additional clarification and supporting information within Section III.

I. Introduction

An Interdisciplinary Team has prepared an Environmental Assessment (EA), which contains analysis of the effects of implementing a variable retention harvest on 111 acres. The variable retention harvest prescription is based on the principles of Drs. Norman Johnson and Jerry Franklin (*Applying Restoration Principles on the BLM O&C Forests in Southwest Oregon* (2010)).

The Soup Creek VRH EA contains two alternatives: a no action alternative and a proposed action alternative. The no action alternative provides a useful baseline for comparison of environmental effects and demonstrates the consequences of not meeting the need for the action. The proposed action alternative describes the environmental effects of meeting the purpose and need. The proposed action includes conducting timber harvest to develop a desired age class distribution, and initiating active management to develop early successional forest conditions that provide more ecological benefits to Northern Spotted Owls (EA p. 3). The proposed action also includes 3.2 miles of road renovation, and 0.06 miles of road decommissioning. The BLM would offer the timber sale in 2015. The project is located in T. 23 S., R. 09 W., Section 19, Willamette Meridian.

II. Background

The EA was developed under the management direction of the 1995 Coos Bay District Record of Decision and Resource Management Plan (1995 ROD/RMP). The analysis supporting this decision tiers to the *Final Coos Bay District Proposed Resource Management Plan/Environmental Impact Statement* (UDSI 1994). The Coos Bay District ROD/RMP is supported by and consistent with the *Final Supplemental Environmental Impact Statement (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 [NWFP]) (USDA and USDI 1994a) and its *Record of Decision* (USDA and USDI 1994b) as supplemented and amended.

The Soup Creek VRH project is consistent with the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, as incorporated into the Coos Bay District Resource Management Plan.
Details of required project surveys are described within the Soup Creek VRH EA analysis. A decision record issued prior to any timber sale would identify if any species were found and the buffer measures taken to ensure species persistence.

As stated in the Record of Decision for the Northwest Forest Plan, the Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems on public lands within the range of Pacific Ocean anadromy. Consistency of the proposed action alternative with the ACS objectives is included in Chapter 3 & 4 of the EA (pp. 37-42).

III. Finding of No Significant Impact

The Soup Creek EA effects analysis indicates that there would not be a significant impact on the quality of the human environment from the implementation of either alternative. This finding and conclusion is based on my consideration of the Council of Environmental Quality's (CEQ) criteria for significance (40 CFR 1508.27), both with regard to context and intensity of the impacts described in the EA.

Context

The proposed action would occur within the Matrix land use allocation, particularly the General Forest Management Area (GFMA), as designated by the 1995 Coos Bay District ROD/RMP. Management direction and objectives for Matrix lands includes conducting silvicultural treatments to "produce a sustainable supply of timber" and to "provide early-successional habitat" (EA p. 2). This previously thinned stand has been identified as meeting the management direction for regeneration harvest because the stand is within the age class (> 60) designated by the 1995 Coos Bay District RMP to provide scheduled timber harvest (EA p. 1) while also assisting creation of forests with desired structural characteristics (EA p. 3). The stand proposed for harvest is approximately 67-70 years old, structurally homogenous, with high competition among trees, slowing basal area growth, and would not meet definitions of late-successional forest (EA p. 20).

The BLM adopted its Coos Bay Resource Management Plan in 1995, incorporating the 1994 Northwest Forest Plan (NWFP) and its EIS. BLM has thus prepared two EISs that consider the significant and potentially significant effects of conducting timber harvest in the Coos Bay District within stands of the age class found in this project. The EISs for the NWFP and 1995 Coos Bay RMP projected effects for 7,600 acres of regeneration harvest in the second decade (2005-2014). In actuality, the Coos Bay District offered 383 acres of regeneration harvest, which is only 5.0% of the projected amount of regeneration harvest (EA p. 1). Under these plans and EISs, the projection of effects in the third decade (2015-2024) was based upon 7,900 acres of regeneration harvest techniques. The Soup Creek Project will be one of the first regeneration projects in this third decade, and equate to 1.4% of the projected decadal regeneration harvest offerings (EA p. 27). Given the very large discrepancy between the acreage of regeneration harvest assumed within the effects analysis of the NWFP and RMP EISs and what the Coos Bay District has actually offered for sale, it is abundantly clear that the incremental effect of the harvest proposed in the Soup Creek Project is well within the effects of the total regeneration harvest projected within the Coos Bay District by the NWFP and RMP EIS's. Even though the incremental harvest within the Soup Creek project falls within the NWFP and RMP EISs effects analysis, the BLM analyzed the specific effects of the proposed action to determine if the timber sale presents effects that are in and of themselves significant under NEPA. The answer is no due to the reasons detailed below in the evaluation of NEPA intensity factors.

The RMP also has management objectives to manage habitat for federally listed species to achieve species recovery in compliance with the Endangered Species Act (RMP p. 32). Surveys for the Northern Spotted Owl have been conducted annually on known sites near the project area, and occupancy has been very infrequent during the past ten years. For sites with home ranges partially within 1.5 miles of the project area, there has been no known reproduction (fledglings) within the last ten years, and the last verified nesting attempt was in 2005. One lone adult was detected in 2011 (EA p. 51).

Occupancy is not reasonably certain to occur within or immediately adjacent to the project area because no home range overlaps the project area (EA p. 51). Additionally, regardless of the proposed action or no action, the presence of a known barred owl core nest site immediately adjacent to the project area decreases the probability that a spotted would use the site as long as the barred owl is present (EA p. 51, 56). Inter-species competition

would not likely be exacerbated by the proposed action because short-term effects of harvest would not modify high quality habitat (USDI-FWS 2014, p. 34), and occupancy is not currently reasonably certain.

The proposed action is consistent with the *Revised Recovery Plan for the Northern Spotted Owl* (USDI-FWS 2011) which supports application of ecological forestry approaches to provide complex and resilient habitat that contributes to long-term Northern Spotted Owl recovery (EA p. 56). The long-term effects of the proposed action would benefit Northern Spotted Owl habitat more effectively, as compared to leaving these stands untreated, by promoting the development of trees with structural features that support Northern Spotted Owl foraging and roosting (EA pp. 58-59).

The proposed action is not likely to adversely modify the Northern Spotted Owl Critical Habitat Unit (CHU) (USDI-FWS 2014, p. 49), and is expected to result in long-term improvement of Northern Spotted Owl habitat conditions within the CHU (EA p. 58)[1].

The proposed action is also consistent with recommendations in the *Recovery Plan for the Marbled Murrelet* (USDI-FWS 1997), as protocol surveys (2012-2014) found no occupancy in the proposed action area (EA p. 54), and harvest would not remove suitable murrelet habitat (EA p. 59). In addition, the proposed action would improve the development of new habitat by increasing the rate of canopy development (EA p. 25, 59)[2].

Intensity

1. *Impacts that may be both beneficial and adverse* (40 CFR 1508.27 (b)(1))

Any impacts, both beneficial and adverse, are not significant because, as explained above, the incremental effects of harvest in the Soup Creek Project falls within the range and scope of timber management analyzed in the 1994 Final Coos Bay District Proposed Resource Management Plan/Environmental Impact Statement (EIS) and the NWFP EIS to which the EA is tiered.

The proposed action would remove 88 acres of Northern Spotted Owl dispersal habitat, which includes 37 acres of foraging-only habitat and 51 acres of dispersal-only habitat (EA p. 58)[3], but would not affect or overlap any Northern Spotted Owl core or home range area (EA p. 51). That is to say, it is highly unlikely that there is any individual owl in the area using these acres for dispersal (EA p. 58). For generalized owl dispersal purposes, this short-term removal amounts to only 0.16% of dispersal habitat across all ownerships in the watershed (54,441 acres), or 0.44% of dispersal habitat on federal lands (EA p. 53). While the state of the science does not quantify the acreage of dispersal habitat that Northern Spotted Owls need to provide dispersal function across all ownerships in a watershed of this size (86,057 acres of which 84,305 acres is forested, EA p. 53), we can confidently conclude that the remaining 99.84% of post-harvest dispersal habitat in the watershed (54,353 acres) will allow continued dispersal function (USDI-FWS, p. 31). This is because Northern Spotted Owl habitat connectivity appears to be sufficient, in that over 60 percent of the watershed currently is in dispersal habitat condition (EA p. 58), when viewed in the context of the Thomas et al. (1990) recommendations (i.e. the "50-11-40" rule-landscapes consisting of at least 50 percent Northern Spotted Owl dispersal habitat is more likely to successfully accommodate dispersing owls). In addition, dispersal habitat function and connectivity for Northern Spotted Owls do not appear to be limiting in the Oregon Coast Range Province or in the NWFP area (EA p. 58).

Further, although the proposed action would alter short-term dispersal habitat conditions, long term benefits to the quantity and quality of habitat are highly likely (EA pp. 57-59) because variable retention harvest would result in the creation of multiple-aged stands as a younger generation of trees becomes established around the retained islands of the pre-harvest stand (EA p. 25). This benefits Northern Spotted Owl habitat by accelerating

[1] The effects of the proposed action on the CHU, Northern Spotted Owl, and its habitat are addressed under Intensity factor #9 below.
[2] The effects of the proposed action on marbled murrelet habitat are addressed under Intensity factors #1, 4, and #9 below.
[3] The removal of foraging habitat is addressed under Intensity factor #9 below.

the development of older forest with structural characteristics that support adequate levels of Northern Spotted Owl prey which in turn would provide improved habitat for nesting and roosting (EA pp. 57-59).

The proposed action would have no adverse effect on marbled murrelets because protocol surveys (2012-2014) found no occupancy in the proposed action area (EA p. 54), and harvest would not remove any suitable murrelet habitat (EA p. 59). However, the project would provide a beneficial effect by recruiting suitable murrelet habitat through disturbance based epicormic branching in residual trees (EA pp. 20, 25) and maintenance of wider spacing within the areas of regenerating forest (EA p. 59).

This means that treatments would put the stands on a growth trajectory that provides for rapid canopy development (EA p. 25) and increased numbers of large limbed trees with potential platform structures that marbled murrelets could use to nest (EA p. 59). In contrast, the absence of stand-replacing disturbances would likely postpone development of structural attributes associated with structurally complex forests by 100 years (EA pp. 23-24).

2. *Public Health and Safety* (40 CFR 1508.27(b)(2))

No aspect of the proposed action would have a significant effect on public health and safety. Smoke management from pile burning would adhere to the Oregon Smoke Management Plan (EA p.14), which would limit or prohibit burning during periods of stable atmospheric conditions, to minimize the potential for smoke to penetrate downwind human population centers (EA p. 70). Fire hazard reduction (EA pp. 68 -70) includes 46 acres of hand piling, and 42 acres of broadcast burning. Project design features include 100% mop up to reduce smoke persistence and continued consumption (smoldering) of coarse wood and stumps (EA pp. 14 -15). This would greatly limit smoke dispersal. Due to the combination of burning only on days with stable atmospheric conditions and limited smoke dispersal, there would be no significant impacts on air quality associated with burning.

The proposed action would have no impact on geologic conditions or increase the risk for catastrophic landslides (EA p. 51) because project design/placement of areas of retention, and road drainage features minimize (essentially eliminate) the potential for slope movement associated with timber harvest (EA p. 14). Root strength would be retained within Riparian Reserves where rapidly moving landslides typically originate. Thus there is a highly unlikely chance the proposed action would contribute to rapid moving landslides, or any such event could reach structures or roads below the proposed action area (EA p. 51). Project location and design criteria (stream buffer width and aggregate location) ensure there would be no impact to water quality, or drinking water sources, from sediments (EA p. 36, 79). A water supply line originating in the southwest corner of the project area would be protected by a buffer width (220 feet) which is greater than four times the width specified by the state (50 feet) for protecting this type of water supply (EA p. 36). The proposed project is not located within headwaters and is not part of a Drinking Water Protection Area (EA p. 79).

No herbicides would be directly used in conjunction with this project. The BLM only uses herbicides along roads as part of the Coos Bay Integrated Noxious Weed Program (EA p. 16). Noxious weed control methods for the proposed action includes manual control (hand brushing), and native grass seeding along roadsides (EA p. 16). Because herbicides are not used for the management of BLM timberland (EA p. 71), herbicide use would not be a public health or safety issue associated with this project.

3. Unique characteristics of the geographic area (40 CFR 1508.27(b)(3))

There are no known prime or unique farmlands, wetlands, floodplains, Wild and Scenic Rivers Areas of Critical Environmental Concern or wilderness values within the project area (EA p. 80).

4. *Degree to which effects are likely to be highly controversial* (40 CFR 1508.27(b)(4))

CEQ guidelines relating to controversy refer not to the amount of public opposition or support for a project, but to a substantial dispute as to the size, nature, or effect of the action. The EISs for the NWFP and 1995 Coos Bay RMP projected effects for 7,600 acres of regeneration harvest in the second decade (2005-2014). In actuality, the Coos Bay District offered 383 acres of regeneration harvest which was only 5% of the projected amount of regeneration harvest. Under these plans and EISs, the projected effect in the third decade (2015-2024) was based upon 7,900 acres using regeneration harvest techniques. The Soup Creek Project will be one of the first regeneration projects in this third decade, and equate to 1.4% of the projected decadal regeneration harvest offerings (EA p. 27). Given the very large discrepancy between the acreage of regeneration harvest assumed within the effects analysis of the NWFP and RMP EISs and what the Coos Bay District has actually offered for sale, it is abundantly clear that the incremental effect of the harvest proposed in the Soup Creek Project is well within the effects of the total regeneration harvest projected by the NWFP and RMP EISs in the Coos Bay District. The Coos Bay BLM acknowledges that there may be social controversy or differences of opinion regarding the proposed action, however this did not equate to scientific controversy over the nature of effects of the proposal.

The EA contains analysis of effects on relevant elements of the human environment. This project would implement a 111-acre variable retention harvest on trees under the age of 80; resulting in 88 acres of complex early successional habitat. All the effects of this timber harvest are described at the site-specific level in the EA. Those effects are not scientifically controversial because these stands are structurally less diverse (even-aged), less than 80 years old (EA p. 52), have been previously harvested (EA p. 20), and treatment would not remove RA32 habitat (EA p. 54). Therefore, the proposed action is consistent with *Revised Recovery Plan for the Northern Spotted Owl* (RPNSO) (USFW 2011) recommendations for active management and disturbance based principles (EA pp. 2, 3, 52, 56-62) to promote its ecological goals.

The proposed action would not harvest trees with structural attributes known to be beneficial to the murrelet. Trees within the project area exhibiting potential structural attributes would be protected through project design (EA p. 26, 59). Seasonal restrictions (EA p. 16) would prevent potential disturbances to marbled murrelets within the disruption distance of habitat exhibiting occupied behaviors. This would provide consistency with the *Recovery Plan for the Marbled Murrelet* (USDI-FWS 1997) recommendations to mediate the effects of edge and provide for the protection of interior forest habitat (EA p. 54).

No unique, appreciable, or serious question regarding scientific controversy has been identified regarding the effects of the proposed action. Effects are expected to be consistent with those of the published literature cited in the EA and are not controversial in a scientific sense.
The BLM is aware that the fundamental nature of science requires disagreement and vigorous debate, and as a result some disagreement will always be present in any scientific discussion.

A notable example of this discussion, found in the article by DellaSala et al 2013, is limited in direct application, and is more focused on criticism of ecological forestry as a potential region-wide management policy. As such, key concerns centered on active management of stands greater than 80 years. Although directed refuted in the same publication (*J. For*. 111(6):420–437) and referenced as an "opinion piece" by key scientists (Henson et al., 2103, Franklin and Johnson, 2013), the BLM has fully considered this source and the potential issues it presented. Issues the article brought forward have been considered in the EA such as historic baseline (EA pp. 19, 66-67), natural disturbance pathways (EA pp. 5, 23-24), and landscape context (EA pp. 6, 27-28). Scientific debate does not foreclose NEPA to act, so long as there is a reasonable basis for and analysis of scientific viewpoints (*Center for Biological Diversity v. U.S. Forest Service*, 349 F.3d 1157, 1160 [9th Cir. 2003]). Largely because the proposed action is in stands less than 80 (EA p. 52), the article does not generate and is not evidence of a substantial dispute over the size and nature of proposed action effects.

The BLM is also aware that the RPNSO uses the word 'controversy' in its discussion of Northern Spotted Owls and ecological forestry (p. III-11). A thorough reading of the full discussion in the Recovery Plan, however, reveals that the controversy is not related to the size, nature, or effect of ecological forestry, but instead to the ongoing societal controversy over management of Pacific Northwest forests. Correspondingly, the RPNSO identified that:

> The Service continues to recommend that active forest management and disturbance-based principles be applied throughout the range of the spotted owl with the goal of maintaining or restoring forest ecosystem structure, composition and processes so they are sustainable and resilient under current and future climate conditions in order to provide for long-term conservation of the species. The majority of published studies support this general approach for Pacific Northwest forests, although there is some disagreement regarding how best to achieve it. We received widely varying recommendations for meeting this goal from knowledgeable scientists. Most of this variance in opinion is due to the scientific uncertainty in: (1) accurately describing the ecological "reference condition" or the "natural range of variability" in historical ecological processes, such as fire and insect outbreaks across the varied forest landscape within the range of the spotted owl (e.g., see Hessburg et al. 2005, and Keane et al. 2002, 2009); and (2) confidently predicting future ecological outcomes on this landscape due to rapid, climate-driven changes in these natural processes, with little precedent in the historical (or prehistoric) record (Drever et al. 2006, Millar et al. 2007, Long 2009, Littell et al. 2010). These are very real problems that should be addressed with more research (Strittholt et al. 2006, Kennedy and Wimberly 2009). In the meantime, addressing this uncertainty in a careful but active manner is the challenge of this Revised Recovery Plan and of forest management in general (See RPNSO at III-13).

While the Fish and Wildlife Service (FWS) in the RPNSO identified differences of scientific opinion regarding the informational needs for active forest management to achieve the goals of forest restoration for achieving owl recovery, this difference in scientific opinion does not rise to the level of a highly controversial scientific debate that requires an EIS for this project. The difference of opinion on informational needs does not demonstrate a scientific controversy over using active forest management to restore ecological processes. As the RPNSO stated: "There is a scientific and social consensus emerging that land managers must restore more sustainable (resistant and resilient) ecological processes to forests at various landscape scales (Hessburg et al. 2004, Millar et al. 2007, Long 2009, Moritz et al. 2011) (See RPNSO at III-12)." The FWS RPNSO identification of "consensus" on this issue demonstrates that there is no serious question on whether scientific controversy exists over the use of active forest management through projects like the proposed action to achieve long-term Northern Spotted Owl recovery. This kind of policy debate is a sign of healthy discussion, but not of controversy as NEPA uses the term, and thus is not evidence of a substantial dispute over the size or nature of proposed action effects. The RPNSO goes on to state that:

> Federal land managers should apply ecological forestry principles where long-term spotted owl recovery will benefit, even if short-term impacts to spotted owls may occur (Franklin et al. 2006) to improve the resiliency of the landscape in light of threats to spotted owl habitat from climate change and other disturbances. This includes early-successional ecosystems on some forest sites (Swanson et al. 2010, Perry et al. 2011) (See RPNSO at III-14, EA p. 2).
>
> [m]Management designed under an ecological forestry framework should avoid existing high value habitat, if possible, while meeting long-term restoration goals. Within provincial home ranges but outside core-use areas, opportunities exist to conduct vegetation management to enhance development of late-successional characteristics or meet other restoration goals in a manner compatible with retaining resident spotted owls. Restoration activities conducted near spotted owl sites should first focus on areas of younger forest less likely to be used by spotted owls and less likely to develop late-successional forest characteristics without vegetation management. Vegetation management should be designed to include a mix of disturbed and

undisturbed areas, retention of woody debris and development of understory structural diversity to maintain small mammal populations across the landscape (See RPNSO at III-17).

Thus, the reasoning of the RPNSO supporting management action defines the low level of controversy connected to the proposed action. Again, the controversy referenced in the RPNSO reveals that references to "controversy" are largely referring to the social controversy of implementing active forest management to achieve restoration goals. The RPNSO does identify differences in scientific opinion about information needs associated with implementing such actions, but not whether such actions should be undertaken; particularly in younger stands outside of Northern Spotted Owl home-ranges and core areas, which is the case of the proposed action.

While public comments generally expressed disagreement with the proposed action, none of the comments established a scientific basis for disagreement about the nature of effects that have not been analyzed within the EA and/or Biological Assessment. Comments generally centered on rhetorical questions or subjective assessments; such as the ecological need for early seral habitat, quality of habitat for the murrelet, or the alternatives connection to global warming. These comments have been fully considered, and analyzed within the EA (EA pp. 4-7). Additionally, a section was added to the EA to address the comments in detail (EA pp. 112-116). The BLM is aware that social controversy is ongoing over the existence and practices of timber harvest on public lands across western Oregon. This societal debate, reflected in the comments received by the BLM and addressed as applicable in the EA (EA pp. 4-7, pp. 112-116), is precisely the public position that the CEQ guidelines have identified as not relevant to the term 'controversy' as applied to NEPA.
The BLM has found that none of the comments received from the public establish a dispute over the size, nature, or effects of the action. Because those comments do not establish such a dispute, the proposed action is not controversial under NEPA.

5. *Degree to which effects are highly uncertain or involve unique or unknown risks* (40 CFR 1508.27(b)(5))

The possible effects of the proposed activities on the quality of the human environment are not highly uncertain and do not involve unique or unknown risk. Timber harvest is a common practice on lands managed by the BLM in western Oregon. None of the public comments received indicated unique or unknown risks to the human environment. The use of variable retention harvest in the proposed action is not "experimental" and does not seek to "pilot" the use of ecological forestry in older stands.

As discussed above, the RPNSO discusses scientific uncertainty regarding the informational needs for active forest management to achieve the goals of forest restoration for achieving owl recovery, specifically (1) accurate ecological baseline information, and (2) confident predictions of outcomes of actions to restore conditions, given uncertainty in climate conditions. The RPNSO did not state that ecological forestry should be "tested" as a way of addressing these uncertainties, but rather these uncertainties were the reason for recommending *application* of ecological forestry (See RPNSO at II-11, III-18) as a solution for addressing those uncertainties and as a part of ensuring the best available science (which includes the recommended practice of ecological forestry) is used to benefit ecosystems and Northern Spotted Owls in the long term. As discussed in more detail below, this project presents no serious question as to uncertain effects regarding the use of ecological forestry within the stands included in the proposed action to benefit Northern Spotted Owls in the long term.

The EA analyzed the historical range of variability for this type of ecological disturbance in the watershed and their ecological effects (EA pp. 24-28, 113). The proposed action only accounts for 0.1% of forested lands in the watershed (EA p. 53) and is in context with historically plausible fire disturbance patterns and occurrences of early seral forest in this area (EA pp. 19-24, 66-71). Thus there is no highly uncertain information about baseline conditions in the action area. As discussed below, BLM has used the best available scientific information regarding reasonably foreseeable climatic conditions, and made predictions of project effects and outcomes based on that best available science and the BLM's professional judgment and expertise. Any uncertainty in local climate conditions, or even regional or global climatic conditions, does not suggest the effects, or more

specifically, the restorative outcomes for Northern Spotted Owls from implementing the proposed action are highly uncertain, or that there is a serious question on such issues because, as discussed in more detail below, BLM has a high degree of confidence in its prediction that the proposed action will improve long-term habitat quality, complexity, and resilience to support Northern Spotted Owl recovery due to several factors in harvest prescriptions and unit design (EA p. 56).
This is true even with variation in regional climate model estimates because application of larger-scale model results to the analysis area directly would be predicted to induce bias and have low accuracy (EA p. 75).

Climate change and greenhouse gas emissions have been identified as an emerging resource concern by the Secretary of the Interior (Secretarial Order No. 3226; January 16, 2009), the OR/WA BLM State Director (IM-OR-2010-012, January 13, 2010), and by the general public through comments on recent project analyses. It is currently beyond the scope of existing science to identify a specific source of $C0_2$ emissions and designate it as the cause of specific climate impacts at an exact location (EA p. 76). However, to make informed decisions, the EA analysis estimates carbon flux to the analysis area associated with the proposed action. Although the proposed action would be predicted to result in a mid-term (20 yr.) flux of additional carbon to the atmosphere, carbon stores in the reserved portions of the action area under the proposed action would be predicted to approach a steady state at or above 250 metric tons acre C, which is comparable to storage under the no action alternative (EA pp. 77-78). 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. However, estimates of the magnitude and direction in carbon response are probably accurate, and these results may be instructive for comparing the effects of the alternatives on local (watershed-scale) carbon stores (EA p. 79). For all the reasons stated above, the effects of the proposed action are not highly uncertain and do not present unique or unknown risks with regard to carbon flux.

While 88 acres of harvest would remove 37 acres of foraging and 51 acres of dispersal-only habitat from the landscape (88 acres total dispersal), due to the lack Northern Spotted Owl presence within the action area, there would be no direct short-term effects to Northern Spotted Owls (EA p. 57). The proposed action will improve long-term habitat quality, complexity, and resilience to support Northern Spotted Owl recovery due to several factors in harvest prescriptions and unit design, including the fact that 45 percent of the management units 161 acres would be retained, and these untreated areas (riparian reserves and aggregates) would provide dispersal connectivity (EA pp. 57). The long-term creation of future complex habitat would improve forest structural conditions that would assist owl survival when the birds are able to re-colonize the area (EA p. 58). Also, the treated area is likely to support high-quality Northern Spotted Owl foraging habitat in the future (after 30 years) because planting and maintenance of in-growth at lower stocking levels would effectively promote the development of trees with structural features that are beneficial to Northern Spotted Owl foraging and roosting, especially in combination with the continued presence of older trees in untreated areas (EA p. 58). In this way the proposed action would accelerate development of structurally complex forests compared to leaving the stands untreated (EA p. 24) due to the stands current homogeneous structure (EA p. 20) and rate of development (EA pp. 23-24); which barring major disturbance, the untreated stand would unlikely provide understory tree development sufficient to cause a shift from a single-storied to a two-storied or multi-layered structure within 100 years (EA p 23). For all the reasons stated above, the effects of the proposed action are not highly uncertain and do not present unique or unknown risks with regard to stand or habitat development.

6. *Consideration of whether the action may establish a precedent for future actions with significant impacts* (40 CFR 1508.27(b)(6))

The proposed project does not establish a precedent for future actions or represent a decision in principle about future actions with potentially significant effects. The timber management program on BLM-managed lands in western Oregon is well-established and this project would not establish a new precedent.

This project will not bind any future BLM actions and will not shape or determine BLM forestry methods or strategies beyond this project. This project is not "experimental" or a "pilot", but as with any project, BLM will use information learned from implementing the project. This does not mean those learnings commit BLM to any course of action with any future project or overall forest management strategy beyond this individual project, and as such this factor does not weigh in favor of an EIS or raise a serious question on this issue.

7. *Consideration of whether the action is related to other actions with cumulatively significant impacts* (40 CFR 1508.27(b)(7))

There are no individual or cumulatively significant impacts identified by the environmental assessment.

The proposed action would not result in cumulative impacts to forest structure since the proposed action would increase the amount of complex early seral in the watershed by only 0.1% from 3.0%, whereas ten percent (10%) is classed as simplified early seral forest structure within all ownerships of the watershed (EA p. 24-27).

The proposed action would not result in cumulative impacts to aquatic species or water resources as vegetation treatment would not occur within Riparian Reserves; therefore the treatment would not affect future large wood recruitment to the intermittent streams within the action area. Riparian Reserves (220 foot site-potential tree height buffers) would ensure continued delivery of large woody debris (LWD) to streams within the project area (EA p. 32), which is also more than adequate to maintain the existing thermal regime of the drainages within the project area based on LiDAR analysis and recent studies (EA p. 29). Road renovation would not produce a measurable change in the timing or magnitude of peak flows in downstream drainages (EA p. 35), while site-scale peak flow increases, if they occur, would not be measurable at the drainage, sub-watershed, and watershed scales (EA p. 36). Springs and streams within and adjacent to BLM-managed land would still continue to supply water, and deleterious effects are not expected since buffer widths, as described above, are more than four times in excess of State standards (EA p. 36).

There would be no cumulative effects to coho salmon, coho critical habitat, Special Status Species habitat, or Essential Fish Habitat from vegetation treatment or road activities in the Loon Lake-Mill Creek or Lower Lake Creek 6th field sub-watersheds or the Mill Creek 5th field watershed (EA pp. 44-46). Coho habitat is more than 5.5 miles downstream from the harvest units, below a natural barrier (EA p. 46).

The proposed action would not be expected to have direct, indirect or cumulative impacts on existing soil resources or geologic conditions. No signs of current slide activity/instability were observed during site investigations, and because project design features minimize the potential for slope movements there is an unlikely chance the proposed action would contribute to rapid moving landslides, and a highly unlikely chance such an event could reach structures or roads below the proposed action area (EA pp. 49-51).

The effects of the proposed action, would not add any cumulative impacts to Northern Spotted Owls or marbled murrelets within the watershed. In particular, active management of these stands is encouraged by the USFWS to achieve recovery goals for the Northern Spotted Owl, particularly in vacant stands of critical habitat.

The effects of non-Federal actions within and adjacent to the action area are not expected to affect owl critical habitat because these lands are most likely marginal habitat (EA p. 62).

There would be no direct effects for botany Special Status Species from the proposed action and no cumulative effects are expected as it is assumed that Special Status Species in the watershed would be protected only on BLM-administered lands (EA pp. 65-66).

The BLM expects that timber harvest with associated burning activities would continue in the future on state and private ownerships. The BLM has no planned fuels treatments in the watershed in the foreseeable future thus no other federal actions in the area that would contribute to cumulative effects relative to fuels (EA p. 71).

Due to the active management of noxious weeds by BLM and other landowners within the watershed, no cumulative increase in noxious weed infestation within the analysis area is likely (EA p. 72).

No cumulative effects to recreation are anticipated under the proposed action, as recreation within this area is primarily hunting (deer, elk and bear) and mushroom picking. Open for public use roads are the primary way people access this area for their recreational pursuits (EA pp. 73-74).

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%: 2008 RMP FEIS, pg. 538). 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 (EA pp. 76-79).

8. *Scientific, cultural, or historical resources, including those listed in or eligible for listing in the National Register of Historic Places* (40 CFR 1508.27(b)(8))

The proposed activities would not affect districts, sites, highways, structures or objects listed in or potentially eligible for listing in the National Register of Historic Places. Nor would the activities cause a loss or destruction of significant scientific, cultural or historical resources and as such this factor does not weigh in favor of an EIS or raise a serious question on this issue.

9. *Threatened or endangered species and their critical habitat* (40 CFR 1508.27(b)(9))

The Coos Bay BLM has completed consultation with the U.S. Fish and Wildlife Service in accordance with Section 7(a)(2) of the Endangered Species Act for effects to federally listed wildlife species and their critical habitat on lands managed by the Coos Bay BLM. On February 18, 2014 the BLM received a Biological Opinion (#: 01EOFW00-2014-F-0053), which includes a finding that "the Districts proposed action is not likely to jeopardize the continued existence of the Northern Spotted Owl or marbled murrelet, and is not likely to destroy or adversely modify Northern Spotted Owl critical habitat" (USDI-FWS 2014, p. 49). This opinion covers all commercial and non-commercial treatments, and associated roadwork.

As mentioned above, the project will remove 37 acres of Northern Spotted Owl foraging habitat. Although the Service found that the loss of these 37 acres of foraging habitat is likely to adversely affect the Northern Spotted Owl in the short-term, the mid to long-term effects of the proposed project are likely to enhance the quantity and quality of nesting, roosting, and foraging (NRF) habitat in the action area by accelerating the development of older forest with structural characteristics that should support adequate levels of Northern Spotted Owl prey as well as provide improved habitat for nesting and roosting (USDI-FWS 2014, p. 32).

While the removal of 37 acres of foraging habitat represents 6.7 % of the 549 acres of Northern Spotted Owl foraging habitat on 3,488 acres of BLM-administered lands in the 7,773 acre action area; encompassing a radius of 1.5 miles from the project area (EA p. 53). Post- harvest, 512 acres would remain in the vicinity to support short-term foraging for owls that may venture into the area. Short-term foraging opportunities for the Northern Spotted Owl may be provided by the VRH because of contiguous habitat provided by the combination of retention aggregates and riparian reserves (USDI-FWS 2014, p. 30). However, since none of these 37 acres are within any owl home-ranges (or core area), given the location of the barred owl nest, and the lack of Northern Spotted Owl presence near the project area; the removal of 37 acres of foraging habitat would result in no discernable effects to any Northern Spotted Owls (EA p. 58).

While this action would remove dispersal and foraging habitat, the short-term effects would not diminish the conservation support function of the Critical Habitat Unit because of the long-term benefits of creating high quality Northern Spotted Owl foraging habitat using ecological forestry principles (EA p. 58). Taking into account the current status of Northern Spotted Owl foraging and dispersal habitats in the CHU, the above short-term adverse effects of the proposed Soup Creek project are not likely to appreciably diminish the conservation support function of this CHU or critical habitat at the Provincial and range-wide scales primarily because these project impacts are relatively very small in relation to the total amount of existing Northern Spotted Owl foraging and dispersal habitat in the CHU (USDI-FWS 2014, p. 48). The removal of 37 acres of foraging habitat represents 0.04% of the 97,253 acres Northern Spotted Owl foraging habitat within the CHU, with 97,216 acres remaining post-harvest (EA p. 52). In the long-term, the treated area is likely to support high quality Northern Spotted Owl foraging habitat because of managed in-growth at lower stocking levels that will more effectively promote the development of trees with structural features that are beneficial to Northern Spotted Owl foraging and roosting (USDI-FWS 2014, p. 48). In addition, habitat quality for Northern Spotted Owl prey species is expected to improve as there would be a long-term benefit to woodrats with the creation of ecological edges and growth of shrubs or hardwoods (EA p. 58).

As previously discussed, the proposed action will remove 88 acres of Northern Spotted Owl dispersal habitat (51 acres of dispersal-only and 37 acres of foraging). Again, the lack of Northern Spotted Owl presence within the action area would result in no direct short-term effects to Northern Spotted Owls (EA p. 57). The proposed action will improve long-term habitat quality, complexity, and resilience to support Northern Spotted Owl recovery due to several factors in harvest prescriptions and unit design, including the fact that 45 percent of the management unit (161 acres) would be retained, and these untreated areas (riparian reserves and aggregates) would provide dispersal connectivity (EA pp. 56-57). The long-term creation of future complex habitat would provide better conditions than leaving the stands untreated, to ensure owl survival when the birds are able to re-colonize the area (EA p. 58). The treated area is likely to support high-quality Northern Spotted Owl foraging habitat in the future (after 30 years) because, compared to leaving the stands untreated, planting and maintenance of in-growth at lower stocking levels would more effectively promote the development of trees with structural features that are beneficial to Northern Spotted Owl foraging and roosting, especially in combination with the continued presence of older trees in untreated areas (EA p. 58).

Short-term adverse effects of the proposed action, including effects to foraging and dispersal habitat, are not likely to appreciably diminish the conservation support function of this CHU because the harvest of 88 acres would only constitute 0.06 % of the total dispersal habitat (147,283 acres) within the CHU sub-unit (EA p. 58). When only considering only the Coos Bay BLM-administered lands, harvest would constitute 0.20 % of the total dispersal habitat (43,609 acres) within the CHU sub-unit (EA p. 52). This is relatively small in relation to the total amount of existing Northern Spotted Owl dispersal habitat in this CHU. Retention areas, including untreated Riparian Reserves, would shorten the duration of short-term habitat effects by enabling faster recovery of foraging and dispersal habitat function (USDI-FWS 2014, p. 47). In addition, long-term benefits of the proposed action would include creation of complex habitat which provides better conditions for owl survival (EA p. 59). No effects to Northern Spotted Owls from disturbance/disruption activities are expected because there are no nesting pairs in the area and the BLM would implement seasonal restrictions limiting burning activities to outside the critical breeding period (EA p. 57).

No critical habitat for the marbled murrelet occurs in the project area and the proposed action would not occur directly adjacent to any occupied murrelet habitat (EA p. 59). This is consistent with the *Recovery Plan for the Marbled Murrelet* (USDI-FWS 1997) to mediate the effects of edge and provide for the protection of interior forest habitat (EA p. 54). Therefore, no direct effects from harvest to murrelet occupied or murrelet critical habitat are expected (EA p. 59).

Burning activities generates smoke that could inundate suitable or occupied murrelet habitat outside of the project area. Seasonal restrictions (April 1 thru August 5) during nesting season would lessen the potential for disruption (EA p. 59). However, if smoke management techniques fail to protect occupied or unoccupied suitable habitat from smoke inundation, potential nesting disruption to marbled marbled murrelet could occur. In order to minimize these negative effects, if a suitable burn opportunity does not occur until March 1 or later, then prescriptions for burning would limit the possibility of transporting heavy smoke into suitable habitats to the south and east of the project area. These prescriptions would include limiting burn days to those with favorable directional transport winds (EA p. 70), and conducting immediate mop up (EA pp. 14 -15).
Therefore, no disturbance effects to marbled murrelet occupied or marbled murrelet critical habitat related to burning are expected (EA p. 59).

The proposed action has been determined to have "no effect" to federally threatened Oregon Coast coho salmon and its associated critical habitat. Based on analysis by the Fisheries Biologist (p. 46), we also find that the proposed action would not adversely affect Essential Fish Habitat (EFH) as designated by the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. 1855 as amended).

These findings are due to the fact that harvest, burning, or new road construction are not proposed within the Riparian Reserves (EA p. 44), and the proposed harvest units are greater than 5.5 miles upstream of a natural barrier; defining the limitations of occupied coho, coho critical habitat, and Essential Fish Habitat (EA p. 43). Additionally, the paved haul would not result in sediment delivery to the stream channel (EA p. 46). Thus this project would not destroy or adversely modify critical habitat for Oregon Coast coho salmon or affect EFH. Therefore, consultation with the National Marine Fisheries Service is not warranted. This conclusion further supports a finding of no significant impact.

The project would have no effect on any threatened or endangered botany species, because no such species occur in the proposed action area and project activities present no causal mechanism to effect any threatened or endangered botany species outside of threatened or endangered botany species outside of the project area (EA p. 64).

10. *Any effects that threaten a violation of Federal, State, or local laws or requirements imposed for the protection of the environment* (40 CFR 1508.27(b)(10))

The proposed activities would not violate Federal, State, or local laws imposed for the protection of the environment. These include the Clean Air Act, Clean Water Act, and the Endangered Species Act.

The BLM's analysis has also concluded that implementation of the proposed action would not contribute to the need to list any Special Status Species as identified in BLM Manual 6840 and BLM OR/WA 6840 policy. The Mill Creek watershed is within an area of the red tree vole range not requiring surveys or site management based upon the updated Red Tree Vole Survey Protocol (Nov 2012; Huff et al. 2012). That analysis identified the project area as a non-high priority site and concluded that additional site management is not needed in order to provide a reasonable assurance of species persistence (EA p. 55).
Pursuant to Executive Order 13212, the BLM must consider the effects of this decision on the President's National Energy Policy. As there would be no impact to the exploration, development, or transportation of undeveloped energy sources from the proposed action, a Statement of Adverse Energy Impacts is not required.

Conclusion:
Based on the information and analysis contained in the EA (DOI-BLM-OR-C030-2012-0004-EA), I have determined that the proposed action would not have a significant impact on the human environment within the meaning of section 102(2) (c) of the National Environmental Policy Act of 1969, and that an Environmental Impact Statement is not required.

I have determined that the effects of the proposed silvicultural treatments and associated road management activities are within those anticipated and already analyzed in the *Final Coos Bay District Proposed Resource Management Plan/Environmental Impact Statement* and would be in conformance with the 1995 *Record of Decision/Resource Management Plan* for the Coos Bay District.

/s/ Todd D. Buchholz ***July 17, 2015***

Todd D Buchholz
Umpqua Field Manager

Date

Soup Creek Variable Retention Harvest Environmental Assessment

July 23, 2015

DOI-BLM-OR-C030-2012-0004-EA

Coos Bay District
Bureau of Land Management
1300 Airport Lane
North Bend, OR 97459

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CHAPTER 1 PURPOSE AND NEED FOR ACTION

The Umpqua Field Office of the Coos Bay District proposes to apply ecological forestry principles to promote development of structurally complex forests within the Soup Creek area. Approximately 111 acres of a previously thinned 67 year-old stand has been identified that would meet the management direction for regeneration harvest in the General Forest Management Area (GFMA).

BACKGROUND

The *Final - Coos Bay District Resource Management Plan Environmental Impact Statement* (RMP) (USDI 1994) and its *Record of Decision* (ROD) (USDI 1995) allocates lands for different primary purposes. The GFMA is federal land located outside of designated reserves and special management areas that are available for timber harvest at varying levels. Management direction for the GFMA includes use of regeneration harvest[1] to develop a desired age class distribution across the landscape in stands as young as 60 years old (p.53). The RMP projected that in the second decade of the life of the plan (FY05 to FY14); the Coos Bay District would harvest 7,600 acres using regeneration harvest techniques (USDI 1994, Table AA-7). Within the second decade (as of September 2013) the District has regeneration harvested 383 acres which is only 5.0% of the projection (2013 Coos Bay Districts Annual Program Summary, USDI 2013). The RMP projected in the third decade (FY15 to FY24), that the Coos Bay District would harvest 7,900 acres using regeneration harvest techniques.

In February 2012, the Secretary of the Interior announced that the BLM will plan additional timber sales using ecological forestry principles by designing variable retention harvest (VRH)[2] projects, suggested by Professor's Franklin and Johnson (2011), on a broader landscape to restore forest health and to provide sustainable timber harvests.

The Soup Creek VRH project area, consisting of 295 acres, is within newly designated critical habitat for the northern spotted owl. The U.S. Fish and Wildlife Service issued the Revised Recovery Plan for the Northern Spotted Owl in June 2011, a revised critical habitat proposal for the northern spotted owl on March 8, 2012, and a final rule for revised critical habitat designation on December 4, 2012. The final rule for the 2012 Northern Spotted Owl Critical Habitat Revised Designation (USDI-FWS 2012, Federal Register p.71877) states:

> "…we encourage land managers to consider implementation of forest management practices recommended in the Revised Recovery Plan to restore natural ecological processes where they disrupted or suppressed (e.g., natural fire regimes), and application of "ecological forestry" management practices (e.g., Gustafsson et al. 2012; Franklin et al. 2007; Kuuluvian and Grenfell et al. 2012) within critical habitat to reduce the potential for adverse impacts associated with commercial timber harvest when such harvest is planned within or adjacent to critical habitat."

The Endangered Species Act requires the BLM to consult with the U.S. Fish and Wildlife Service when a proposed project may affect critical habitat for a listed species and to conference when a project may adversely affect critical habitat for a listed species. This EA will evaluate the impacts of the proposed action and alternatives on northern spotted owl critical habitat.

[1] Silvicultural treatment emphasizing removal of trees to open the forest stand to the point where shade intolerant tree species will be reestablished (1995 RMP). Similar to "low level" green tree retention as defined in the Report of the Forest Ecosystem Management Assessment Team (FEMAT 1993) where only enough trees are retained for snag and legacy tree recruitment.

[2] Silvicultural treatment that emphases retention of structural features from the pre-harvest stand to achieve various ecological objectives (Franklin et al. 2007). Similar to "high level" green tree retention as defined by FEMAT (1993).

NEED FOR THE PROPOSED PROJECT

The *Final - Coos Bay District Resource Management Plan Environmental Impact Statement* (USDI 1994) and its *Record of Decision* (ROD/RMP) (USDI 1995) responds to multiple needs. The two primary needs are the need for forest habitat and the need for forest products (p.1). The RMP addressed these needs through an ecosystem management strategy under which BLM lands "will be managed to maintain healthy, functioning ecosystems from which a sustainable production of natural resources can be provided" (p. 5). The Coos Bay District declared an Allowable Sale Quantity (ASQ) in the RMP, which is to be derived entirely from the Matrix (Connectivity and GFMA) land use allocation.

Of particular concern is the lack of diversified stand structure (height, age, and diameter classes) and distribution within the analysis area BLM administered land and Critical Habitat Unit (CHU). No regeneration harvest on BLM-administered land has occurred in the watershed in over a decade. Less than one percent (1%) of BLM-administered lands in the watershed is under 20 years old and decline of early seral forest habitats is more pronounced than anticipated (USDI 1994 p. 4:35-43) under the RMP. Research suggests that complex early-seral communities have importance on par with complex late-seral forests in providing habitat for conservation-listed species (Swanson et al. 2014). The Revised Recovery Plan for the Northern Spotted Owl recommends active forest management and disturbance-based principles (Revised Recovery Plan 2011, p. III-13):

> "Managers should promote spatial heterogeneity within patches and local and regional landscapes, restore lost species and structural diversity (including hardwoods) within the historical range of variability, and restore ecological processes to historical levels and intensities (Franklin et al. 2002, 2007, Drever et al. 2006, Long 2009). This includes early-successional ecosystems on some forest sites (Swanson et al. 2011, Perry et al. 2011)."

Management action is needed in order to "develop early successional forest conditions that provide more ecological benefits to spotted owls (and other native forest species) than do traditional clearcuts and young, even-aged stands" (Revised Recovery Plan 2011, p. III-18).

While adjacent industrial timberlands have regenerating forests, they are densely reforested to truncate the length of early-succession and often involve the use of herbicides to limit competition of brush with desired tree species (Swanson et al. 2011). Spies et al. (2007) modeled 100 years into the future to determine what the Oregon coast landscape would look like under all current forest management policies. Industrial forest management is expected to "intensify over time, decreasing the period required for plantations to reach canopy closure, increasing the uniformity of plantations and decreasing the occurrence of remnant trees in the open, early-successional stage." This would result in the decline of overall ecological diversity associated with early-successional forest types.

Complex, early-successional ecosystems are highly diverse, trophic- and function-rich ecosystems that exist on forest sites between a stand-replacement disturbance and reestablishment of a closed forest canopy (Swanson et al. 2011). Pacific Northwest moist forests ecosystems are far below historical levels of these diverse early-successional ecosystems and future levels are expected to continue to decline (Johnson et al. 2007; Spies et al. 2007; Wimberly 2002).

PURPOSE OF THE PROJECT

The Coos Bay District ROD/RMP (USDI 1995) specifies objectives and management actions to be accomplished in managing the BLM lands in the project area. These purposes may be given different weight, depending on Secretarial direction and the objectives for that particular RMP land allocation. For example, timber production would be given greater emphasis on the portion of the action located on the

GFMA land allocation and ecosystem management purposes would have greater emphasis on the portion of the action within the Riparian Reserve (RR) lands. A reasonable action alternative must meet the objectives outlined below to be considered and analyzed in the EA.

1. Protect, manage and conserve federally listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and the Bureau Special Status Program (RMP p.32) by:
   - Providing for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next and maintenance of ecologically valuable structural components such as down logs, snags and large trees (RMP p.22).
   - Encourage and initiate active management actions that restore, enhance, and promote development of high value habitat, consistent with broader ecological restoration goals (Revised Recovery Plan 2011 p. III-5).
   - Use pilot projects and applied management to test or demonstrate techniques and principles (Revised Recovery Plan 2011 p. III-19).

2. Provide a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability (RMP p.22) by:
   - Conducting timber harvest and other silvicultural activities in that portion of the Matrix with suitable forest lands (RMP p.22).
   - Developing a desired age class distribution (RMP p. 53).
   - 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.

3. Provide early-successional habitat (RMP p.22); and apply ecological forestry principles, suggested by Franklin and Johnson (2011) and the Recovery Plan for the Northern Spotted Owl (2011) as part of an initiative presented by the Secretary of Interior in February 2012, to restore sustainable timber harvests and ecosystems by:
   - Applying silvicultural systems that are planned to produce, over time forests with desired species composition, structural characteristics, and distribution of seral or age classes (RMP p. 53).
   - Maintaining a well-distributed pattern of early and mid-seral forest across the Matrix (RMP p.53).

CONFORMANCE WITH EXISTING LAND USE PLANS

This project is tiered to and is in conformance with, the *Coos Bay District Resource Management Plan/Final Environmental Impact Statement* (USDI 1994) and it's *Record of Decision* (ROD/RMP), as supplemented and amended. The Coos Bay District ROD/RMP is supported by and consistent with the *Final Supplemental Environmental Impact Statement (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 [NFP]) (USDA and USDI 1994a) and its *Record of Decision* (USDA and USDI 1994b) as supplemented and amended. The BLM retains discretion under the RMP to apply additional project design features, such as retaining more green trees than the minimum number required, in order to meet ecosystem management objectives.

The Soup Creek VRH project is consistent with the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, as incorporated into the Coos Bay District Resource Management Plan. 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 the Plaintiffs' motion for partial summary judgment and finding NEPA violations in the Final Supplemental to the 2004 Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines (USDA and USDI, June 2007). Currently, projects that are within the range of the northern spotted owl are subject to the survey and management standards and guidelines in the 2001 ROD.

The BLM has conducted the applicable surveys so the project complies with the 2001 ROD. No species were found. Details of the project surveys are described within the analysis.

Documents Incorporated by Reference

The following documents were used to assist in the analysis of the proposed project and are referenced throughout this document:

- *Revised Recovery Plan for the Northern Spotted Owl (USDI-FWS 2011)*
- *Restoration of Federal Forests in the Pacific Northwest: Strategies and Management Implications* (Johnson and Franklin 2009)
- *A Guide to Creating Diverse early Successional Ecosystems through Variable Retention Regeneration Harvest on the Coos Bay District of the BLM* (Franklin and Johnson 2011*)*
- *Recovery Plan for the Marbled Murrelet (Washington, Oregon, and California populations)* (USDI-FWS 1997)

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) is currently in process and a project level Biological Assessment (C2012-02) has been submitted for effects to species on lands managed by the Coos Bay BLM. This assessment includes analysis of effects to the northern spotted owl and the marbled murrelet as well as their applicable critical habitat. The BLM would incorporate applicable Terms and Conditions into project designs.

The BLM will not request Consultation with the National Marine Fisheries Service as the ID Team has determined the proposed project will have "no effect" to threatened Oregon Coast Coho Salmon. Additionally, project activities would not adversely affect Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855 (b)).

PROJECT LOCATION

The Soup Creek VRH project is located in the central portion of the Mill Creek 5th-field Watershed and the Lower Lake Creek 6th field Watershed. This area is located approximately 21 miles inland from the Pacific Ocean and approximately 7 miles south of State highway 38. The proposed harvest activities are located in T. 23 S., R. 09 W., Section 19, Willamette Meridian. BLM lands in the Mill Creek Watershed are part of the O&C lands in Douglas County.

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 EA will examine in detail. The BLM sent

scoping notices to adjacent landowners, agencies that have requested these documents, and other interested parties from the District mailing list. The scoping period for the proposed project was open between November 21 to December 22, 2012. The BLM received three comments. In addition, the BLM conducted a field tour on December 12, 2012.

ISSUES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

There were questions and issues raised during the formal scoping period. These comments will be addressed within the analysis, but comments did not identify issues with circumstances necessary for development of additional action alternatives. Other comments were mostly concerned with comparisons outside the range of current RMP guidelines and are not applicable to the development of this EA. The following summarizes and addresses comments by topic:

The EA should consider an alternative that creates early-seral habitat in a 15 to 40-year-old forest, not a forest already providing big-tree habitat.

BLM must consider alternative ways of restoring early seral forest, reintroducing fire. Alternative places to apply proposed treatments, testing new silvicultural concepts on federal lands... how to convert old clearcuts (now plantations) back to complex old forests.

Rationale for Elimination: Current RMP direction limits regeneration harvest to the GFMA land use allocation (LUA) within stands more than 60 years old (p. 53). The project area is within GFMA and a key objective of this LUA is to produce a supply of timber. Plantations or 15-40 year-old forest would not provide logs for manufacturing. Maintaining or creating early seral in these types of stands would be accomplished through pre-commercial means and not through an ecological forestry-based timber sale. The reintroduction of fire into the stand with sufficient intensity to cause abundant mortality would mean burning in the highest risk periods of the fire season (July-September) and that would put the entire watershed at risk. Therefore, these types of activities would not fully meet the Purpose and Need.

There are already more roads than are compatible with clean water, healthy populations of fish & wildlife, and limited budgets for road maintenance.

Rationale for Elimination: The BLM is not proposing new roads within this EA.

Regeneration harvest in moist forests on federal lands is an unsupported solution to the alleged shortage of early seral forest, because Johnson & Franklin (2009) failed to explore better options for attaining early seral habitat objectives including natural disturbance processes… or patches of very heavy thinning within a subset of the young stands that are subject to variable density thinning. The assertion that logging disturbance is better than natural disturbance raises several red flags and needs to be validated.

Rationale for Elimination: Objectives for the GFMA emphasize production of forest products and providing early successional habitat. Franklin and Johnson have "focus[ed] on forest restoration activities that achieve ecological goals while simultaneously providing economic and social benefits" (2009). They have further defined a Moist Forest Restoration Strategy, which includes "implementing regeneration harvests in Matrix forests using principles of ecological forestry to help provide a regular flow of structurally complex, early-successional habitat (as well as other stages of forest development. This approach will likely lead to the restoration and maintenance of forest ecosystems which are resilient to a wide range of environmental challenges or scenarios (Long 2009). A strategy that increases structural diversity and resilience in the face of disturbance is more likely to achieve conservation goals (Johnson &Franklin, 2009).

Management of natural disturbance processes were analyzed within the FEMAT report (1993) and the RMP (USDI 1994). These analyses identified that late successional forests would provide elements of natural disturbance over time as stands increase in age. Provisions for management within Late Successional Reserves (LSR) manage the landscape within that context. The district has conducted density management thinning extensively for over a decade utilizing gaps, particularly in Late-Successional Reserve and Riparian Reserves (RR). However, these small disturbance patches are of short duration and do not produce a tangible quantity of early seral habitat typically created by larger natural disturbance events. Small disturbances are not expected to slow the decline of early seral habitats within the 100 year time horizon (USDI 1994, p. 4:35-43). Relying on weather or fire related episodic events to create early seral habitat would be unreliable and would not fully meet the projects Purpose and Need.

BLM has not yet made a showing that there is an ecological need for more early seral habitat in the checkerboard. The need to provide early seral habitat is unproven and needs validation. Maintaining future options in the matrix requires that BLM refrain from regen harvest in order to limit carbon emissions and help stabilize the climate.

Rationale for Elimination: As previously stated (p. 2), decline of early seral forest habitats is more pronounced than anticipated under the RMP (USDI 1994 p. 4:35-43) because treatments planned through the NWFP have not been implemented in the last decade. This has resulted in less available early seral habitat across the landscape. It is the scientific research community's contention that this habitat is needed to promote ecosystem resilience and spatially diverse ecosystems. Federal forests can serve as significant carbon sinks, but a sole focus on "climate reserves" will not restore these forests (Johnson & Franklin, 2009). Late Successional Reserves comprise 82% of BLM lands in the watershed which are managed with a conservation emphasis. Additionally, 56% of the Matrix land base in the watershed is currently conserved for late-successional or Riparian Reserve habitat objectives. RMP direction for the remaining Matrix lands available for consideration is to apply silvicultural systems to produce a distribution of seral or age classes over time. (p. 53). Refraining from harvest would not provide the full range of diverse habitats analyzed for by the RMP and would not fully meet the purpose and need. The EA will include a vegetation analysis, and the cumulative effects analysis to address climate change.

Consider a wide range of alternative ways of meeting project objectives. Alternative ways of creating jobs, producing wood. Since managing these stands is not "needed" for any ecological reason or any economic or social reason, what would be the objective?

The EA needs to address how the application of Drs. Franklin and Johnson's ecological principles will provide jobs, promote economic growth, and generate revenues on a sustained basis.

Rationale for Elimination: The objectives for managing GFMA lands include providing a range of forest age classes to help balance forest product production with resource conservation. Both contribute to ecological and social values. The scale of this project is too small to determine how the application of Franklin and Johnson's principles in Section 19 will sustain jobs and economies. However, the VRH projects combined regionally are intended to help inform deliberations around sustaining a regional forest workforce and wood products manufacturing capability and the potential of these efforts to provide revenues for county governments. In rural counties such as Douglas, the forest sector accounts for 20-to-30 percent of economic output and 12-to-18 percent of all employment (Oregon Forest Resources Institute, 2012). Determination of alternative economies is outside the scope of this project.

ISSUES CARRIED FORWARD

The public identified the following issues through formal scoping, public meetings and field tours: **reforestation**, **monitoring**, **habitat quality**, **T&E species**, **S&M species, forest structure, and slope**

stability. They are relevant to the Soup Creek VRH project development and/or analysis. The Interdisciplinary Team members identified other issues and addressed them in Chapter 3&4 of this EA.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

NORTHWEST FOREST PLAN REGENERATION HARVEST

This regeneration alternative was dropped from detailed consideration because it would not fully meet the purpose and need. An alternative to incorporate a Northwest Forest Plan type regeneration harvest would have yielded approximately 111 acres of harvest treatment. Although this treatment design would not have designated areas to be left intact without entry (aggregates), the overall number of trees retained within the action area would not appreciably different from the Proposed Action Alternative.

THINNING ONLY

This alternative was dropped from detailed consideration because it would not meet the purpose and need. An alternative to incorporate thinning would use the same road system as the Proposed Action Alternative. The area impacted by harvest would not be appreciably different from the Proposed Action Alternative but the retained tree canopy across the area would be more heterogeneous (with wider tree spacing) rather than having larger skips and gaps contributing to structural diversification and early seral communities.

DECISION FACTORS

In choosing an alternative that best meets the Purpose and Need, consideration would be given to the extent each alternative would:

1. Actively apply the principles developed by Franklin and Johnson for variable retention harvest;
2. Promote diversified stand structure and related ecological restoration goals of the Revised Recovery Plan (USDI 2011) and RMP (1995).
3. Provide a commercially-viable timber sale that provides jobs in the local communities from forest management, logging and wood processing that is replicable across the Oregon Coast Range; and
4. Comply with applicable laws and Bureau policies including, but not limited to: the Clean Water Act, the Endangered Species Act, the O&C Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the Special Status Species Program.

CHAPTER 2: ALTERNATIVES

This chapter contains a description of a No Action Alternative and a Proposed Action Alternative. For an action alternative to be considered, it must meet the purpose and need. The alternatives developed are consistent with the RMP and satisfy the purpose and need of implementing the RMP. All quantifications (i.e. acreages, mileages, etc.) are based on estimates obtained from geographic information systems (GIS). Final numbers could vary slightly as the plans are translated to the ground.

NO ACTION ALTERNATIVE

Under this alternative, the BLM would not conduct the VRH treatments described in this document in the near future. There would be no road renovation. Improvements designed to reduce erosion, correct drainage deficiencies, improve water quality, and provide for user safety would not be planned under this action. Ongoing activities necessary to comply with laws, and regulations would continue. These include but are not limited to 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 silvicultural activities in young stands.

The No Action Alternative provides a baseline for the comparison of the alternatives. This alternative describes the existing condition and the continuing trends. Selection of this alternative would not constitute a decision to reallocate these lands to non-commodity uses. This alternative would not meet the Purpose and Need. Future activities in this area would not be precluded.

PROPOSED ACTION ALTERNATIVE

Project Summary

The proposed action implements a variable retention harvest (VRH) as described by Franklin and Johnson (2011) on approximately 111 acres of BLM administered lands available in the GFMA. Green tree retention within the 111 acres would be predominately grouped into islands of structural retention or "aggregates" rather than dispersing single leave trees throughout the treatment area. No harvest would occur in the 23 acres of aggregates in addition to 50 acres of Riparian Reserves within the 161 acre action area. The proposed action is summarized in Table II-1.

Proposed units would be harvested using skyline cable yarding equipment. Road management activities would consist of renovation of existing roads, and closure of roads not needed on a long-term basis (>5 years). Post-harvest fuels treatments would be conducted to reduce post-harvest hazardous fuel loads and assist reforestation success. Figure A-1 in Appendix A displays the approximate geographical location of the VRH units.

Table II-1: Project Summary

EA UNIT #	GFMA		Riparian Reserves	Total
	Early Seral	Aggregate		
1	75	19	37	131
2	13	4	13	30
Total Acres	88	23	50	161

For the Mill Creek 5th field watershed, the BLM has calculated Riparian Reserve buffer distance to be 220 feet slope distance from the stream bank. The BLM would offer proposed units only after the completion of required wildlife surveys (as referenced within the Wildlife section) and pertinent no occupancy findings for marbled murrelet. The BLM has conducted surveys for marbled murrelet for EA unit #1 in 2012 and 2013. The BLM completed surveys for unit #2 in 2014.

SILVICULTURAL PRESCRIPTIONS

The ID Team developed the Soup Creek VRH treatment prescriptions using the Coos Bay 1995 RMP and the management strategies for moist forests developed by Franklin and Johnson (2009; 2011). The RMP provides the objectives and management direction for conducting timber harvest in the Matrix and Riparian Reserve land use allocations. Franklin and Johnson recognize that these land use allocations (LUAs) are a fixture of the current plan and have proposed a rule set for a more conservative pathway to achieve the goals of the GFMA land use allocation (2009, p.11).

Variable Retention Harvesting

Variable retention harvest (VRH) as proposed by Franklin and Johnson involves the retention of structures, organisms, and conditions from a pre-harvest forest stand for incorporation into the post-harvest forest ecosystem and ultimately, structurally complex forest stand. These can include individual structures, such as old trees and snags, intact areas of the pre-harvest stand, or patches of ecologically important conditions found in the pre-harvest stand (e.g., seeps and rock outcrops) (Franklin & Johnson 2011).

As an alternative to regeneration harvest described in the RMP, Franklin and Johnson used a three-phase approach for providing ecologically sound and socially acceptable Moist Forest regeneration harvest:

1) Provide significant structural retention for structurally complex and diverse early successional communities,
2) Consider stands outside of reserves and other controversial areas below the age threshold (approximately 120), and
3) Fit the approach within the agencies other laws and mandates (2009, p.54).

The general goals of VRH as proposed by Franklin and Johnson (2011, p.2) include:

- Providing for continuity of forest structure function, and biotic composition between forest generations;
- Regenerating a new cohort of trees;
- Sustaining plant and animal species by providing critical habitat, food sources, and micro-environmental conditions;
- Structurally enriching the post-harvest ecosystems, including the early successional (pre-forest closure);
- Providing conditions for expression of early successional (pre-forest) ecosystem; and
- Altering visual conditions from within and outside of the harvest unit.

Aggregates

Small intact forest patches or aggregates are intended to serve as an aid in sustaining biota and structurally enriching the post-harvest stand (Franklin & Johnson, 2012). The goal in locating aggregates is to have them well distributed throughout the harvest unit. Some objectives, such as facilitation of Northern Spotted Owl foraging, may require larger aggregates as suggested by Franklin and Johnson (2011, p.3). These larger aggregates would be incorporated into unit design to preserve the legacy trees and canopy structures, structurally enrich stand conditions, and foster stand conditions conducive for corridors facilitating spotted owl movement and prey species persistence. Green tree retention required by the ROD/RMP would be met at individual unit scale by summing qualifying trees within the aggregate areas.

The candidate areas for location of aggregate retention (2011, p.3) include:

- Representative patches of the pre-harvest forest stand;
- Locations of old-growth trees;
- Concentrations of large woody debris;
- Locations of large snags;
- Special habitats such as seeps, and other areas of high species diversity;
- Areas that facilitate Northern Spotted Owl movement and foraging.

The VRH prescription for the Soup Creek VRH is to leave roughly 30% of the area in aggregated retention. Franklin and Johnson modeled a minimum of 20% retention (2009, p.40) and a range of 20-30% retention (2011, p.3). Because of the large amount of Riparian Reserves well distributed within the

harvest area, the BLM received input from Franklin and Johnson that Riparian Reserves could account for 10% of the 30% retention guideline and meet the aggregate retention goals. Starting with 111 acres available for regeneration harvest, approximately 33 acres would be needed to meet the prescription (30% retention). Of the approximately 50 acres of Riparian Reserves within the proposed treatment area, there are more than 35 acres within the interior portions suitable for inclusion. In this case, approximately 11 acres of Riparian Reserve (1/3 of aggregate total) would be used toward the target aggregate total. The remaining 20% aggregate retention (23 acres) would come from GFMA.

Table II-2: VRH Prescription Summary

EA UNIT #	VRH Acres	Early Seral	Total[3] Aggregate
1	94	75	28
2	17	13	6
Total Acres	111	88	34

No harvest or other type of treatment would occur within the aggregate areas. Additional retention in the form of single trees dispersed within the harvest area would also occur. Some of these trees are expected to provide a source of distributed snags and down wood within the harvest unit as described below.

Snags and Down Wood

The RMP requires 120 linear feet per acre of down wood in decay class 1 and 2 be retained post-harvest in regeneration harvest units (USDI 1995) exclusive of the riparian reserves. Full surveys of the units would be completed prior to treatments. This timber cruise data for the unit would assure that additional trees would be left in the harvest unit. Down wood within the aggregates would contribute to this requirement. As needed, trees retained for this purpose would be felled after site preparation activities if post-treatment surveys show more is needed to meet RMP direction.

The RMP also requires retention of snags "within a timber harvest unit at all levels sufficient to support species of cavity-nesting birds at 40 percent of potential population levels" (EA p.53). The snag requirement within the Mill Creek watershed is calculated at 1.5 snags/acre (USDI, BLM 2005). Full surveys of the units, as part of the timber cruise, would be completed prior to treatments. Additional trees would be retained within the harvested areas as needed in order to meet RMP direction for snag recruitment.[4] Trees retained for this purpose would typically be left near the edges of aggregates or Riparian Reserves to diversify the horizontal structure of the canopy adjacent to the edge of openings (i.e. soften edge) and would typically be composed of the largest available trees. Existing snags within the harvest unit would be retained if operationally feasible. After site preparation activities, if post-treatment surveys show more snags are needed (i.e., insufficient post-harvest mortality) to meet RMP direction, appropriate measures (topping or girdling) would be taken to meet recruitment goals.

Reforestation (VRH area only)

Reforestation would be conducted through a combination of planting and natural regeneration strategies. Tree planting is planned within one to two years of harvest as required by the Coos Bay District Resource Management Plan (USDI 1995). Reforestation (including site preparation) is deemed necessary due to district experience with heavy vegetative competition impeding successful regeneration. Planting would occur at an average of 200 trees per harvested acre with non-uniform spacing, in contrast to customary

[3] Includes allowance for inclusion of Riparian Reserve.

[4] Based upon existing stand exam inventories, additional retention of two (2) trees (> 20" dbh) per acre on average is expected to meet the cumulative total needed for both snags and down wood per RMP requirements.

planting practices for the region which are 300-450 trees per acre (Rose, R. and D.L. Haase. 2000). This less aggressive approach to tree regeneration, as outlined by Franklin and Johnson (2011), would be utilized to foster expression of the complex early successional ecosystem. The initial seedling mix for planting would consist of Douglas-fir, western redcedar, and western hemlock. Seedlings would be protected from animal damage with Vexar tubing as needed. Approximately 6 acres located near natural seed sources would not be planted and allowed to develop independently to broaden diversity objectives (see Figure A-3, Appendix A). If abundant natural regeneration augments planting, the BLM would conduct thinning treatments to maintain an average density of 200 trees per acre or a relative density[5] of less than 0.15. The post planting prescription would include maintaining some areas of relatively open grown trees in order to promote large limb structure[6]. This more open condition would be maintained for 20-30 years following harvest activities.

ROAD MANAGEMENT

Road management consists of developing and maintaining a transportation system that serves the project needs in an environmentally sound manner as directed by the Coos Bay District RMP/ROD (p. 69) and the Western Oregon District's Transportation Management Plan (USDI 2010 *update*). This would involve renovation of existing roads, and decommissioning of roads (Table II-3; Appendix A, Figure A-2).

Table II-3: Road Work and Closure Estimates

Road Number	Road Work	Surface Type	Haul Season	Closure Status	Miles
23-9-20.0	renovation	rock	all	open	1.38
23-9-29.4	renovation	rock	all	open	1.78
23-9-19.2	renovation	rock	all	decommission	0.06
Total					3.22

Road Renovation

Road renovation involves bringing an existing road back up to the standard it was originally built to. Activities may include, but would not be limited to, clearing brush and/or trees within the road prism, removal of bank slough material, cleaning and/or replacing ditch relief/stream crossing culverts, replacing depleted surface rock, restoring proper road surface drainage, grading, or other maintenance. Renovation totaling roughly 3.2 miles would occur.

Landings

Cable and ground-based landings are typically about one quarter-acre in size including the existing roadbed. Existing landings would be utilized whenever possible. The Soup Creek VRH would require the construction of two additional landings in order to facilitate optimum placement of aggregates. This design would allow cable yarding to avert aggregate areas. Landing construction would mainly consist of creating a wide spot along the existing road to facilitate safe yarding and loading of logs. "Conservation Practices for Road and Landing Construction" Best Management Practices (USDI 1995, pg. D3-D4) for landing construction would be implemented. These include, but are not limited to, construction during the dry season, avoiding fragile or unstable areas, and end-haul of waste material where appropriate.

Road Maintenance

Existing roads would be maintained during the life of the project to minimize road drainage problems, reduce sediment delivery to streams, and reduce the possibility of road failures. Maintenance may include, but is not limited to grading to remove ruts; removal of bank slough; placement of silt trapping

[5] Ratio or proportion of existing density relating to a biological maximum density (Curtis 1982, Drew & Flewelling 1979, Ernst & Knapp 1985).
[6] Specific to wildlife objectives within the project area.

straw bales or other sediment control devices, culvert replacement and cleaning, and adding gravel lifts where needed such as stream crossings and soft spots in the road surface. Maintenance on BLM controlled asphalt and rock surfaced roads would be performed by the BLM road maintenance crews.

Road Closure/Decommissioning

Following completion of harvest, approximately 0.06 miles of renovated rock surface roads under BLM control would be decommissioned. Water barring, and seeding and mulching would be required as needed to reduce potential erosion and to help restore the natural hydrologic flow. Decommissioned roads would also be barricaded to prevent vehicle passage in order to protect resources, prevent illegal dumping, and provide for public safety. Road closure status is referenced in Table II-3.

MONITORING

Reforestation

The BLM would monitor the VRH area to assess the extent of natural regeneration and reforestation needs. Usually, the first season of monitoring (year 1) occurs the September after planting (Feb/March). The site would be monitored again in years 3, 5, 8 and 12. In year 12, the objective is usually to see if the trees are established and free-to-grow and if pre-commercial thinning needs to be scheduled. The prescriptive goal would be to maintain a Relative Density of less than 0.15 or approximately 200 trees per acre to extend the early-successional conditions for 20-30 years.

Habitat

One of the goals of variable retention harvest is to create complex early seral habitat (Franklin & Johnson 2011). Complex early seral habitat contains more legacy features (trees, snags, down wood) and greater diversity in structure than simplified early seral habitats typically created from more traditional regeneration harvest methods. The early-successional plant communities on forest sites contain well-developed shrub and perennial herb species that provide diverse food resources (Swanson, et al. 2011).

BLM would conduct post-harvest monitoring to measure the compositional and structural changes in the post-harvest ecosystem and availability of components that would support complex early seral habitat. Within the action area, surveys would be conducted to quantify and map snags and down logs greater than 10 inches in diameter, legacy tree cover, and the presence of plant communities including specific grasses, herbs and shrubs. Habitat types would be mapped in order to run analyses of landscape diversity using FRAGSTATS or a similar program for quantifying landscape patterns. Results would be compared against typical conditions in traditional regeneration harvest units nearby and, where available, compared against existing post-harvest monitoring data for other harvest units on the District. This information would be used to assess how to best implement specific projects as well how they would function in the greater mosaic of habitats across a landscape.

Photo Point Monitoring

The objective of establishing permanent photo points is to document current forest stand structural and vegetative conditions and assess development through the early to mid-seral stages. Sites would be visited (at a minimum) pre-harvest, post-harvest, 1 year after planting, 5^{th} year, 10^{th} year and 15^{th} year. Sites would also be visited after any other occurrence of silvicultural activities, such as pre-commercial thinning. Appendix C contains more information on design.

PROJECT DESIGN FEATURES

This section describes measures designed to avoid, minimize, or rectify impacts on resources and are included as part of the proposed action. Project design features (PDF) are site-specific measures, restrictions, requirements, or mitigations included in the design of the project in order to reduce adverse environmental impacts.

Implementation monitoring would be accomplished in the form of road construction and renovation inspections, logging inspections, slash disposal and noxious weed monitoring. Site monitoring for solid and hazardous waste would be performed in conjunction with normal contract administration. Monitoring would also consist of silvicultural inspections of planting, site preparation, and regularly scheduled post-planting surveys until the trees are considered free to grow. All BLM contract administration and monitoring is performed by authorized BLM personnel. Cases where a contractor fails to remedy noncompliance with contract specifications (e.g. PDF's) as directed by the BLM would result in work suspension, with penalties up to contract termination.

Harvest Operations – All Areas

1. Trees would be felled away from all unit boundaries, reserves, aggregates and property lines.
2. Existing snags would be reserved from cutting except those that must be felled to meet safety standards. Snags felled or accidentally knocked over would be retained on site.
3. Existing down logs in all decay classes would be reserved.
4. All non-alder hardwoods ≥12" DBH would be retained.
5. Harvest operations would be conducted with a skyline cable logging system. One-end log suspension would be required.
6. Lift trees and/or intermediate supports may be required to attain desired log suspension
7. Seasonal timing restrictions would be implemented to minimize soil compaction, and disturbance to areas of occupied suitable marbled murrelet habitat. Table II-4 summarizes these restrictions.
8. Aggregate trees would be generally restricted from use, however when a tailhold or guyline cannot be avoided within aggregate areas, appropriate measures would be used to protect trees from damage so that felling is not required.
9. Avoid use of trees for tailhold or guylines if they would threaten structure of murrelet habitat trees (or those that contain potential habitat structural attributes) if they fell.
10. Snags and coarse down wood would be created following burning operations as needed to meet RMP goals.

Table II-4: Seasonal Restrictions

Activity	Reason for Restriction	Restricted Dates	Dates Restrictions in Effect											
			J	F	M	A	M	J	J	A	S	O	N	D
Road renovation, improvement construction	Erosion Sedimentation	Rainy season, generally Oct. 15 – June 1	>	>	>	>	31					15	>	>
Potentially disruptive activities	Occupied or unsurveyed suitable marbled murrelet habitat within 100 yards of activity	No activity April 1 thru Aug. 5, then apply daily timing restriction* until Sept. 15				1	>	>	>	5				

* Restriction may be extended to September 30 based on site specific conditions. Seasonal operating restrictions for marbled murrelet are based on disturbance only.

Soils

1. Use one-end log suspension cable systems or other similar low impact operations in areas classed as FGR1[7] and FGR2. When feasible, full log suspension cable systems would be required on lands classed as FGR2. If full log suspension cannot be achieved on FGR2 lands, then seasonal restrictions (dry season only) may be required (USDI 1995). Figure A-8 in Appendix A depicts the fragile gradient locations.
2. Landing construction activities will be limited to the dry season (USDI 1995).
3. Drainage and erosion control measures would be applied to bare soil areas following use and prior to winter rains (USDI 1995).
4. Spur road will be decommissioned by blocking driving access and seeding and mulching natural surface areas (USDI 1995).
5. Follow the Best Management Practices as listed for waste placement (USDI 1995).
    a. The site should be free of growing vegetation and scarified before drifting or piling materials on the area.
    b. Where possible, compact the waste materials in lifts of 8-12 inches as practical. The final shape of the material should be slightly crowned or sloped to allow water to run to the sides of the pile.
    c. The outer sides of the waste pile should be sloped to a 1.5:1 ratio.
    d. Mineral soil should be seeded and mulched.
    e. Manage water in ditch lines or roadways away from the site.
    f. Provide a means to prevent traffic from entering into the area.

Riparian Reserves

1. Approximately 3 existing yarding corridors would be needed for yarding through the Riparian Reserve in the northwest corner of the project area. When yarding across stream channels, logs would be fully suspended above the stream banks. Place slash on areas of exposed mineral soil when full suspension cannot be achieved within 50 feet of the stream bank.

Fuels Treatments

1. Landing Pullback: Require slash pullback from around all landing areas prior to removal of equipment from the site. Woody material should be sorted, decked or re-piled on top of the existing landing and if not otherwise utilized (for biomass or firewood), be prepared for burning.
2. Landing Hazard Reduction Burning: Landing piles resulting from logging operations would be burned. Locate landing piles a sufficient distance (minimum of 15 feet) from any leave trees to limit scorch potential. Cover piles with 4 mil black PE sheeting and burn during late fall and winter months before any broadcast burn operations are undertaken.
3. Heavy concentrations of roadside slash resulting from cable yarding operations would be piled adjacent to roads and on landings. Piles would be relatively free of soil and rock materials to promote cleaner combustion. Placement of piles within 15 feet of reserved trees, aggregates, snags or suitable coarse woody debris would be avoided.
4. Coarse woody debris and live trees would be protected by using lighting techniques and patterns that would reduce extreme heat near these key features. In some areas, logging debris would be pulled away from these features and a fire trail would be constructed around the feature(s).
5. All applicable Oregon State Fire Laws would be followed. Burning of slash piles would comply with the Oregon Smoke Management Plan (OAR 629).

[7] Timber Production Capability Classification: fragile due to slope gradient but suitable for forest management using appropriate mitigation. The FGR classification is based on landscape features, various soil properties, and reforestation potential.

6. Logging residue on roadsides that is suitable for fuelwood use, would be segregated (to the extent feasible) from burn piles and made available to the public through established procedures.

Broadcast Burning

7. Slash existing undesired vegetation (brush, non-commercial hardwoods, prostrate and damaged conifers) to create a compact and uniform fuel bed.
8. Construct approximately 6000 feet (±) of fire trails along unit boundaries outside of reserved aggregate and riparian reserve buffers.
9. Fire lines would be cleared of vegetation to a width of no more than eight feet. Within the fire line the fire trail would be cleared to mineral soil to an average width of three feet.
10. Construct water bars in fire trails where necessary following the trail slope guidelines below:
    a) 0% to 9% 1 water bar every 300 feet
    b) 10% to 29% 1 water bar every 200 feet
    c) 30 % to 100 % 1 water bar every 100 feet
11. To reduce the impacts of burning on desired retention features such as coarse wood, conduct burning only when spring like conditions are present.
12. Where conditions exist that would allow for a prescribed fire to reach and ignite remnant trees or snags, conduct slash pullback from around those features to minimize chance of damage from surface fire. If feasible, pre-treat these features with water before burning is conducted.
13. Complete 100% mop up of burned areas immediately following burning to reduce impacts of smoke and continued consumption (smoldering) of coarse wood and stumps.
14. Reconstruct water bars in fire trails where necessary after mop up is completed.

Hand Piling and Burning

15. Hand piled areas would have existing undesired vegetation (brush, non-commercial hardwoods, prostrate and damaged conifers) slashed during or after harvest.
16. Hand pile logging debris and other slashed vegetation ½ inches to 4 inches in diameter.
17. Construct piles a sufficient distance away from coarse woody debris or leave trees to minimize damage potential from burning. A minimum of fifteen feet would be required.
18. Cover piles with 4 mil black PE sheeting.
19. Randomly select and leave approximately 10% of slash piles uncovered and unburned.
20. Burn covered piles during late fall/early winter months after wetting rains have occurred.

Table II-5: Soup Creek VRH Site Preparation Prescription Recommendations

EA Unit No.	Unit Acres	Avg. Slope %	Prescribed Site Prep/Hazard Reduction Method	Fire Line Needed (estimated in feet)
1	42	46	Broadcast Burn	6000
1	33	55	Hand Pile & Burn	n/a
2	13	55	Hand Pile & Burn	n/a
Totals	**88**			**6000**

Reforestation (VRH area only)

1. Planting would occur at an average of 200 trees per harvested acre with non-uniform spacing. The initial seedling mix for planting would consist of Douglas-fir, western redcedar, and western hemlock.
2. Seedlings would be protected from animal damage with Vexar tubing as needed.
3. Approximately 6 acres located near natural seed sources would not be planted.
4. If abundant natural regeneration augments planting, the BLM would conduct treatments to maintain 200 trees per acre or a relative density of less than 0.15.

5. This condition would be maintained for 20-30 years following harvest activities.

Noxious Weeds

1. To prevent the introduction and spread of noxious weeds during the contract period, equipment would be washed prior to entering BLM-managed lands.
2. Vehicles and equipment would be required to stay on road and landing surfaces.
3. BLM-controlled haul routes and potential landing areas would be inventoried for noxious weeds and treated, either mechanically or chemically, prior to road renovation or harvest activities. Treatments would be conducted as part of the Coos Bay Integrated Noxious Weed Program (USDI, BLM 1997).
4. To reduce the chance of noxious weeds becoming established, bare soil areas from landing and road construction would be mulched and seeded with native plant species, and fertilized if determined necessary.
5. Noxious weeds within management units would be treated by manual methods; normally chainsaw cutting.
6. Roads and landings would be monitored on an annual basis to identify new invaders and treat them using an integrated pest management approach.

Special Status Species

1. All timber sale contracts contain a standard provision that includes management guidelines for species found after the contract is awarded. These species include Threatened & Endangered species, occupied marbled murrelet sites, active raptor nests, federal proposed and candidate species, Bureau Sensitive or State listed species protected under BLM Manual 6840.
2. Seasonal Timing Restrictions limiting harvest activities would be implemented within the disruption distance of occupied marbled murrelet habitat. These seasonal restrictions would be applied from April 1 to August 5.
3. Daily Operating Restrictions would be implemented to minimize disturbance to areas of occupied marbled murrelet habitat. Daily Operating Restrictions would limit potentially disturbing activity to two hours after sunrise to two hours before sunset and would be implemented from August 6 through September 15. This restriction is not required for activities that occur beyond the disruption distance and does not apply to hauling along existing roads. Table II-4 summarizes these restrictions.

Roads

Road Renovation

1. Drainage and erosion control practices would be applied to renovated 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.
2. The BLM would plan road renovation activities 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. Activities would not disturb existing drainage ditches that are functioning and have a protective layer of non-woody vegetation.
3. Other stream culverts or cross-drains may be installed during road renovation. Table II-6 would be used as the guide for road drainage spacing if needed.

Table II-6: Guide for Drainage Spacing by Soil Erosion Classes 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.		

Haul

1. 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.
2. Sediment traps would be installed in ditch lines to minimize delivery of fine sediment to stream networks as needed.

Decommissioning

1. Soil-stabilization techniques would be used 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.
2. Closure of decommissioned roads would include the installation of a barrier to prevent vehicular traffic. Barriers could include, but are not limited to, tank traps and boulders.

Cultural Resources

1. If cultural resources are encountered during project implementation, all work within the vicinity would be stopped and the District Archaeologist would be notified.

CHAPTER 3 & 4 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

ANALYSIS BACKGROUND

This chapter contains the affected-environment and effects-analysis discussion and is arranged by specific resource values that may be impacted. It identifies the direct, indirect and cumulative environmental effects that may result from no action or implementation of the alternative described in Chapter 2. It also addresses the interaction between the effects of the proposed variable retention harvest with the current environmental baseline. This chapter includes analysis of impacts that might be expected, how these impacts may occur and the incremental effects 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, state, and private entities.

Reasonably Foreseeable Actions

Annual recurring activities are likely to occur within the analysis area (here defined as the Mill Creek 5th field watershed). These include, but are not limited to, fire suppression activities, routine road maintenance, treatment of noxious weeds and silvicultural activities in young stands. Twenty-nine percent of the Mill Creek watershed is federally managed and twenty-six percent of the Lower Lake Creek sub-watershed is federally managed (Table III-1). There are no federal timber sales that are active or anticipated to be active in the analysis area over the next five years.

Table III-1: Land Ownership in the Project Area 6th-Field Subwatersheds

Sixth Field Watershed	Federally Managed/BLM (Acres)	Other Ownership (Acres)	Mill Creek (5th field) Watershed
Loon Lake-Mill Creek	1,686	7,857	9,543
Lower Camp Creek	5,775	7,699	13,474
Lower Lake Creek	8,409	23,896	32,305
Upper Camp Creek	7,921	1,151	9,072
Upper Lake Cr	1,059	20,293	21,352
Total Acres	24,850	60,896	85,746

The BLM assumes private forests would be intensively managed on a 40-to-50 year harvest rotation under the direction of the State of Oregon Forests Practices Act (OAR 527). The private industrial landowners with a large acreage in the Mill Creek watershed are Weyerhaeuser and Roseburg Resources. The Oregon Department of Forestry is the only another major public landowner within the watershed. Table III-1 shows the amount of BLM and other acreage by subwatershed. BLM manages about ¼ of the total area in the analysis area and is the minority owner in all but the Upper Camp Creek subwatershed.

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 and indirect effects of the action alternative should be based on generally accepted scientific methods such as empirical research. The cumulative effects 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.

FOREST VEGETATION

Affected Environment and Effects by Alternative

The project area is adjacent to Ash Valley which contains a dispersed unincorporated community of farms, rural residential homes, and fishing lodges by Loon Lake. The nearest full service town is Reedsport OR. Douglas County Road 3 provides year round access. The mean annual rainfall is about 50 to 80 inches across the area. Winters are cool and wet, and summers are hot and dry. The steepness of the terrain varies from gentle to steep, with slopes ranging from flat to 80%. Elevations of the analysis area range from 460 to 1,100 feet.

DISTURBANCE HISTORY AND ECOLOGY

The Ash Valley, valley side forests, and to a lesser extent the rest of the land inside the Mill Creek Watershed, were human influenced landscapes long before Euro-American settlement. A reconstruction of the territories and villages of American Indians in the vicinity indicates that in about 1830 the Mill Creek Watershed was occupied by the Lower Umpqua tribe (Zenk 1990). American Indians set fires to promote a diversity of habitats, especially by increasing edge effect, so to maintain preferred plants and attract game (Williams 1995). White settlers set fires to clear land for agriculture and maintain land in a condition suitable for grazing, and by that created more uniformity on the landscape (Williams 1995).

Fire history data collected in adjacent and nearby watersheds indicates that fires, of sufficient intensity to leave evidence of their occurrence, burned with return rates of 50-years or less in several drainages in nearby watersheds. Also, the fire history data suggests the frequency of fires close to valleys was greater than in the more remote areas on the landscape (USDI, BLM 2005). This is consistent with observations by Barrett and Arno (1982) that the lower elevations, close to valleys where Indians resided, had higher fire frequencies than more remote mountainous areas where lightning was likely the primary ignition source.

Based on the earliest available historical survey notes, maps, and inventory data; with few exceptions the oldest stands in the Mill Creek watershed regenerated following fires in the 1700's (USDI, BLM. 1995). Disturbances such as wildfire, wind, and flooding were common in presettlement forests, creating a shifting mosaic in which the amounts and spatial patterns of seral stages continually fluctuated (Bonnicksen 2000). An important operation of most types of natural disturbance is that biological legacies are created or retained in the disturbance phase, and these enrich the developing stand (Franklin et al. 2000, Franklin et al. 2002). Creation of woody debris (snags and down wood) and uproot structures such as pit-and-mound topography is an active effect of disturbance (Harmon et al. 1986, Maser et al. 1988), while retention of live trees, shrub/forb understories, and other elements of the biotic community results from uneven severities within a disturbance. A retrospective analysis of landscape patterns on the Central Coast Range (Ripple et al. 2000) indicate the pre-logged mature/ old-growth dominated landscapes had early/ midseral components. However, modern disturbance regimes have changed the historical range of forested landscape conditions to where forest patch shape and configuration has shifted from large and complex to small and simple (Nonaka & Spies 2005), and early seral forest structure has shifted from complex to simple (Thompson et al. 2006).

The 1933 Soup Creek Fire is the most recent large fire in the watershed and burned an estimated 320 acres (USDI, BLM 2005). The fire would have created a favorable seed bed for germination; however is unknown if the stand naturally regenerated or was intentionally seeded. Harvest units prepared and sold from 1941 to about 1950 typically left some seed trees and thus sources of residual habitat structure. Although there is no definitive sale information available from the 1940's; photo interpretive evidence (1952) indicates the project area stand was harvested in the mid 1940's and downhill logged into the various drainages. These photos also indicate both individual trees and clumps of trees were retained only on the upper reaches of the harvest settings. Cumulatively, approximately 8% of the project area is estimated to have been retained after the harvest resulting in the current presence of remnant trees.

Forest Health

The only noteworthy disease agent currently influencing the project area is laminated root rot. A pocket, approximately 3 acres in size, is found within the northeast corner of the project area and is causing localized mortality. This pocket extends into the riparian reserve and a clump of remnant trees. Laminated root rot, caused by the fungus, *Phellinus weirii* decays roots of highly susceptible host trees, in this case Douglas-fir, and either causes windthrow or kills them by destroying their ability to take up

water and nutrients. Spreading from the original infection foci and forming expanding disease centers, the average rate of radial enlargement is about 1 foot per year.

FOREST COMPOSITION AND STRUCTURE

Douglas-fir (*Pseudotsuga menziesii*) is the dominant overstory species and comprises upwards of 60% of the species composition in the stand. Western hemlock (*Tsuga heterophylla*) is a minor component in the overstory in some isolated areas. Western redcedar (*Thuja plicata*) is only found within directly adjacent stand areas. Hardwood tree species include red alder (often associated with soil disturbance), Oregon myrtle, and Bigleaf maple; chinquapin occurs occasionally on southern aspects and ridges.

The western hemlock series (Aztet et al. 1996, McCain & Diaz 2002), most commonly the rhododendron and the evergreen huckleberry associations, describe plant associations for the project area. This classification is based on the concept of potential natural vegetation. Series is based on the dominant, most shade tolerant regenerating tree species on the site (Aztet et al. 1996).

Stand inventory conducted in 2012 and analyzed using Ecosurvey and the Forest Vegetation Simulator (FVS) program indicates that the treatment area is less than 70 years old with an average diameter of less than 18 inches. The stand currently has a relative density greater than 54, and average canopy cover of 68 percent. This stand density indicates that there is high competition among trees and slowing basal area growth. The stand averages over 130 trees per acre, which equates to a basal area per acre of more than 225 square feet. Stand structure is predominately homogeneous (even-aged) although there are isolated remnant trees. Coniferous tree foliage is largely concentrated high in the canopy with little or none lower in the canopy. Hardwood species are predominantly suppressed within the lower canopy except near roads and streams. With the exception of the remnant trees, individual tree crown development is indicative of original branches without evidence of epicormic branching. The initiation of epicormic branches is associated with older crowns (Ishii and Ford 2001), or very open conditions around the stems such as found after intensive (>40%) live crown removal (Collier & Turnblom 2001).

Remnant trees, typically 100 years and older Douglas-fir, can be found sporadically in the project area either in clumps or as solitary trees. These trees typically are over 40 inches in diameter and have heights approaching 200 feet tall with dead and/or broken tops with advanced stages of decay. The locations of the groups and individual trees do not form contiguous connections (are greater than 100m apart) and are from a different and isolated cohort rather than part of the predominate overstory stratum. They currently do not influence the surrounding stand enough to exhibit the characteristics of a stand in the vertical diversification stage of structural development (Franklin et al. 2002, USDI 2008). These characteristics include vertical diversity, presence of large shade tolerant trees, deciduous shrub layer, large snags, and large down woody material.

Although most of the stand was commercially thinned in 1996, which removed intermediate and understory trees, this stand has grown and reoccupied the site enough so that it is described as in the Biomass Accumulation/Competitive Exclusion (BACE) stage of development (Figure III -1); based on field-collected data, relative density measures, and application of characterizations by Franklin (2002). The FVS model indicates the stand has returned to approximately its pre-treatment density, after the prior commercial thinning treatment, and has captured the vast majority of growth benefit from the thinning.

Based on field review and the current stand age (<70 years old), the project area would not meet definitions of late-successional forest (FEMAT 1993, Spies & Franklin 1991, USDA 1993). This area lacks substantial late-successional characteristics or has very low densities and arrangements of late-

successional structures, meeting few of the criteria for old-growth conditions (Garman et al. 2003, USDA 1993).

Figure III-1: Structural Stage comparison. Reprinted from USDI 2008.

Typical stand age[b] (years)	Oliver (1981) stand development stages	Franklin et al. (2002) structural stage	1994 RMP/EIS Seral stage	Structural stages (This RMP/EIS)
0	Disturbance and legacy creation			
20	Stand Initiation	Cohort establishment	Early seral	Stand Establishment
30	Stem Exclusion	Canopy Closure	Mid seral	Young
50		Biomass accumulation/ competitive exclusion	Late seral	
80	Understory Reinitiation	Maturation		Mature
150	Old Growth	Vertical diversification	Mature seral	Structurally Complex
300		Horizontal diversification	Old-growth	
800-1200		Pioneer cohort loss		

[a]A more extensive comparison of classification schemes can be found in Franklin et al. 2002.
[b]Stand ages are provided as references. However, stands can achieve structural classes at different stand ages, depending on disturbance and site conditions.

As illustrated in Table III-2, stands currently less than 20 years of age represent less than 1 percent of BLM-administered lands in the project watershed. Within the 4,540 acres of Matrix, 2% (110 acres) of stand ages are less than 20 years. This age class is representative of regenerated young stands with structural legacies conducted under the standards and guidelines of the Northwest Forest Plan and management direction of the 1995 Coos Bay District ROD/RMP. Stands in the 20-year age class represent 10 percent of BLM-administered lands in the project watersheds. These lands were primarily harvested following traditional clearcut[8] harvest practices with intensive reforestation and silvicultural treatments intended to maximize forest production, rather than habitat complexity thus they are not indicative of complex early seral habitat as defined by Franklin (2007) or Thompson and Johnson (2006). LiDAR analysis conducted to represent complex early seral within the BLM-administered lands of the project watershed indicates that only 0. 4 percent contains this complex early seral component.

While LiDAR is not available for the entire watershed, comparative analysis using Landsat satellite (GNN) imagery that covers all ownerships indicates that three percent (3%) is classed as complex early seral structure within the Mill Creek Watershed. The spatial analyses show that classification is overwhelmingly due to narrow bands of vegetative height contrast along stand edges and streams which the model associates as complex habitat. Approximately 1.7% of the watershed is associated with complex early seral polygons less than 1 acre, and 0.9% greater than 3 acres. Comparatively, the analysis of the watershed indicates that ten percent (10%) is classed as simplified early seral forest structure.

Simplified early seral, typically created by traditional regeneration harvest methods, generally lacks biological legacies such as residual trees, snags, and woody debris (Swanson, et al. 2011, Franklin et al. 2007) and provides little high quality early seral habitat (Johnson & Franklin 2013). Intensive site preparation, dense planting, and control of competing vegetation is undertaken with this harvest method to ensure rapid dominance of the next forest crop on the site. These treatments with the use of herbicides,

[8] Defined as the removal of all trees from a unit area (USDI 1994).

limits or actively eliminates both the diversity and duration of early seral organisms (Swanson et al. 2011). Consequently, many moist forest landscapes currently lack sufficient representation of high-quality early seral ecosystems (Swanson et al. 2011, Spies et al. 2007, Johnson & Franklin 2013). Compositional simplification of young stands via herbicide application can reduce or eliminate ecologically important processes. Nitrogen fixation by early seral vegetation such as ceanothus or alder species is an example of a process that may be reduced by compositional simplification of young stands and truncation of the early seral period (Hansen et al. 1991).

Table III-2: 10-Year Age Class Distribution for BLM Managed Lands in Mill Creek Watershed

		Subwatershed Acres by Age Class						
	Stand Age	Mill Cr.	Lower Camp Cr.	Lower Lake Cr.	Upper Camp Cr.	Upper Lake Cr.	Total BLM Acres	Percent in Age Class
Age classes in the cohort establishment stage of stand development.	0-9	0	11	0	0	0	11	0.0%
	10-19	69	16	59	0	23	167	0.7%
	20-24	61	217	398	323	126	1,125	4.5%
	25-29	236	209	308	491	199	1,443	5.8%
Subtotal	0-29			765			2,746	
Stands 30 to 79-years-old stands are typically in the canopy closure-competitive exclusion stage of stand development.	30-39	83	1,019	1,220	1,363	65	3,750	15.1%
	40-49	136	1,120	924	1,487	0	3,667	14.8%
	50-59	0	507	1,606	86	0	2,199	8.8%
	60-69	10	426	789	3	0	1,228	4.9%
	70-79	24	129	508	0	0	661	2.7%
Subtotal	30-79			5,047			11,506	
Stand age classes typically displaying mature – structurally complex stand characteristics	80-89	0	0	117	0	0	117	0.5%
	90-99	0	18	0	3	0	21	0.1%
	100-149	511	428	306	0	4	1,249	5.0%
	150-199	131	13	185	0	0	329	1.3%
	200-299	67	1,302	1,753	4,123	558	7,803	31.4%
	300+	347	359	230	25	84	1,045	4.2%
Subtotal	80-300+			2,591			10,564	
Non-forest	N/A	10	1	6	18	0	35	0.1%
Totals		**1,686**	**5,775**	**8,410**	**7,921**	**1,060**	**24,850**	

Snags and Down Wood

Stand exam inventories indicate that an average of 2.6 snags per acre (decay class 1-5, >11 inches DBH) exist within the project area. In addition, the majority of remnant trees within the project area contain broken tops with varying gradations of stem decay. Within the project area, down wood varies in quantity and quality. In some locations there are numerous large Douglas-fir logs (>30 inches in diameter) that are mostly decay class 4 and 5. Smaller diameter down wood resulting from suppression mortality occurs more uniformly throughout the proposed action area and indicates a deficiency in regards to RMP standards (see page 10). These pieces show advanced decay and may not persist longer than 10 years.

No Action Alternative

STAND DEVELOPMENT

Absent treatment or substantial disturbance, the project area stand would continue on its current developmental trajectory (as illustrated in Figure III-1). Canopy cover would remain near closure levels

and relative density measures would remain near the level indicative of high completion and slowing basal area growth. Tree foliage would remain largely concentrated high in the canopy. Distinctive of the BACE stage, the crowns of less competitive trees would recede, resulting in decreasing diameter growth (Davis et al. 2007) and increased suppression mortality over the next 20-30 years as trees compete for water, nutrients, and sunlight. In the short-term, shrub density and cover would remain generally stable (Chan et al. 2006).

Barring any major disturbance, the stand would likely progress to the maturation stage, typically beginning at 80 to 100 years (Franklin et al, 2002). Significant establishment of shade-tolerant tree species in the understory typically begins during the maturation stage but the process is highly variable in speed and uniformity (Franklin et al, 2002). The existing shortage of a shade tolerant conifer species mix is inhibiting the development of structural and compositional heterogeneity. Many mature natural Douglas-fir stands on sites suited to western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*) lack significant shade-tolerant regeneration after a century or more of development (Acker et al., 1998). Over the long-term, shrubs and shade-tolerant tree species (e.g. western hemlock) would gradually increase in numbers as receding overstory tree crowns and tree mortality allow increased light in the understory (Oliver & Larson, 1996). This process would be slow, however, and unlikely to provide for understory tree development sufficient to cause a shift from a single-storied to a two-storied or multi-layered structure within 100 years (Oliver & Larson 1996; Munger 1940). Seedlings of shade-tolerant tree species may persist in a suppressed state with virtually no height growth for several decades (Larson & Churchhill 2008). Opening of the canopy is typically required for an individual to grow into the canopy layer (Oliver & Larson 1996), and disturbance or patch dynamics may therefore be critical to shaping the structure of late-successional forest (Zenner 2004).

Development of structural complexity in Douglas-fir forests requires mortality in the pioneering cohort and recruitment of shade-tolerant conifer species into the lower and middle canopy (Franklin et al. 2002; Zenner 2005). Windthrow gaps of relatively small size may contribute to the persistence of mid-tolerant tree species (Taylor 1990) as the stand moves into the late successional stage. However, some mature Douglas-fir stands have very little shade-tolerant representation after even 150-175 years of development (Keeton & Franklin 2005). Smaller disturbance patches tend to fill in more rapidly, since dispersing plant propagules (especially from trees) can access most or all of the disturbed area, decreasing time to recovery (Foster et al. 1998). Furthermore, small patches are generally still under the microclimatic control of the adjacent forest, and experience an array of biotic and abiotic edge effects (Swanson 2012). Reestablishment of shade-tolerant conifers is a key process in late-successional forest development because it leads to vertical differentiation of the canopy and eventual codominance of shade-tolerant species (Keeton & Franklin, 2005). Availability of seed sources, such as shade tolerant mature and remnant old-growth trees, presence of suitable seed beds, competition with herbaceous shrubs, stand density, and environmental conditions all affect this process (Schrader 1998; Keeton 2000). Young- and old-growth forests offer extreme contrasts in foliage distribution (Franklin et al. 2002). In many old-growth forests, foliage and live branches are distributed continuously from near the ground to the top of the canopy (Parker 1995, 1997; Parker and Brown 2000; Lefsky et al. 1999). The shift in foliage distribution with stand development is a complex, long-term process (Franklin, Jerry F., et al. 2002; see e.g. Ruggiero et al. 1991; Carey et al. 1999; Carey &Wilson 2001; Lindenmayer et al. 2000).

This stand would require some type of stand-modifying disturbance to facilitate development of multiple tree canopies, tolerant understories, and large overstory dominants associated with old-growth forest (Spies & Franklin 1991; Larson & Franklin 2005; Franklin & Van Pelt 2004). Wind as a disturbance agent tends to superimpose a fine-scale mosaic pattern (Lertzman et al. 1996), frequently on a coarser mosaic created by large fire-created patches (Spies and Franklin 1989). Fire, of high and mixed severity, is the dominant stand-replacing disturbance agent across the Pacific Northwest (Franklin and Hemstrom

1981, Agee 1993, Agee 1998). These disturbances create snags and down woody debris (Harmon et al. 1986), volatilize nutrients and biomass (Campbell et al. 2007), and open growing space for the establishment of new cohorts of shrubs, trees, and forbs (Oliver and Larson 1996). In the absence of stand-replacing disturbances, the project area as a whole would likely enter the horizontal diversification (old-growth) stage within 300 years. During this stage, the stand evolves into multiple structural units primarily as a result of gap creation and expansion (Franklin et al. 2002). Douglas-fir can regenerate in the large, fire-created gaps, but fewer species regenerate in smaller gaps formed by other processes (Spies & Franklin 1989). Active fire exclusion has eliminated a major disturbance process, which formerly affected stand structures and densities leading to the development of the kinds of old-growth stands characteristic of the southern Oregon Coast Range (Weisberg 2004).

Complex early-successional habitat would remain missing from the landscape in this area, continuing the current decline in this type of habitat across the Oregon Coast Range (Spies et al. 2007; Swanson et al. 2011; Wimberly 2002). Analysis of the age class distribution within the watershed indicates that the early seral component is becoming more infrequent on federal lands as displayed within Table III-2. As the remaining acres of young stands (represented in Table III-2) transition into the 20-year age-class in the next several years, the youngest age-classes (< 20 years) would be unrepresented on BLM lands in the project watershed. Within the next five years most of the 20 year age class will transition into the 30-year age-class which have already or will soon enter the stage of canopy closure and stem exclusion. The contrast between stand edges on BLM lands would decline similarly as tree height growth results in less height contrast between younger and older stands. Lessening of structural diversity between stands would likely result in diminishing landscape heterogeneity.

The No Action Alternative would result in slow stand growth, postpone development of structural attributes associated with structurally complex forests, would not provide wood fiber in the near future or increase the growth rate of wood fiber for future harvest.

Proposed Action Alternative

STAND DEVELOPMENT

The variable retention harvest would change a predominantly single-storied canopy stand to one providing complex early-successional habitat components with patches of older forest in the form of aggregate retention, riparian reserves, occasional legacy trees, large down wood, and patches with a dense cover of shrub and establishing tree species. Aggregate retention patches and riparian reserves would ameliorate potential loss of structural recruits within large portions of the project area because the aggregates are designed and located to protect existing high-quality structures. The retained areas would also provide components of biological diversity within the project area. The aggregates would retain interior forest coinciding with the 70 year-old cohort and scattered 100 year-old or older remnants. Microclimate and soil ecologies in the harvest areas and retention aggregates would be modified and/or simplified depending on locations from edge or interior areas. Individual tree retention, aggregates, and riparian reserves edge would add structural diversity around the regenerating portions of the stand. Retention schemes with biological legacies can mimic the landscape level patterns created by natural disturbances, while promoting accelerated and complex recolonization and successional pathways (North & Keeton 2008). Disturbances across a larger spatial extent encompass a wider range of soil and topographic conditions thereby engendering diverse recovery pathways; in ways a smaller opening could not (Swanson 2012). Turner and Dale (1998) emphasize that large disturbances have persistent effects on ecosystems, present tremendous internal heterogeneity due to both stochastic disturbance processes and diversity of recovery pathways, and often host early successional species that can colonize ahead of recovering later-successional species (Swanson 2012).

Harvesting utilizing variable retention prescriptions would result in creation of multiple-aged stands as a younger generation of trees becomes established around the retained islands of the pre-harvest stand (Franklin & Johnson 2012). Remnant trees have important influences on stand development. Retention of legacies, such as living trees, can influence (Zenner 2000) and even accelerate (Keeton & Franklin 2005) long-term stand development processes and recovery from disturbance. However, remnant tree densities influence horizontal complexity development rates in either positive or negative ways (Zenner, 2000). Remnant tree density diversifies the spatial patterning of colonizing tree seedlings (Goslin 1997) but at the same time, high densities of remnant trees can reduce growth rates in these younger cohorts (Zenner et al. 1998).

For 10-20 years following the action, the harvested areas would be in an establishment or initiation phase of stand development. The heterogeneous design of the treatment would increase vertical and horizontal habitat complexity of the stand, and associated vegetative diversity over the project area landscape within the 50 year time horizon. Trees respond to disturbances by growth of replacement structures whose form depends on disturbance intensity and age (Van Pelt & Sillett 2008). In this manner, epicormic branching can re-establish lower crowns. Although the number of larger trees available within the short term (< 50 year) time horizon would be modified or reduced by the proposed action, growth of epicormic structures is greatly influenced by the amount of light reaching lower crowns. The aggregates, individual tree retention, and Riparian Reserves would provide trees available for recruitment of limb structures. However, growth of large limb structures often takes 200 years (Van Pelt & Sillett 2008).

Promoting and maintaining wider spacing within the regenerative layer would provide greater potential for long term (100 year) recruitment of large limbed tree structures than the no action alternative, under which dense tree spacing would limit light penetration within lower crowns and lead to suppression and/or mortality of lower limbs. Wider planting spacing or early precommercial thinning's are necessary to ensure development of large, low branches that are important habitat component for mosses, lichens, and other species (McCune et al. 2000). The regenerating species mix of Douglas-fir, western redcedar, and western hemlock would enhance compositional heterogeneity within the developing stand. Stand development, as characterized by tree characteristics and understory vegetation, is influenced by density fairly early and is very dynamic in young plantations (Puettmann & Berger 2006). Douglas-fir, western hemlock, rhododendron, salmonberry, other shrubs, and grasses would regenerate naturally depending on seedbed conditions, environmental conditions, and seed sources.

Over the 50 year time horizon, the increased growth rates, creation of spacing diversity, inclusion of shade tolerant species, and snag and down log creation would improve development of late-successional forest characteristics such as multi-layered canopies, large diameter trees, and diverse structure (Tappeiner et al. 1997). Reduced canopy cover near forested edge would allow more light to penetrate to the forest floor allowing increased understory vegetation development. The prescribed fire treatments are expected to stimulate growth by providing bare soil for increased seed germination (Shebitz et al. 2009).

Existing down wood and snags would be retained during harvest and protected during site preparation activities as feasible. Additional green trees would be reserved as necessary to meet RMP direction (as referenced on page 9). The snag requirement within the Mill Creek watershed is calculated at 1.5 snags/acre (USDI, BLM 2005). Snags within the aggregate retention areas would also be protected, as operationally feasible, to assist meeting RMP goals. Existing down wood in aggregates would also be retained, and standing trees reserved from harvest outside the aggregates would be felled to meet the RMP requirement of 120 linear ft. /acre after post-harvest monitoring, if necessary.

The resulting landscape would be more complex as a mosaic of structural units develops to collectively constitute the stand. Ecologically in such environments, it is more useful to view the functional late-successional stand as a mosaic of structural units (Franklin & Fites-Kaufmann 1996). The VRH would promote this larger scale stand complexity, and the development of multi-layered canopies, which in turn would support a broad range of, tree and shrub, sizes and species.

Older Cohort

Within the proposed action area, there are several 100-year-old or older trees dispersed across the landscape from the original harvest. While the vast majority of this older cohort are retained outside of the proposed action area, all remaining remnants would be retained and receive a one-half site tree (110') no-treatment buffer so that limb structures would be protected during harvest and site preparation activities. In addition, all are retained within the aggregate areas except for one individual identified near a landing and adjacent to a yarding corridor used in the previous harvest. Therefore this area is not an intact forest patch, and thus does not fit as a candidate for aggregate placement as described by Franklin and Johnson (see page 10). However, it still would receive a one-half site tree no-harvest buffer.

When these remnants are considered as individuals of a different cohort, rather than part of the proposed stand for harvest, some could be considered late-successional based strictly on individual age. However, they currently do not influence composition and structure of surrounding younger trees enough to exhibit a stand with forest area characteristics in the mature stage of structural development. These characteristics include vertical diversity, presence of large shade tolerant trees, deciduous shrub layer, large snags, and large down woody material. The Wildlife resources section includes a discussion of the habitat quality for spotted owls and marbled murrelets.

REFORESTATION

Reforestation would be a combination of planting and natural regeneration. Planting trees of a variety of species would occur within one year at an average of 200 trees per acre (TPA) and ensure minimal reforestation[9] as per management direction in the RMP (p. E-1). Initial planting would be Douglas-fir, western redcedar, and western hemlock. As most of the current existing stand is Douglas-fir, it would be the most prevalent species replanted. If follow up planting is needed (based on monitoring) in subsequent years due to mortality, western hemlock and western redcedar would be planted because it is shade tolerant and would be better suited to survive after the rapid occupation of the site with competing vegetation. It is expected that planting success would constitute a three-year survival of seventy-five percent (75%) or higher.

Within portions of the action area that would not be planted (approximately 6 acres), naturally regenerating species that may occur include red alder and western hemlock because they are species that have more consistent seed crops. However, variability of seed source, dispersal pattern, seed bed, and vegetative competition creates difficulties for determining the density and overall mix of naturally regenerating species that would consistently occur within these areas. These areas would overlap approximately 2 acres planned for broadcast burning as the method of site preparation. Approximately 4 acres would be within areas planned for hand piling. Seed beds created by broadcast burning are often more ideal due to the creation of a mineral soil seed bed and reduction of competing vegetation. However light to moderate intensity burning would create highly variable post-harvest seed bed conditions. Similarly, the creation of seed beds through hand piling would depend on the size and extent of the piles. Typically, hand piling as a method of site preparation would not create an ideal mineral soil seed bed for natural regeneration (Hobbs et al. 1992). Woody and herbaceous vegetation would rapidly reoccupy the

[9] Customary planting practices for the region are 300-450 TPA (Rose and Haase 2000).

site, especially with the increase in growing space and sunlight, further making conditions unsuitable for natural regeneration. Large seed crops of the commercial species found within the project occur at infrequent intervals (Table III -3). If a large seed crop follows harvest, there could be considerable natural regeneration. If there are small or no seed crops, or heavy predation of the seed crop for several years following harvest, there could be little natural regeneration due primarily to the rapid propagation of competing vegetation (Hobbs et al. 1992, Stein 1995).

Table III-3: Frequency of large seed crops[10].

Tree Species	Length of Time Between Large Seed Crops
Douglas-fir	2-11 years
Western Hemlock	5-8 years

If abundant natural regeneration augments the planting, then precommercial thinning would be completed to extend early seral conditions. Stocking levels within the harvested portions of the stand would be targeted to not exceed a 0.15 relative density or approximately 200 TPA. Over the monitoring periods, additional precommercial thinning would be completed if warranted. Tree to tree competition would not occur at a relative density of less than 0.15. Therefore no crown closure would occur in these areas, and individual tree growth would be maximized since the trees would not be competing with each other. Using customary reforestation standards, the reforested area would be considered understocked, since growing space is not being fully utilized by trees, thus enabling persistence of early seral conditions. These stocking levels would be maintained for 20-30 years. See Appendix C for more information on reforestation and monitoring.

Cumulative Effects

The proposed action would contribute 111 acres or 1.4% to the District-wide RMP current decadal projection (FY15 to FY24) for regeneration harvest (USDI 1994, Table AA-7).

STAND DEVELOPMENT

The VRH would increase the amount of BLM-managed acres in the 0-20 age class in the Mill Creek Watershed to 1.1% from 0.7%, and to 1.7% from 0.7% within the Lower Lake Creek Subwatershed. The VRH would increase the amount of complex early seral forest on BLM managed lands to 0.9% from 0.4%. Across multi-ownerships of the 85,746 acre Mill Creek watershed, the VRH would increase the amount of complex early seral by approximately 0.1%. As most existing young stands within the watershed are the result of intensive reforestation following clearcut harvesting and most lack the habitat complexity and legacy components typical of stand establishment forests following natural disturbance (USDI 2008); this particular stand would provide missing complex forest structure to the localized Ash Valley landscape due to the proximity of the project area to forested edge bordering the agricultural lands. However, on the watershed scale, other similar treatments would need to follow to create more than a minimal amount (< 1%) of complex early seral on federal lands and extend these structural dynamics across the landscape over time. Under current state forest practices the BLM assumes other ownerships would not include significant structural retention which would enhance development of structurally complex and diverse early successional communities.

Landscape level diversity is the result of differences among the stands on the landscape. Between stand diversity is not random. It is the product of site conditions, disturbance history, and mechanics of recolonization. Some stands will be very complex while others are simple. The more complex stand contains niches that do not exist in the simple stands across the landscape. Applying the VRH

[10] The Woody Plant Seed Manual. (Bonner and Karrfalt 2008)

prescription would promote contrast between stands and promote structural variation within the stand that is in context with historically plausible fire disturbance patterns of this area.

WATER RESOURCES

Affected Environment and Effects by Alternative

The Soup Creek VRH project is located within the Lower Lake Creek 6th field subwatershed and the Mill Creek 5th field watershed (Table III-4). The action area referenced in this water resources section refers to the 161 acre area containing the proposed regeneration units, the aggregate areas and the Riparian Reserves. The project area referenced in this water resources section refers to the 161 acre action area plus the 134 acre area immediately east of the action area.

Almost all precipitation in the proposed harvest units occurs as rainfall from October to May and is due to frontal storms originating over the Pacific Ocean. Mean annual precipitation from 1971 to 2000 was 68 inches in the vicinity of the proposed harvest units. Annual stream flow is closely correlated with annual precipitation. Fall rains recharge soil moisture depleted by summertime evapotranspiration[11] and stream flow. In winter, rainfall is rapidly converted to runoff because soils remain wet between frequent storms and evapotranspiration diminishes. During spring, runoff decreases due to less rainfall, increasing transpiration by plants, and increasing canopy interception and evaporation of precipitation. Both rainfall and discharge drop to seasonally low levels in the summer.

Table III-4: Location and acreage of proposed harvest (approximate values based on GIS data)

Watershed	Subwatershed	Subwatershed acres				Project acres			Retention acres as % of total action area
		Private	BLM	State	Total	Regeneration	Aggregates	Riparian	
Mill Creek	Lower Lake Creek	21,910	8,409	1,987	32,306	88	23	50	0.45

Rain-on-snow events occur during cloudy periods when warm winds and rain combine to rapidly melt shallow snowpacks. Rain, combined with rapid snowmelt, can result in higher than normal stream flow potentially causing bed and bank erosion. Although rain-on-snow can occur in the Coast Range, it is more common in the lower and middle elevations of the western Cascades of Washington and Oregon (Harr and Coffin 1992). Rain is the predominant mechanism of peak flow generation in Oregon's Coastal region (Reiter and Beschta 1995, Greenberg and Welch 1998). The lower limit of the transient snow zone on District is approximately 2,000 feet (USDI BLM 2008, Vol I Chapter 3 - 332). The proposed harvest units are less than 1,120 feet based on Light Detection and Ranging (LiDAR) elevation data so post-harvest peak flow augmentation resulting from rain-on-snow events in cut areas is unlikely and will not be discussed further in this analysis.

The upstream end or inception point of each stream originating in the action area was field verified. First and second order[12] headwater streams at the upper end of the drainage network account for approximately 94% or 1.17 of the 1.24 miles of channels within the action area. One roughly 370-foot long third order

[11] Evapotranspiration is defined as the water lost to the atmosphere from the ground surface, evaporation from the surface of vegetation, and the transpiration of groundwater by plants.

[11] First order headwater streams have no tributaries. When two first order channels join they form a second order stream. When two second order channels come together they form a third order stream, and so on. If two streams with different orders join then the higher order is retained. The main stem always has the highest order (Strahler 1957).

stream exits the action area to the north. Approximately 73% of the streams within the action area are intermittent (i.e. they exhibit discontinuous pools or they dry entirely during the summer). Perennial streams within the action area that flow throughout the year have low summer flows that can be measured in gallons per minute.

In accordance with the Northwest Forest Plan, all streams within the action area would receive a 220-foot, one site-potential tree no-harvest buffer because the streams are either permanently-flowing (perennial) and non-fish-bearing or they are seasonally-flowing (intermittent).

STREAM TEMPERATURE

The Oregon Department of Environmental Quality develops water quality standards that protect the beneficial uses of rivers, streams, lakes and estuaries. Section 303(d) of the Federal Clean Water Act requires that Oregon develop a list of water bodies that do not meet water quality standards. According to the Oregon Department of Environmental Quality 2010 Integrated Report Database there are no streams immediately downstream of the project area that are 303(d) listed for exceeding water temperature standards.

Elevated stream temperatures are primarily attributable to a lack of stream shading. A lack of shade allows sunlight to reach the stream surface, and the majority of energy for summertime stream heating comes from direct solar radiation (Boyd and Sturdevant 1997).

No Action Alternative

Within the action area, stream temperatures are assumed to be relatively cold. Based on continuous water temperature information gathered on District in the Smith River drainage to the north of the action area and the North Fork Coquille River drainage to the south, summer stream temperatures in the perennial channels that originate in the action area are likely well below the State temperature standard, 64.4°F, designated to protect salmon and trout rearing and migration. The State standard is based on the 7-day average maximum temperature, and it is calculated by averaging the daily maximum stream temperatures for the seven warmest consecutive days during the summer.

Thirty-seven continuous water temperature records gathered on 17 different small, perennial streams since 2010. The drainage area above the monitoring sites ranges from 18 to 1927 acres, the elevation ranges from 147 to 1,330 feet, distance to the coast ranges from 9 to 27 miles, and the surrounding forest ranges in age from 48 to 73 years old. The 7-day average maximum temperatures between 54.9°F and 60.5°F with an average of 57.3°F. The third order perennial stream flowing north out of the action area likely has a similar temperature signature because it, like the other monitored streams, drains a well-shaded reach, and the drainage area at the action area boundary (81 acres), elevation (460 feet), distance to the coast (21 miles), and forest age (67 years old) are similar to conditions monitored elsewhere.

Proposed Action Alternative

The intermittent and perennial streams within the action area would receive 220-foot no-harvest buffers. These buffers are more than adequate to maintain the existing thermal regime of the drainages within the action area based on LiDAR analysis and recent studies.

LiDAR can be used to accurately delineate the trees and shrubs that are tall enough to provide primary shade or shade from 10 a.m. to 2 p.m., the period of greatest solar loading (Figure III-2). Figure A-4 in Appendix A shows that the LiDAR-derived primary shade zone falls well within the Northwest Forest Plan buffers. The buffers also contain trees and shrubs in the secondary shade zone that provide shade during the morning and afternoon hours when the sun is lower in the sky.

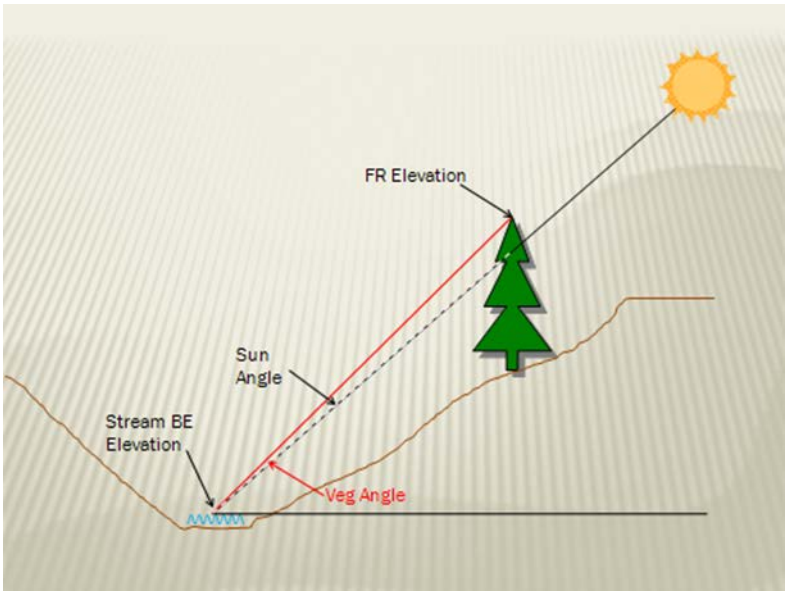

Figure III-2: LiDAR is used to compare the first return (FR) elevation of vegetation with the sun angle to determine if the vegetation is tall enough to intercept sunlight. BE refers to bare earth.

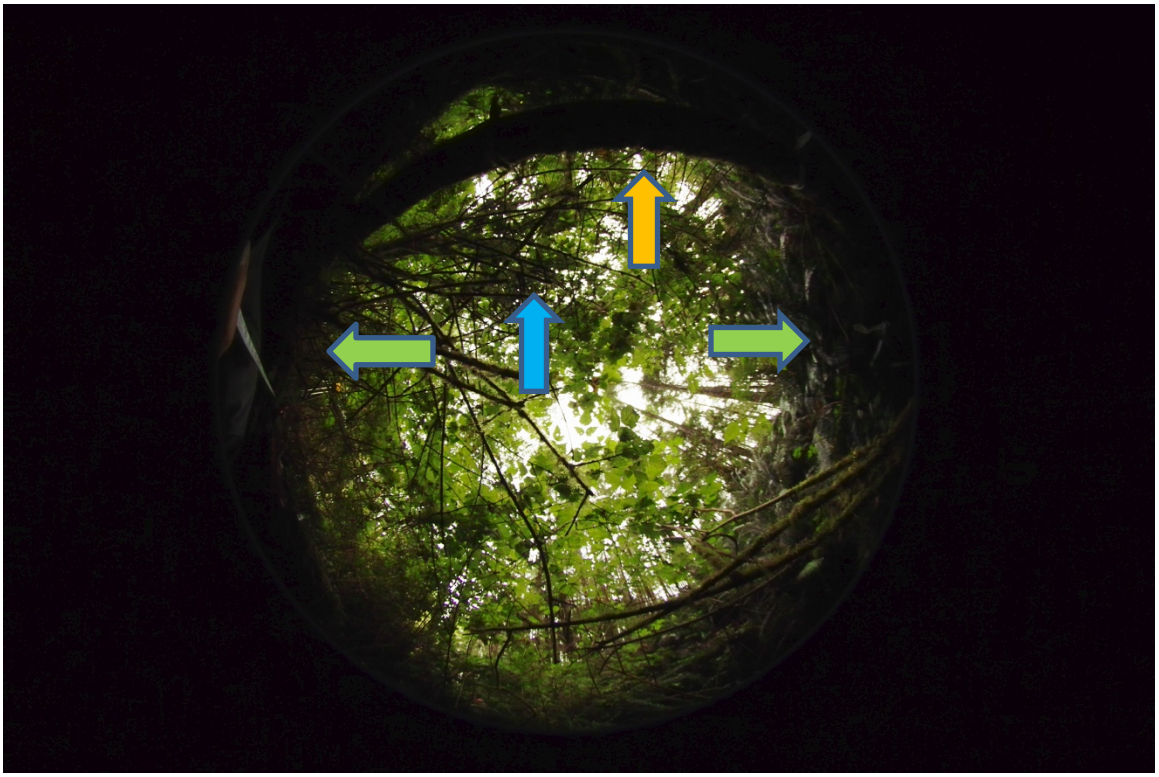

Figure III-3: Hemispherical photograph taken approximately 3 feet above a third-order tributary to the North Fork Coquille River. The top of the photo faces south.

Note the salmonberry (blue arrow) and wood (orange arrow) over the stream and the stream banks (green arrows) of the hillslope-constrained channel. Effective shade, the total solar radiation blocked from reaching the stream over a twenty-four hour period (USDA FS and USDI, BLM 2005), is 96% for the site pictured. This measurement together with 10 other randomly chosen sites along a 700-foot stream reach produced an average effective shade of 94%.

Kibler pointed out the importance of shade provided by wood over the channel in her 2007 thesis *The Influence of Contemporary Forest Harvesting on Summer Stream Temperatures in Headwater Streams of Hinkle Creek, Oregon*. Densitometer measurements taken at waist height indicated that canopy closure in harvested reaches decreased by 84% on average. Canopy closure measurements taken 2 to 8 inches above the stream surface showed only a 20% decrease post-harvest. Kibler concluded that the waist high measurements did not adequately characterize the shade provided by downed vegetation (logging slash) in the streams.

Results from a recent study indicate that the use of Northwest Forest Plan buffers would not lead to a detectable increase in stream temperatures. Groom et al. (2011) studied pre- and post-harvest stream temperatures in 15 first to third order state forest streams in the Oregon Coast Range and found no change in maximum temperatures when modest buffers were employed. Study reaches had 25-foot no-cut buffers and limited entry buffers out to 170 feet where at least 50 trees per acre remained after harvest. The proposed Soup VRH no-cut buffers would provide considerably more shade than the study reach buffers because the Riparian Reserves contain 2 to 3 times the trees per acre and the Riparian Reserves are almost 9 times the width of the study's no-cut buffers (220 feet versus 25 feet).
Cable yarding corridors would not measurably increase stream temperatures. Three yarding corridors would cross the intermittent stream in the northwestern corner of the project area. The corridors would be far narrower than the maximum corridor width specified in the Coos Bay District Resource Management Plan (1995, p. D-5) (approximately 12 feet wide versus 50 feet), full log suspension would be required reducing the chance of damaging stream-adjacent trees, and the stream has discontinuous surface flow or no flow (i.e. limited or no exposure to direct solar radiation/sunlight) during the time of the year when maximum water temperatures are a concern (July and August).

LARGE WOODY DEBRIS DELIVERY TO STREAMS

Wood enters streams via chronic and episodic processes (Bisson et al. 1987). Chronic processes such as tree mortality and bank erosion generally deliver single pieces or relatively small numbers of trees at frequent time intervals (Reeves et al. 2003). Episodic or infrequent events including windthrow, severe floods, landslides and debris flows[13] can rapidly add large amounts of wood to streams. Windthrow and flooding happen on a scale of years to decades. Landslides and debris flows are highly variable in space and time and they have a recurrence interval of decades to centuries (May and Gresswell 2004).

Tree fall from mortality and windthrow, landslides and debris flows are most responsible for the delivery and distribution of wood in first and second-order headwater channels. As mentioned previously, first and second order channels account for 96% or 1.69 of the 1.76 miles of streams within the project area. The short, 370-foot reach of third order stream in the project area contains legacy wood from previous decades to centuries-old debris flows, and more recent wood inputs from individual tree fall and bank erosion.

[13] A landslide is a mass of soil, rock or debris that breaks free on a steep slope. A debris flow is a rapidly moving slurry of rock, soil, wood and water that travels down a steep stream channel.

Wood of all sizes from small fragments to entire trees is important to stream function. However, because decay rate and probability of displacement are a function of size, large pieces have a greater influence on habitat and physical processes than small pieces (Dolloff and Warren 2003). In first- and second-order streams, wood that is large relative to the channel can store large volumes of sediment in the interval between debris flows (May and Gresswell 2004). The distribution of wood in these low order channels is mainly determined by the pattern of local wood recruitment because small streams have insufficient flow to transport large pieces downstream (May and Gresswell 2003a). In higher order perennial streams, wood that is large relative to the channel decays slowly and resists downstream transport, creates pools and backwaters, and stores sediment and smaller wood.

No Action Alternative

The streamside stand in the project area is old enough to contribute functional or pool-forming LWD based on modeling of wood recruitment by Beechie and coauthors (2000). According to their study, 13 centimeter/5 inch diameter wood is functional in streams with a bankfull[14] width of 5 meters/16 feet. The estimated time from stand establishment to first recruitment of wood of this size is 7 years following alder regeneration and 15 years following conifer regeneration. The estimated time to the first increase in wood abundance (i.e. recruitment > depletion) is 10 years and 30 years following alder and conifer regeneration respectively. The existing stand in the project area averages 67 years old, and all of the streams draining the project area have bankfull widths less than 16 feet.

In the foreseeable future, most wood delivered to streams within the action area would likely come from tree fall due to mortality and windthrow, and a limited amount of bank erosion. Continuous forest cover coupled with relatively gentle (< 70%) topography over 75% of the action area reduces the chance of landslides and debris flows (value derived from LiDAR data). Less than 25% of the total proposed harvest area, less than 30% of the Riparian Reserves, and less than 25% of the aggregate areas have slopes greater than or equal to 70%. In their analysis of the storm impacts of 1996, Robison and others (1999) found that the highest hazard for shallow rapid landslides in their western Oregon study sites was found on slopes of over 70% or 80% depending on landform and geology. Robison and coauthors also found that stands between 10 and 100 years in age typically had lower landslide densities and erosion volumes as compared to younger and older forest stands. The stand within the project area averages 67 years old, and recent landslide and debris flow activity was not found within the project area during field work for this environmental assessment.

Proposed Action Alternative

Site-potential tree height buffers would ensure continued delivery of large woody debris (LWD) to streams within the action area. The Riparian Reserves contain not only trees that could fall directly into streams but also upslope trigger trees (Reid and Hilton 1998) that could fall and knock other trees into the streams. Figure A-5, Appendix A demonstrates this point. Vegetation within the gray area in Figure A-5 is tall as or taller than the slope distance to the adjacent stream[15]. If a tree at the upslope or outside edge of the gray area were to fall perpendicular to the slope its top would just touch the stream. Trees that are at or near the upslope edge of the gray line may contribute small wood to the stream if they fall directly towards the channel, but they may not contribute LWD. Large woody debris usually consists of pieces of wood or tree boles that exceed a specific diameter and/or length (e.g. 20 centimeters/8 inches x 1.5 meter/5 feet (Robison and Beschta 1990), 20 centimeters/8 inches x 2 meters/6.5 feet (May and Gresswell 2003a), 15 centimeters/6 inches x 3 meters/10 feet (Foster et al. 2001). Therefore, more than just the tip

[14] Bankfull width is the point where water fills the channel just before beginning to spill onto the floodplain. In entrenched and nonadjustable channels (e.g. first- and second-order channels) ordinary or annual high water approximates bankfull (USDA FS 2008).

[15] First return LiDAR elevations that map the canopy were compared with slope distances to the stream to develop the layer in Figure A-5, Appendix A. This layer does not show individual trees and shrubs.

of the tree would need to contact the channel to provide LWD. Robison and Beschta (1990) use the term effective tree height to mean the height to the minimum diameter and length necessary for the wood to qualify as LWD. Because LWD dimensions are variously defined in scientific publications, effective tree height can vary.

SEDIMENTATION

Sediment input to stream channels may be a result of natural and/or management related processes. Primary sediment sources include episodic landslides and debris flows usually associated with intense winter storms, hillslope erosion, stream bank erosion, and runoff from roads. Forest management related increases in sediment delivery to streams 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).

There are no streams in the analysis area listed by the Oregon Department of Environmental Quality as impaired by excess fine sediment.

No Action Alternative

Under this alternative the 23-9-20, 23-9-29.4, and 23-9-19.3 roads would not be renovated. Removal of relatively small accumulations (less than 10 cubic yards) of cutbank slough was identified during road review for this EA. The ditch line at five sites is blocked by this material which increases the chance of diverting surface flow onto the road and over the outboard edge of the road. Under this alternative these hazards would remain until addressed by District road maintenance staff.

Proposed Action Alternative

Harvest

Project design features would prevent harvest-related sediment delivery to streams within the action area. Riparian Reserves are more than adequate to prevent sedimentation of action area streams. In a two year study of surface erosion and sediment routing following clear cut logging in western Washington, Rashin and others (2006) found that stream buffers were most effective at preventing sediment delivery when timber falling and yarding activities were kept at least 10 meters/33 feet from streams and outside of steep inner gorge areas. Harvest would not occur in steep inner gorge areas and the Riparian Reserves would be more effective than the study buffers at preventing sediment delivery to streams because the proposed no-harvest buffers would be almost seven times as wide as the 33-foot study buffers.

Riparian Reserves would adequately protect bank stability because the contribution of root strength to maintaining stream bank integrity declines at distances greater than one-half a crown diameter (Burroughs and Thomas 1977; Wu 1986, both cited in FEMAT 1993, p. V-26). Also, no-harvest buffers would make effective filter strips because most undisturbed forest soils in the Pacific Northwest have very high infiltration capacities and they are not effective at overland sediment transport by rain splash or sheet erosion (Harr 1976; Dietrich et al. 1982).

The three cable yarding corridors that would cross the intermittent stream in the northwestern corner of the project area are not expected to cause sedimentation. Full log suspension over the stream would be required leaving undisturbed forest soils adjacent to the stream.

Road and Landing Construction
No new roads are proposed and the construction of two landings would occur outside of the Riparian Reserves in stable, road-adjacent areas. Therefore, sediment delivery to streams from landing construction and use would not occur.

Road Renovation and Haul
Project design features would prevent renovation-related sediment delivery to streams within the project area. Ditch relief culvert replacement, spot rocking, and removal of cutbank slough would be done in the dry season when there is no surface flow and therefore no mechanism to move sediment towards streams. Bare soil areas would be seeded and mulched prior to winter rains.

Haul is not expected to result in sediment delivery to streams because the existing drainage features are decoupled from the stream network. There are fifteen 12-inch to 24-inch corrugated metal and plastic ditch relief/swale drainage culverts in the 23-9-20 and 23-9-29.4 roads. Four of these pipes along the 23-9-29.4 road discharge to low gradient bench areas well away from stream channels and there is no evidence of scour or sediment deposition at the culvert outlets. The remaining 11 pipes are roughly 80 to greater than 450 feet slope distance (median distance greater than 108 feet) from main stem streams or the inception points of intermittent channels. There is no erosion or sediment deposition at the outlets of 10 of these culverts. A foot-wide scour channel can be found for approximately 20 feet below one pipe but the scour ends where flows infiltrate the ground. Brake and others (1997) studied sediment travel distances below 96 ditch relief culverts on established logging roads in the Oregon Coast Range, and they found that the mean sediment travel distance was approximately 17 feet and the maximum sediment travel distance was 76 feet. These results together with the existing conditions along the proposed haul route and the BMP to limit haul during wet periods indicate maintenance of existing water quality.

There is one 36-inch stream crossing on the 23-9-20 road that is adequately buffered from sediment delivery. A ditch relief culvert is located approximately 260 feet upslope from the crossing and the intervening ditch drains to a vegetated area above the pipe that is approximately 40 feet wide. Water infiltrates or enters the soil in the vegetated area and this stops sediment movement towards the stream crossing.

PEAK FLOW AND ROADS
Peak flow is the instantaneous maximum discharge generated by an individual storm event. Roads affect peak flows by intercepting subsurface flow and converting it to surface flow, effectively increasing the density and runoff efficiency of streams in a watershed. Rapid delivery of water to stream channels during a storm via this expanded network can decrease the time until peak flow and increase the magnitude of peak flow (Wemple et al. 1996). The direct transport of inboard ditch flow to a stream channel and the transport of ditch relief culvert water to a stream via a channel or gully are two processes that increase road and stream connectivity (Gucinski et al. 2001, Croke and Hairsine 2006). Midslope road segments perpendicular to subsurface flows paths with cutslopes that intersect most of the soil profile are especially problematic (Jones 2000, Wemple 1998 cited in Jones 2000).

No Action Alternative
The existing roads to be renovated are decoupled or disconnected from the stream network. That is, ditch flows are discharged onto hillslopes and infiltrate the hillside between culvert outlets and downslope streams. Because subsurface flow paths are more tortuous and water moves slower than surface flow, the influence of the existing roads on peak flow timing and magnitude is minimized.

Proposed Action Alternative

Road renovation would not produce a measurable change in the timing or magnitude of peak flows in downstream drainages. The existing drainage features (ditches, culverts) are functioning with the exception of the previously mentioned ditch plugging by cutbank slough. Removal of this material would eliminate the possibility of flow diversion and gully formation, keep road drainage in a vegetated ditch for eventual delivery to the forest floor, with infiltration away from stream channels.

PEAK FLOW AND HARVEST

Under the Proposed Action Alternative, harvest-related peak flow increases in stream reaches draining regeneration units may occur due to reductions in interception and evapotranspiration, but the magnitude of such events would likely be of little consequence to stream channel morphology.

Grant et al. (2008) reviewed the effects of forest practices on peak flows and the subsequent channel response in western Oregon. According to Table III-5 developed by the authors, road density, road connectivity and drainage efficiency have more of an impact on peak flow increase than the amount of harvest and buffer width. The three former parameters have a low likelihood of increasing peak flows in the 295 acre project area (orange ovals added to Table III-5). The existing compaction in the project area is 1.5%; well below the 12% threshold in the District's Resource Management Plan (USDI 1995, p. D-5). Existing roads in the project area are located outside of Riparian Reserves and these roads, as well as the haul route to the east, are hydrologically disconnected from streams. Also, the drainage efficiency of project area streams is slow. Headwater channels in the project area are resistant to changes in dimension (cross-sectional area), pattern or plan view as seen from above, and profile or slope because they are confined by narrow valleys and bedrock. Wood and rock delivered from adjacent hillslopes is typically large in relation to the width of these relatively small channels (less than 6 feet at ordinary high water) and are therefore resistant to movement, even with increasing flow. There is no indication of recent debris flow activity in project area streams and legacy wood in the channels together with present day wood inputs from the Riparian Reserves increase sediment and water storage and retard the export of nutrients.

Table III-5: Site conditions and management treatment considerations that potentially influence peak flows. Considerations are listed in decreasing likelihood of effect. Grayscale represents theoretical range in impact of each factor (black = high, white = low). Table appears in (page 40) *Effects of Forest Practices on Peak Flows and Consequent Channel Response: A State-of-Science Report for Western Oregon and Washington* by Grant et al. (2008). Ovals added to denote conditions in the Soup VRH project area.

Likelyhood of peak flow increase (High ← → Low)			Potential considerations
High	Moderate	Low	Road density
All or most	Some	Few or none	Road connectivity
Fast	Moderate	Slow	Drainage efficiency
Large	Small	Thinned	Patch size
Absent	Narrow	Wide	Riparian buffers

According to Table III-5 VRH Unit #2 at 13 acres probably equates to a small to moderate likelihood of peak flow increase. VRH Unit #1 at 75 acres has a higher likelihood of increasing peak flows. Any increase would be moderated however by at least two factors. First, several drainage divides within Unit

#1 mean that subsurface flows are not concentrating in any one drainage. Second, wide Riparian Reserves, which imply a low likelihood of peak flow increase according to Table III-5, and aggregate areas contain trees that would utilize some of the increased soil moisture that becomes available following harvest. Based on a review of regional harvest and stream flow studies the National Marine Fisheries Service Northwest Fisheries Science Center issued a memo (Collier 2005) stating that "it is difficult to separate effects of timber harvest on stream flows from effects of roads, but the major influences appear to be from roads." This statement agrees with Table III-5 in that road density and road connectivity have the most impact on peak flow increase. The memo also says that "it is difficult to argue convincingly (based on the literature) that changes in peak or low flows due to timber harvest alone will have significant effects on habitat and salmon populations."

Site-scale peak flow increases, if they occur, would not be measurable at the drainage (Lake Creek), subwatershed and watershed scales for at least three reasons. First, regeneration harvest with the retention of Riparian Reserves and aggregates would likely produce a relatively small stream flow response, and the ability of individual small streams to affect downstream discharge decreases as small streams form increasingly larger drainage networks (Garbrecht 1991). Second, the temporal and spatial variability of precipitation and the variable timing of peak flows from individual streams complicate change detection. Third, interannual flow variability will be greater than the magnitude of any peak flow increase, and the size of any increase would likely fall within the 5 to 10 percent error associated with stream flow measurements (USGS 1992).

WATER RIGHTS

There are three domestic use water rights registered with the State of Oregon downslope from the project area. The point of diversion (POD) to the west is an unnamed spring greater than 900 feet from the project area boundary. There are two points of diversion, both springs, to the north. One POD is over 600 feet from the project area boundary and the other POD is greater than 1,000 feet from the boundary.

There is also an unregistered domestic use water system within the project area. The system consists of 3 tanks and piping that run up the stream in the southwest corner of the project area to the inception point of the drainage.

No Action Alternative

Springs and streams within and adjacent to BLM-managed land would still continue to supply water for domestic use.

Proposed Action Alternative

Harvest-related deleterious effects to the stream and springs that supply domestic use water are not expected. The water system in the southwestern corner of the project area would be protected from physical damage because it is located within a Riparian Reserve that is bordered by an aggregate area to the west. The BLM buffer width is greater than twice the width specified by the Oregon Department of Forestry (ODF) for protecting domestic water supplies in the Ash Valley School sale to the west of the project area. From the ODF Pre-Operations Report: "Both registered and unregistered domestic water supplies will be protected. Storage tanks will be protected from damage by a 100 foot buffer. Streams classified as Type D (Domestic Water Use) will be protected by the greater of the following measures: a 50 foot no touch buffer, or the Forest Practice requirement of at least 30 live conifer trees per 100 feet along large Type D streams and 10 live conifer trees per 1000 feet along medium Type D streams." The domestic use springs to the west and north originate in forested areas on State and private land, they are all greater than 600 feet from the project area boundary, and they do not have a surface flow connection to any stream that leaves the project area. Reduced interception of precipitation and reduced

evapotranspiration can lead to increased water yield after forest cutting (Harr 1983). It is unknown if upslope harvest within the project area would produce a measurable change in downslope spring flow, but any increase would likely be viewed as positive by those using the water. The surrounding landowners were contacted during scoping for the project and they did not express concerns regarding the proposed harvest and their water systems.

CONSISTENCY WITH AQUATIC CONSERVATION STRATEGY OBJECTIVES

Components of the Aquatic Conservation Strategy

There are four components to the Aquatic Conservation Strategy (ACS): Riparian Reserves, Key Watersheds, Watershed Analysis and Watershed Restoration.

1) Riparian Reserves
The widths of the Riparian Reserves within the Mill Creek 5th field watershed are 220 feet for intermittent and perennial non-fish-bearing streams and 440 feet for perennial fish-bearing streams.

2) Key Watersheds
The Mill Creek 5th field watershed is not a Key Watershed.

3) Watershed Analysis
The project area is covered by the 1995 Mill Creek Watershed Analysis. Management recommendations found in Chapter IX were incorporated into the Proposed Action Alternative.

4) Watershed Restoration
Watershed restoration is a comprehensive, long-term program to restore watershed health and aquatic ecosystems, including the habitats supporting fish and other aquatic and riparian-dependent organisms. The program's most important components are control and prevention of road-related runoff and sediment production, restoration of the condition of riparian vegetation, and restoration of in-stream habitat complexity.

The Management Actions/Direction for the program (USDI 1995, p. 8) includes:

"Preparing watershed analyses and plans prior to restoration activities." This has been completed for the project area.

"Focusing watershed restoration on removing some roads and, where needed, upgrading those that remain in the system." The Proposed Action Alternative proposes to proactively renovate existing roads.

"Applying silvicultural treatments to restore large conifers in Riparian Reserves." The Riparian Reserves are excluded from harvest under the Proposed Action Alternative.

"Restoring stream channel complexity." Stream channel complexity will remain on existing trajectories as a result of the retention of Riparian Reserves.

Existing Watershed Condition

The following acreages are approximate values based on GIS data.
Existing conditions in the **Mill Creek** 5th field watershed:

- The BLM manages 24,850 acres out of 61,207 acres or 28.9% of the watershed.

- Approximately 10,581 acres or 42.6% of the BLM managed land in the watershed is in Riparian Reserves.
- The BLM controls 174.6 miles or 24.5% of all road miles in the watershed.
- Approximately 99.3% of the BLM-managed forest in the watershed is greater than or equal to 20 years old. Stream flow increases following logging generally decrease over time and eventually disappear in about 20 to 30 years in western Oregon as maturing stands begin losing as much water to the atmosphere as the original forest (Adams and Ringer 1994). The proposed regeneration harvest would lower the amount of BLM-managed forest greater than or equal to 20 years old by less than one percent to 98.7%.
- Small headwater streams that have intermittent or seasonal flow account for roughly 74.7% of the stream miles in the watershed.
- Fish are present in roughly 15% of the stream miles in the watershed.

Aquatic Conservation Strategy Objectives

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.

Site Scale Evaluation
Short-Term/Long-Term
Designating the Riparian Reserves as no-harvest areas under the Proposed Action Alternative ensures maintenance of the existing stream and riparian conditions and allows the eventual restoration of larger, stream-adjacent conifers. Several functions of the Riparian Reserves including shade, large woody debris delivery, leaf and particulate organic matter input to streams, bank stability, and upslope erosion control would be maintained at the site scale in the short-term and long-term via the distribution of no-harvest areas.

5th Field Evaluation
Short-Term/Long-Term
Maintenance and restoration of the Riparian Reserves in the project area is important to aquatic systems and wildlife at the site scale. Benefit to the distribution, diversity and complexity of landscape scale features is limited because the project area accounts for less than one percent of the acreage in the watershed.

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

Site Scale Evaluation
Short-Term/Long-Term
The BLM can maintain connectivity between stream reaches and the adjacent uplands, but not the connectivity within and between watersheds. This is because the project area is surrounded on three sides by State and private lands and the BLM does not manage entire streams from headwater to mouth. Forested BLM-managed lands are typically higher in the watershed where streams are smaller and mostly characterized by intermittent or seasonal flow.

Connectivity between the streams and adjacent uplands in the project area would be maintained in the short-term and long-term by the distribution of Riparian Reserves and the intervening and adjacent aggregate areas.

Maintaining the existing roads would not obstruct routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

5th Field Evaluation
Short-Term/Long-Term
The BLM manages less than one third of the watershed that contains the project area. Scattered federal parcels preclude the maintenance and restoration of connectivity within and between watersheds. Different management objectives and methods between agencies and private landowners also make it challenging to maintain and restore connectivity.

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

Site Scale Evaluation
Short-Term
The physical integrity of the aquatic system would be maintained at the site scale in the short-term and long-term. Riparian Reserves would prevent overland sediment delivery, protect bank stability, and ensure a continuous supply of LWD to project area streams to allow storage of sediment, water and nutrients.

Harvest-related peak flow increases detrimental to bank and bottom configurations are not expected. Grant and others (2008) state that "peak flow effects on channel morphology can be confidently excluded in high gradient (slopes greater than 10%) and bedrock reaches, and are likely to be minor in most step pool [typical of the project area] systems." All first and second order streams in the project area (96% of the streams) have gradients equal to or greater than 10%. The one 3rd order reach has an approximately 6% slope and the terrace-constrained reach with in-channel wood is exposed to a range of flows with limited bank cutting.

5th Field Evaluation
Short-Term/Long-Term
The proposed action would not affect the short-term physical integrity of the aquatic system inside or outside of the project area. Large wood recruitment over the long term would directly benefit less than one fifth of one percent of the streams in the watershed.

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 Evaluation
Short-Term/Long-Term
Water quality necessary to support healthy riparian and aquatic ecosystems would be maintained at the site scale in the short-term and long-term.

The proposed action would not increase water temperatures, result in sediment delivery to streams, or result in the release of hazardous materials. Road renovation would occur during the dry season, and haul with weather restrictions would occur on roads that are hydrologically disconnected from the stream network.

Refueling of gas or diesel-powered machinery would not be allowed in close proximity to stream channels, and contractors would be required to have spill prevention containment and countermeasures plans to minimize the likelihood of contamination reaching a waterway.

5th Field Evaluation
Short-Term/Long-Term
Water quality in would be unaffected by the proposed action at the site scale and therefore unaffected at the watershed scale.

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

Site Scale Evaluation
Short-Term
Riparian Reserves would provide bank stability and sediment filtering now and in the future, and the continuing supply of large, decay resistant wood to project area streams would maintain the local sediment regime over the coming decades and centuries. Small headwater streams can function as one of the dominant storage reservoirs for sediment in mountainous terrain given an adequate supply of in-stream wood (May and Gresswell 2004). Headwater riparian areas would be protected so that shallow landslides and debris flows, should they occur, contain LWD and boulders necessary for creating in-stream habitat. If shallow landslides were to occur in the upslope regeneration units then the Riparian Reserves would make an effective sediment filter.

The proposed action would use road renovation, specifically the removal of cutbank slough, to improve road drainage and eliminate the potential for surface flow diversion and hillslope erosion in and below the road prism.

5th Field Evaluation
Short-Term/Long-Term
Maintenance and restoration of the sediment regime is locally important, but of negligible consequence/benefit to the watershed. The project area represents one third of one percent of the total acres in the 5th field watershed.

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 Evaluation
Short-Term/Long-Term
The proposed action would maintain in-stream flows sufficient to create and sustain site scale riparian and aquatic habitats in the short-term and long-term. Any increase in flow resulting from harvest-related reductions in interception and evapotranspiration would be small (i.e. not measureable at the drainage, subwatershed and watershed scales), and inconsequential to channel morphology. Vegetation remaining

after regeneration harvest is expected to utilize some of the soil moisture that becomes available following tree removal. If soil water content happens to be greater in the cut areas, then small increases in site scale low flows are possible. Low flow increases may benefit aquatic species during the summer if wetted width and stream volume increase and stream temperatures are reduced (Reiter and Beschta 1995).

Step pool streams found in the proposed harvest units are resistant to change in their size and shape, even if there are minor increases in fall flows.

5th Field Evaluation
Short-Term/Long-Term
The proposed action would not create measureable change in the timing, magnitude and duration of flows at the 5th field scale for at least three reasons. First, harvest would produce a small stream flow response, and the ability of individual small catchments to affect downstream discharge decreases as small streams form increasingly larger drainage networks (Garbrecht 1991). Second, the temporal and spatial variability of precipitation and the variable timing of flows from drainages across the analysis area complicates change detection. Finally, inter-annual flow variability would be greater than the magnitude of any flow increase, and the size of any increase would be less than the 5 to 10 percent error associated with stream flow measurements (USGS 1992).

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

Site Scale Evaluation
Short-Term/Long-Term
The higher gradient (6 to 40+% slope) hillslope-constrained and terrace-constrained channels in the action area have little floodplain area when compared to lower gradient main stem streams outside of the action area. Wood in these higher gradient reaches does create steps and flats that store substrate and near surface ground water, and the Riparian Reserves ensure both a short-term and long-term supply of wood.

Riparian Reserves and full log suspension during yarding eliminate the risk of near-stream soil compaction; therefore, infiltration rates and the ability of stream bank soils to store and transmit water would remain unchanged.

5th Field Evaluation
Short-Term/Long-Term
The maintenance of the timing, variability and duration of floodplain inundation along relatively short stream reaches higher in the watershed would have limited benefit at the 5th field scale now or in the future. The project area contains one fifth of one percent of the streams in the watershed. The larger streams with larger floodplains are primarily located on private lands downstream of federal ownership, and the morphology of some of these streams has been greatly altered due to large wood removal, road building and channel straightening, etc.

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 Evaluation
Short-Term/Long-Term

Riparian Reserves would maintain and restore the species composition and structural diversity of riparian plant communities and the associated benefits of these communities over the short-term and long-term. With the exception of three relatively narrow yarding corridors over one intermittent stream, harvest activities would happen upslope and away from riparian zones (i.e. "Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated high water tables, and soils that exhibit some wetness characteristics" (USDI, BLM 1995)). Reserves contain trees that provide primary, secondary and redundant shade, and they also contain all trees that could fall directly into action area streams as well as trees farther upslope.

5th Field Evaluation

Short-Term/Long-Term
Although the BLM manages less than one third of the land in the Mill Creek watershed, over 40% of this federal land is in Riparian Reserves. This means that at least 12% of the watershed currently supplies or will eventually supply high quality riparian habitat.

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

Site Scale Evaluation
Short-Term/ Long-Term
Species intended to benefit from the Riparian Reserve widths prescribed in the Northwest Forest Plan include fish, mollusks, amphibians, lichens, fungi, bryophytes, vascular plants, American marten, red tree voles, bats, marbled murrelets, and northern spotted owls (USDA, USDI 1994b, p. B-13). Now and in the foreseeable future, Riparian Reserves within the project area will benefit a subset of these species as well as additional plant and animal species not listed. Aggregates distributed throughout the project area connect or extend the reach of Riparian Reserves providing connectivity and additional habitat. Candidate areas for aggregates contain representative patches of the pre-harvest stand, older trees, concentrations of large woody debris, and large snags.

5th Field Evaluation
Short-Term/Long-Term
Although the BLM manages less than one third of the land in the Mill Creek watershed, over 40% of this federal land is in Riparian Reserves. This means that at least 12% of the watershed currently supplies or will eventually supply high quality riparian habitat.

AQUATIC SPECIES

Affected Environment and Effects by Alternative

The analysis area includes the Loon Lake-Mill Creek and Lower Lake Creek 6th field subwatersheds located within the Mill Creek 5th field watershed. A watershed-based approach determined the analysis area based on the location of the proposed units and road activities.

Endangered Species Act
The analysis area is located within the federally listed threatened Oregon Coast Coho Salmon, *Oncorhynchus kisutch*, evolutionarily significant unit (ESU). The National Marine Fisheries Service

(NMFS) published the listing determination and Coho critical habitat designation for Oregon Coast Coho Salmon on February 11, 2008, effective May 12, 2008 (73 FR 7816).

Coho Salmon and Coho Salmon critical habitat are located within the Loon Lake-Mill Creek 6th field subwatershed. Loon Lake was formed naturally by a landslide over 1,500 years ago which is a barrier to anadromous fish. The Soup Creek VRH units are greater than 5.5 miles upstream of this barrier. The main haul route adjacent to Mill Creek is paved.

Magnuson-Stevens Act

The Magnuson-Stevens Fishery Conservation and Management Act designates streams used by Coho Salmon and/or Chinook Salmon (*Oncorhynchus tshawytscha*) as EFH. 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)." Chinook and Coho EFH are located in Mill Creek; however the project area is located 5.5 miles upstream of a naturally formed barrier to anadromous fish. The main roads adjacent to Loon Lake and Mill Creek are paved.

Special Status Species

Aquatic Sensitive species on the SSS list found in the analysis area include Oregon Coast Coho Salmon (listed as federally threatened) and Oregon Coast Steelhead Trout (*Oncorhynchus mykiss*). Chum Salmon (*Oncorhynchus keta*) are listed on the BLM SSS list and distribution in the analysis area is unknown. The foothill yellow-legged frog, *Rana boylii*, is documented within the Coos Bay District, with unknown distribution within the analysis area. Table III-6 lists aquatic Sensitive Species found within the Coos Bay District, but not within the analysis area.

Table III-6: Aquatic Sensitive species located within the Coos Bay District but not present in the analysis area.

Species Name	Species Range
Millicoma Dace *Rhinichthys cataractae ssp*	Rubble in areas in swift waters. Range: Coos River basin. The analysis area is outside of the known range.
Pacific Eulachon (Southern DPS) *Thaleichthys pacificus*	Occupy nearshore ocean and spawn in the lower reaches of larger snowmelt-fed rivers (NMFS). Critical habitat is designated from the Umpqua River upstream to the confluence with Mill Creek. No rivers within the analysis area are designated as critical habitat.
North American Green Sturgeon (Southern DPS) ***Acipenser medirostris***	Range: The nearest occupied habitat of the Southern DPS green sturgeon is Winchester Bay (NMFS (http://www.nmfs.noaa.gov/pr/species/fish/greensturgeon.htm)). No rivers within the analysis area are designated as critical habitat (74 FR 52300).
Rotund Lanx (snail) *Lanx subrotunda*	Turbulent water of large rivers. Range: Mainstem Rogue and Umpqua Rivers. The analysis area is outside of known range.
Pacific Walker (snail) *Pomatiopsis californica*	Wet leaf litter and vegetation near flowing or standing water in shaded areas with high humidity. Range: Lower Millicoma River sub-basin. The analysis area is outside of the known range.
Robust Walker (snail) *Pomatiopsis binneyi*	Perennial seeps, shallow mud banks, and marsh seeps leading into shallow streams. Range: A 1998 survey in the Two-mile 6th field sub-watershed, which is within the New River 5th field watershed, documented robust walker presence. The analysis area is outside of the known range.
Caddisfly *Rhyacophila chandleri*	Freshwater habitats. Range: Lane, Deschutes, and Siskiyou (CA) counties. The analysis area is outside of the known range.
Haddock's Rhyacophilan Caddisfly *Rhyacophila haddocki*	Small mountain streams. Range: A survey documented its presence 1.5 miles above the Elk River fish hatchery in Curry County. The analysis area is outside of the known range.
Caddisfly *Namamyia plutons*	Small, cool, densely forested streams. Range: Known to occur in some coastal Oregon counties, but have not been documented in Douglas County (SSS species fact sheet). The analysis area is outside of the known range.
Western Ridged Mussel *Gonidea angulata*	Cold streams from low to mid-elevations. Range: Limited distribution west of the Cascades in Oregon and Washington. (SSS species fact sheet).

Other Aquatic Species

Amphibians expected to be found within the analysis area include two species of salamanders and frogs and one species of newt. Salamander species include Pacific giant salamander and southern torrent salamander, with the Pacific giant salamander being the most abundant. Native frog species found in the planning area include tailed frog and foothill yellow-legged frog. The yellow-legged frog, with unknown distribution within the analysis area, is documented within the Coos Bay District and on the Special Status Species list. It is probable that non-native bullfrogs have also been introduced into the analysis area. Western toads and rough-skinned newts are also believed to be present within the analysis area.

While they have not been documented within the analysis area, Pacific pond turtles may be present within lower elevation ponds or inhabiting slower water areas along channel margins within the mainstem rivers. There are a wide variety of aquatic macroinvertebrates (insects) present within the analysis area. Aquatic insect varieties include stoneflies, mayflies, caddisflies, dragonflies, alderflies, true flies, and beetles which can be found in both stream habitat and ponds.

Riparian Reserve Conditions

The Riparian Reserve within the 295 acre project area is comprised of 94 acres. This Riparian Reserve width is equivalent to a 220 foot stream buffer. The stand within this area averages less than 70 years of age and has an average diameter of less than 18 inches based upon stand inventory conducted in 2012. It currently has an average canopy cover of 68 percent Based upon field review and the current stand age, the project area would not meet definitions of late-successional forest (FEMAT 1993, Spies and Franklin 1991, USDA 1993).

The Riparian Reserves in the project area are occupied with conifer, similar to the upland portion of the stand, but contain a higher proportion of hardwoods. They are relatively brushy and contain wood in and over the channels. Vegetation close to the stream has a high canopy closure and shade is being provided by topography, stream-adjacent shrubs, and wood suspended over the channels. No recent landslide and debris flow activity was found during field reviews.

Refer to the Water Resources section for more in depth descriptions of stream channel conditions within the Riparian Reserves. The discussion for fisheries will focus on the potential effects of road management activities to fish-bearing stream channels.

No Action Alternative

There would be no direct effects anticipated to aquatic species populations as a result of no action. Road renovation would not occur under the No Action alternative. Sediment delivery to resident cutthroat trout habitat from the 23-09-20.0 road could continue without the proposed road renovations (see Water Resources section). Chronic sediment input to streams may reduce spawning production, juvenile rearing survival, and insect production (Everest et al. 1987, Hicks et al. 1991, Meyer et al. 2005, Waters 1995).

Proposed Action Alternative

Variable retention harvesting would not occur within the Riparian Reserves in the action area; therefore, stream temperature and large wood recruitment within Riparian Reserves would not be affected. A 220 foot buffer would remain on the intermittent and perennial streams (full site potential tree height) within the action area. Up to three existing yarding corridors in the northwest corner of the action area would be used that cross intermittent streams within the Riparian Reserve. Full suspension would be required in these corridors to avoid disturbance of aquatic species or their habitat. No new landings or roads would

be constructed in Riparian Reserves. Refer to the Water Resources section for analysis of proposed activities on stream temperature, large wood delivery, and sediment delivery to stream channels within Riparian Reserves.

New Road and Landing Construction

One new 50 foot landing would be constructed off of 23-09-29.4 which is a stable ridge road located outside of Riparian Reserves. This landing would be 820 feet from an intermittent stream and 0.5 miles from a cutthroat trout stream and would be constructed during the dry season. Bare soils created from landing construction would be mulched with appropriate weed-free straw, or equivalent, and seeded with a native or BLM-approved mix. The mulching and seeding would reduce the possibility of soil leaving the landing area and if any soil does move, it will be captured by the vegetated surface area well before it reaches the nearest intermittent stream which is greater than 800 feet from the landing. Therefore, no direct effects to aquatic species populations are anticipated as a result of the proposed landing.

Road Renovation

There would be no direct or indirect effects anticipated to aquatic species populations as a result of the proposed road renovations. Roads proposed for renovation are 23-09-19.2, 23-09-20.0, and 23-09-29.4. The 23-09-19.2 road has a gravel surface and no stream crossings. The 23-09-29.4 road is a gravel ridge road without stream crossings. The 23-09-20.0 gravel road has one stream crossing across a resident cutthroat bearing stream. Renovation activities would include measures to reduce, if not eliminate, sediment input at the stream crossings during wet season haul.

The project design features for road related activities would include dry season grading and ditch-relief culvert replacements. Dry season grading is intended to prevent immediate sediment transport. Future water runoff would then be redirected and not deliver sediment to streams. Stream culverts or cross-drains would be installed using the proper road drainage and erosion control practices (see pg. 18) so that sediment would not reach streams. Dispersal of water from ditch-relief culverts would be onto vegetated slopes away from watercourses so that any sediment is infiltrated by the soil and duff layer before reaching a stream.

Renovation activities 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, which would improve road drainage and reduce the amount of sediment leaving the road surface before reaching a cross-drain and settling into the soil and duff layers. End-haul material would be placed in stable locations, well away from streams, so that sediment would not be delivered to streams. Activities would not disturb existing drainage ditches that are functioning and have a protective layer of non-woody vegetation. This would increase the amount of sediment that is captured compared to if the ditches were cleared of the non-woody vegetation.

Haul

There would be no direct effects anticipated to aquatic species populations as a result of the proposed haul route. Haul could occur during the wet season on all roads proposed for haul. Haul on the paved Soup Creek Road and Loon Lake Road would not result in sediment delivery to stream channels. The haul route on gravel roads does not parallel any intermittent or perennial streams. There is one resident cutthroat stream crossing on the gravel road 23-09-20.0. The amount of sediment entering streams would be negligible during haul on the gravel roads, and have no effects on aquatic species or their habitat, because of the haul related PDFs, adequately surfaced roads, and vegetation in ditchlines.

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. Sediment traps would be installed in ditch lines to minimize delivery of fine sediment to stream networks as needed.

Road renovation completed prior to and after haul would further reduce, if not eliminate, off-site sediment movement to water courses during and after haul. Ditch relief culverts would direct the majority of sediment derived from winter hauling to the forest floor. Sediment directed to hillsides by ditch-relief culverts would filter into the soil before reaching stream channels, and therefore would cause no effect to aquatic species or their habitat. See the Water Resources section for a description of how the existing drainage features would be disconnected from the stream network.

Decommissioning

There are no direct effects anticipated to aquatic species populations as a result of the decommissioning of the 23-09-19.2 road. There are no stream crossings on this road and the nearest intermittent stream is over 390 feet from the road. Soil-stabilization techniques would be used 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. Closure of this road would include the installation of a barrier to prevent vehicular traffic. Barriers could include, but are not limited to, tank traps and boulders.

Conclusion

Sediment generated from road renovation, haul, and decommissioning would not have direct or indirect effects to fish habitat because of the implementation of PDFs and BMPs. Road renovation would result in a long-term reduction in sediment entering streams because this activity would improve road drainage and therefore would be expected to reduce road related surface erosion.

Cumulative Effects

Cumulative effects of past land management practices on private and BLM lands have contributed to the current degraded stream and fish habitat within the analysis area. Long-term sediment reduction due to the proposed road renovation would improve localized stream conditions at a site-specific scale. The proposed vegetation treatment would not occur within Riparian Reserves; therefore the treatment would not affect future large wood recruitment to the intermittent streams within the action area. There would be no cumulative effects to Coho Salmon, CCH, SSS habitat, or EFH from vegetation treatment or road activities in the Loon Lake-Mill Creek or Lower Lake Creek 6th field sub-watersheds or the Mill Creek 5th field watershed. The potential increase of sediment from the proposed road related activities would not affect fish habitat in the 6th field sub-watershed or the 5th field watershed analyzed. The cumulative effects are within the scope of anticipated effects to aquatic resources including fisheries analyzed in the Coos Bay District RMP EIS (USDI 1994).

Endangered Species Act and Essential Fish Habitat Assessment

An effects analysis of the proposed action on Oregon Coast Coho Salmon and their critical habitat resulted in a "no effect" determination. Coho habitat is more than 5.5 miles downstream from the harvest units below a natural barrier. The paved haul route includes one Coho Salmon stream crossing and various intermittent crossings which would not result in sediment delivery to the stream channel. All of the proposed road work and non-paved haul is above Loon Lake. Any sediment would settle out in the lake or well upstream of the lake before reaching Coho Salmon habitat.

The proposed action would not affect EFH. The EFH analysis was included in the "no effect" report for Oregon Coast Coho Salmon and fulfills the requirements as described in the Magnuson-Stevens Fishery Conservation Management Act (16 U.S.C 1855((b)).

Special Status Species

Adverse effects to SSS and their habitat would not occur as a result of the proposed action because of the PDFs and the proximity of the proposed action to SSS habitat. The proposed action would not result in

an increase in stream temperature or peak flows, or a decrease in large wood delivery. Sediment input to streams that may result from actions associated with this project would not affect SSS or their habitat because of the PDFs and the proximity of the proposed action to SSS habitat. The proposed action would not increase the likelihood for the need to list the Sensitive species found in the analysis area under the Endangered Species Act.

SOILS AND GEOLOGY

Affected Environment and Effects by Alternative

The project area is composed of 295 acres within the southern portion of the Oregon Coast Range physiographic province made up of steep dissected mountainous terrain with sharp ridge tops, high gradient streams, and above narrow valleys. Approximately 24% of the project area has slopes 70% and greater. Approximately 14% of the 161 acre proposed action area has slopes 70% and greater; and of those, 7% (half) are within no harvest areas.

Aerial photography shows that most of the project area was harvested before 1952 and later thinned in 1996. Most of the existing ridge roads and landings proposed for use were built for the thinning entry. The ridge roads were not needed in the 1950's, since the logs were moved downhill to landings.

Soils

According to the National Resources Conservation Service (NRCS) (2013) soil literature review the project area contains five soil complexes, but only the 198F and 2E soils are in the proposed action area (Table III-7). These soils are well suited for timber production. All the soils form from weathering of sandstone and siltstone, are well drained with rapid and moderately rapid permeability rates ranging from 2.3 inches per hour to 7.4 inches per hour, and are moderately deep to very deep (20 inches to 60+ inches). Within the project area, four of the five soil complexes cover 98% of the landbase and are found on mountain slopes ranging from 30% to 70%. Of those, 90% are loam and 8% are clayey soils. The remaining 2% (123 A) is a fine-silty soil found in the valley bottom. The Preacher-Bohannon-Blanchly complex (198F) is the predominant soil that covers 94% of the proposed action area. The Absaquil-Blachly-McDuff complex (2E) is predominately within the Riparian Reserves and makes up the remaining 6% of soil type.

Table III-7: Soil complexes, physical properties and the percent (%) within the project area and proposed action area.

Symbol	Name	Acres	Project Area (%)	Proposed Action Area (%)	Soil Taxonomy Classification	Depth to Bedrock (inches)	Permeability (inches/hour)
198F	Preacher-Bohannon-Blachly complex, 30 to 70 % slopes	241	82	94	Fine-loam	20 - 60+	3.5
57F	Digger-Bohannon complex, 30 to 60 percent slopes	25	8	-	Loam	20 - 40	7.4
147F	McDuff-Absaquil-Blachly complex, 30 to 60 % slopes	15	5	-	Clayey	20 - 60+	3.7
2E	Absaquil-Blachly-McDuff complex, 3 to 30 % slopes	9	3	6	Clayey	20 - 60+	2.3
123A	Kirkendall-Nekoma complex, 0 to 3 percent slopes	5	2	-	Fine-silty	60+	2.5
	Total Acres	**295**					

The calculated existing compaction within the proposed action area is 3.4% from existing roads, landings, and old skid trails (see Table B-3 in Appendix B). The Timber Productivity Capability Classification classes half of the lands within the proposed project as FGR1[16] and FGR2 and the other half are classed as not having a fragile gradient (see Figure A-8 in Appendix A). There are no FGNW[17] classified lands in the proposed project.

Geology

The project area is within the Tyee sedimentary basin. The Tyee basin is a thick sedimentary sequence that was formed from delta deposits in a forearc basin 64 to 50 million years ago (Orr and Orr 2012). The geologic units within the project area are middle Eocene (49 million years old) sedimentary rocks including sandstone and siltstone. The younger Elkton Formation (Tee) overlies the slightly older Tyee Formation (see Figure A-7 in Appendix A).

The Tyee Formation is mapped only in the northwest and southwest portions of the project area. The Tyee Formation is mapped as striking north 15˚ west with a shallow dip 10˚ to the east. The entire project area is on the west limb of a small anticline mapped by Niem and Niem (1990). There were no faults mapped in the area. In addition to the bedrock units, the riparian reserves and valleys include alluvium, alluvium terrace and colluvium deposits.

The sandstone units (typically the Tyee Formation) where shallow soil and debris accumulations overly steep bedrock slopes are more prone to large translational and block slides and debris torrents. The siltstone units (typically the Elkton Formation) can produce large slump features and deep-seated rotational features on steep slopes due to the low –strength siltstone and thicker soils. Slope movements are more prone in the geologic contacts between the Tyee and Elkton Formations, on slopes 80% and steeper and/or with thin soils on steep headwalls (> 70%). The lands already prone to sliding under forested conditions are at a greater risk of landsliding during the 0 to 15 years following a traditional clearcut due to the loss of holding capacity of harvested tree roots as they decay and before new trees establish deep, well developed root systems (ODF 1999, USDI BLM 2005). Nearby private lands that have recently been clearcut have had a few (less than four observed) small (less than 1 acre) shallow landslides on steep mid-slopes. These shallow landslides are typical and often observed within clearcut harvests in the Tyee basin. It appears that the majority of the material created from these slides deposited on the slope immediately downhill of the failure (scarp) and did not continue to the streamside areas farther downhill.

From field investigations, review of aerial photographs and GIS LiDAR imagery, five historic (inactive) landslides were counted and appeared to be the in the form of debris flows, slumps and other shallow slides in the project area. Information derived from the LiDAR hillshade (bare-earth) imagery data, which conveys landscape forms, suggests that 5 to 10 acre areas have slumped both in the north and south drainage. On the 1950's aerial photographs, where the land had been clearcut, two possible landslides (less than 1 acre each) can be seen but this evidence indicates they did not continue farther downslope or outside the project area. In the field, evidence of a past debris flow deposit and a slump feature was observed (less than 1 acre in size) in the north drainage. During field review, no recent evidence of instability was observed such as "pistol-butt" trees, fresh scarps, tension cracks, sag ponds, or lands denude of vegetation.

[16] TPCC FGR1 and FGR2: Fragile due to slope gradient but suitable for forest management using appropriate mitigation. The FGR classification is based on landscape features, various soil properties, and reforestation potential (USDI BLM 1986).

[17] TPCC FGNW: Very fragile gradient and usually on very steep, shallow, rocky soils that are prone to sliding when clearcut and are removed from sustainable timber harvest program (USDI BLM 2005).

No Action Alternative

Soils
If the project is not implemented, there would be no direct, indirect, or cumulative impacts to the existing soil condition. All roads proposed for renovation would remain in the current state. With the exception of drivable roads, the lands with existing compaction would continue to decompact naturally.

Geology
If the project is not implemented, there would be no direct, indirect, or cumulative impacts on existing geologic conditions. Landslides and debris flows are natural components of the geologic process and they would continue at the present rate. The risk of slope movements would be low for this landform.

Proposed Action Alternative

Soils – Direct and Indirect Effects
The alternative would have minimal direct, indirect or cumulative impacts on the existing soil conditions. The analysis looked at potential soil impacts to production, compaction, erosion, susceptibility to fire and windthrow and the restoration potential after a disturbance using NRCS rating system (USDA NRCS 2013). See Figure A-8 in Appendix A for the specific ratings for each soil unit.

The estimated quantity of soil disturbance that would incur from the proposed harvest is calculated to be 3.1% (see Table B-2, Appendix B). This value is based on estimating the size and number of yarding corridors and fire line and dividing it by the total acres for the proposed action. The first winter following the harvest and fire treatments would result in the most exposure to rain and hence short-term erosion in areas with bare soil, but due to the resiliency and productivity of the soils, any soil disturbance would decrease greatly after the first winter as vegetation takes hold. The remaining vegetation and slash left on the ground following harvest, in addition to yarding with one end to full log suspension would decrease erosion potential and transport distance. These types of disturbance do not compact the soils.

FOREST PRODUCTIVITY
Forest productivity rating is the volume of wood fiber (cubic feet per acre per year) that can be produced in an even-aged and unmanaged stand of the dominant timber type. The majority of the unit is 198 F, which is rated to produce 172 cubic feet per acre per year (USDA NRCS 2013). This is approximately 8 times greater than 20 cubic feet per acre per year minimum required for classification as commercial forestland for the BLM per Timber Productivity Capability Classification. Based on the forest productivity rating, the soils within the proposed action area are well suited for timber production. This proposed action alternative would not affect the soil productivity, because design features such as one end and full end suspension cable yarding and using slash to protect the soil in ground based operations would protect soil resiliency. In addition, design features that retain sufficient woody material and 10% percent of slash piles would assist in soil development, because the decomposition of the vegetation will break down into organic matter, the key physical component of soil.

COMPACTION
The total soil compaction (existing and new) within the 295 acre project area is projected to increase 0.2% to 3.6% (see Table B-3, Appendix B). The project design features minimize the risk of further compaction. It is likely that compaction from the 1950's has started to decompact naturally. Based on the calculations of soil compaction and soil disturbance, the area will be within the 12% compaction threshold identified within the ROD and Resource Management Plan (USDI 1995).

EROSION

The erosion hazard rating is "severe" for the Preacher-Bohannon-Blachly complex (198F) soil unit, constituting 94% of the proposed action area. The severe rating indicates that erosion is very likely after disturbance occurs and that erosion-control measures are recommended. The Absaquil-Blachly-McDuff complex (2E), constituting the remaining 6%, is rated as "moderate." The moderate rating indicates that some erosion is likely after disturbance to bare soil and erosion-control measures may be needed (USDA NRCS 2013). Soil erosion would be mitigated and reduced by the project design features that reduce soil exposure by leaving protective cover like debris, slash, and vegetation on the soil surface. Refer to the Water Resources section for analysis of issues relevant to erosion and sedimentation.

WINDTHROW

Both soil units within the action area have the potential to experience windthrow. Windthrow refers to trees uprooted or broken by wind. The potential for windthrow would be reduced by retaining larger (1 to 13 acre) clusters of trees (approximately 23 acres of aggregate) versus single trees or narrow bands of trees. Therefore, appreciable windthrow is not expected. Any windthrow that may occur post-harvest would contribute to the RMP down wood requirement for the action area.

FIRE SUSCEPTIBILITY

The proposed action includes hand-piling and broadcast burning as described under the Fuels Management section. The fire susceptibility rating indicates the potential to create a water repellant soil or damage essential soil nutrients. The fire susceptibility rating is "high" for the Preacher-Bohannon-Blachly complex (198F), constituting 94% of the proposed action area. "High" susceptibility indicates that the soil has one or more features that are very favorable for soil damage. The Absaquil-Blachly-McDuff complex (2E) is rated as "moderate" and constitutes the remaining 6% of the proposed action area. "Moderate" means the soils have features moderately susceptible to damage. However, the fire susceptibility rating is only a reference since it is not accurate to the subject soil units because of the following reasons:

- A specific study found that the Oregon Coast Range soils are not highly susceptible to hydrophobic conditions after a wildland forest fire (Jackson and Roering 2008).
- The proposed prescribed burn treatments after harvest are shorter duration, low intensity and low burn severity compared to typical wildland fire behavior (Scott and others 2013).
- The proposed prescribed burning treatments (which include hand pile, and broadcast burns) occur only during spring-like conditions when soil moistures are high. Burning in spring-like conditions (late winter, early spring) reduces the burning intensity and coverage which in turn reduces the likelihood for water erosion, because a higher percentage of duff, vegetation, and woody material would be retained on site compared to fall or late-spring burning.

RESTORATION POTENTIAL

Both soils units in the proposed action area have a high restoration potential rating. This is rated by the soils inherent ability to recover from degradation. Recover means the ability to restore functional and structural integrity after a disturbance (USDA NRCS 2013). However, damage to soils from project actions is expected to be minimal because the project design features reduce soil impacts.

Cumulative Effects

SOILS

The BLM and Oregon Department of Forestry are the major public land managing agencies that accounts for roughly 50% of the lands within the 86,000 acre watershed. Other lands within the watershed are privately owned so other timber harvest activities occur sporadically within the watershed. Implementation of the proposed action would have minimal or no effects to long-term soil productivity,

compaction, or erosion due to application of project design features that minimize disturbance and increase recovery potential.

GEOLOGY – DIRECT AND INDIRECT EFFECTS

The proposed action would not be expected to have direct, indirect or cumulative impacts on existing geologic conditions. No signs of current slide activity/instability were observed during site investigations. The project design features minimize the potential for slope movements and the risk of slope movements is low for this landform. This is because root strength would be retained on half of the steep slopes that are +70%, and Riparian Reserves would not be affected by the proposed action. Riparian Reserves include areas considered as riparian headwalls, where rapidly moving landslides typically originate. Therefore there is an unlikely chance the proposed action would contribute to rapid moving landslides, and a highly unlikely chance an event could reach structures or roads below the proposed action area. This is further supported by analysis that considered slope steepness, channel form and field evidence (per Krost project file).

WILDLIFE HABITAT AND T&E SPECIES

Affected Environment

The action area for wildlife species includes all lands that are within 1.5 miles from the project area boundary. The 1.5 mile distance is based on the Oregon Coast Range province home range size for spotted owls. The BLM uses this action area to describe the direct and indirect effects to owls and their habitat from implementation of project activities. This scale also captures a larger perspective of available murrelet habitat in or near the project area for the analysis. Within the action area there are 7,773 acres, of which the BLM manages 3,489 acres (44.9 percent). The 88 acres of proposed harvest constitutes 1.1 percent of the total acreage and 2.5 percent of BLM-managed lands within the action area. This action area also encompasses all surveyed/unsurveyed suitable marbled murrelet habitats that project activities could affect through disturbance and this area is large enough to quantify and assess impacts to other terrestrial/migratory species.

Northern Spotted Owl

Within the action area, there are portions of three known sites and three alternative sites. Only the home ranges of any of these sites overlap into the action area and none of the proposed project area is within any of these home ranges.

Surveys for the spotted owl are conducted annually on known sites near the action area by the Oregon Department of Forestry (ODF), or as part of the annual demographic study area (BLM Roseburg). Spotted owl occupancy has been very infrequent during the past ten years. One lone adult was detected in 2011 and 2006. The last verified nesting attempt in any of these three sites was in 2005. None of these sites has had any known reproduction (fledglings) within the last ten years. Barred owls have occupied two of the three sites on a regular basis. Additionally, while conducting surveys for marbled murrelets in 2013, surveyors identified a pair of nesting barred owls with fledglings immediately adjacent to the eastern edge of the project area and within 0.8 km of the proposed harvest units. Dugger et al. (2011) found that there was a strong, negative association between barred owl detections and colonization rates of spotted owls. The strong barred owl and habitat effects on occupancy dynamics of spotted owl provide evidence of interference competition between the species. Wiens et al. (2014) found that there was decreasing spotted owl use of habitat the closer the habitat was to a barred owl core nest area and that no spotted owls were detected within 1.5 km of an occupied barred owl nest.

The MaxEnt model indicates that the topographic position and presence of edge around the stand may make it less desirable in general for spotted owl use than other locations of equal stand complexity. Edge effects may give an advantage to other competing predators for the same foraging opportunities. Therefore, the slope position (along with the exposed edges) limits the potential of this stand for spotted owl use.

There is a negligible probability that owls would be using this stand at this time because of the presence of barred owls and a barred owl core nest area adjacent to the project area, the topographic position and amount of exposed edge around the project area, and the distance from any owl activity centers.

Critical Habitat

The USFWS has designated the project area as spotted owl critical habitat (77 FR 71875). A critical habitat designation is for land within the range of a species at the time it is listed that has the physical or biological features essential for the conservation of a species and that may require special management. There are 4,072 acres of critical habitat within the action area (52% of action area).

The Critical Habitat Unit (CHU), Oregon Coast Range 3, subunit 5 (OCR-5), consists of 176,277 acres (Table III-8), of which the Coos Bay BLM manages 52,750 acres (29.9 percent). The Coos Bay BLM-managed lands have 21,790 acres of suitable habitat and 21,819 acres of dispersal-only habitat.

The revised Recovery Plan (USDI FWS 2011) includes recommendations that "land managers consider implementing forest restoration activities where the best available science suggests ecosystems and spotted owls would benefit in the long term." The management activities include implementing disturbance-based principles with the goal of restoring forest structure – which includes early-successional ecosystems – to provide for the long-term recovery of the species. Conducting the management actions in vacant critical habitat that are outside of known home ranges would meet these recommendations.

Table III-8: Northern Spotted Owl Critical Habitat acreage within subunit 5 (OCR-5) and proposed action. Proposed harvest is shown as a percentage of OCR-5 totals.

	OCR-5		Proposed Action (161 acres)		Percent Harvest	
	All Ownerships[1]	BLM-administered Acres	Retained Acreage	Harvest Acreage	All Ownerships	BLM-administered Acres
Total Acres	176,277	52,750	73	88	0.05%	0.17%
Suitable Habitat Acres	97,253	21,790	46	37	0.04%	0.17%
Dispersal-only Habitat Acres	50,030	21,819	27	51	0.10%	0.23%
Total Dispersal[2]	147,283	43,609	73	88	0.06%	0.20%

[1] The data in this column is from the Soup Creek Biological Opinion – and is generated by the USFWS.
[2] Includes both suitable and dispersal-only habitats.

Dispersal Habitat

There are standard classifications to describe owl habitat based on use, or potential use – dispersal or suitable habitat. Dispersal habitat consists of those stands capable of providing for the safe movement of spotted owls across the landscape. Analysis of effects to dispersal habitat is more meaningful at a watershed scale. Dispersing owls use habitats classified as suitable and dispersal-only habitat. The USFWS (USDI FWS 2011) characterizes dispersal-only habitat as forest stands less than 80-years-old, average tree diameters of ≥11 inches dbh, and conifer overstory trees with closed canopies (> 40 percent).

There are 78 acres of dispersal-only habitat in the proposed action stand with 51 acres proposed for harvest. The remaining acreage (83 acres) contains some remnant trees, with larger diameters and crowns and is classified as suitable habitat (foraging-only; see next section). Therefore, the BLM classifies the entire 161 acre proposed action stand as dispersal habitat. Table III-9 summarizes the condition of dispersal habitat across the Mill Creek 5th field watershed.

Table III-9: Northern spotted owl dispersal acreages within the 5th field watershed and proposed action. Proposed harvest is shown as a percentage of the watershed totals.

	Mill Creek – 5th Field Watershed		Proposed Action (161 acres)		Percent Harvest	
	All Ownerships	BLM-administered Acres	Retained Acreage	Harvest Acreage	All Ownerships	BLM-administered Acres
Forested Lands Acres	84,305	24,834	73	88	0.10%	0.35%
Dispersal Habitat[3]	54,441	19,963	73	88	0.16%	0.44%
Dispersal-Only Habitat	38,423	11,327	27	51	0.13%	0.45%

[3] Includes both suitable and dispersal-only habitats.

Foraging-only Suitable Habitat

Suitable owl habitat consists of stands used by owls for nesting, roosting, and foraging (i.e., NRF). The USFWS classifies spotted owl nesting, roosting and foraging habitat 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. These stands have nine individual remnant trees including some that have some broken tops; however, the small number of these trees, their dispersed positions on the landscape, and small amount of interior area will not support nesting or roosting functions for owls. While the BLM biologist has delineated 83 acres as being suitable habitat within the proposed action stand (37 acres proposed for harvest), this habitat is poor-quality because it cannot support roosting or nesting functions. For this analysis, the BLM will refer to this habitat as foraging-only suitable habitat.

Table III-10: Suitable habitat and spotted owl site home ranges within the action area and proposed action. Proposed harvest is shown as a percentage of the action area totals.

	Action Area		Proposed Action (161 ac.)		Percent Harvest	
	All Ownerships	BLM-administered Acres	Retained Acreage	Harvest Acreage	All Ownerships	BLM-administered Acres
Total Acres	7,773	3,488	73	88	1.13%	2.52%
Suitable Habitat[4]	907	549	46	37	4.08%	6.74%
Suitable Habitat[5]		804	46	37		4.60%
Spotted Owl Site Home Ranges	3 Known 3 Alternate; No Occupancy		-	None	-	None

[4] Derived from the NWFP 15 year monitoring GIS raster data.

[5] Data from GIS Local Habitat Layer site-specific classification of BLM lands only.

Disturbance/Disruption

There is one-half (0.5) acre of owl suitable habitat within 65 yards of the project boundary (disruption distance) and 24 acres from 100-440 yards (disturbance distance). There are project activities (chainsaw use/burning) within 65 yards that could disrupt bird behavior to a degree that creates a likelihood of injury. Activities within the disturbance distance can cause owls to be distracted from normal activities.

Recovery Action 32

Recovery Action 32 (RA32) from the Revised Recovery Plan (USDI-FWS 2011) involves identifying high-quality spotted owl habitat stands. The MaxEnt model was used to identify stands characterized as having large diameter trees, a high percentage of canopy cover, and decadence components; such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees. The RA32 modeling effort did not identify any RA32 habitat within the project area.

Marbled Murrelet

The area within the stand proposed for harvest does not constitute suitable habitat for murrelet nesting as the trees lack sufficient diameter and limb size. A previous harvest in the 1940s left remnant trees within and near the project area; however, these trees are not within the current proposed harvest. The remnants are more than 36 inches dbh, possessing deep large crowns, deeply fissured bark, cavities, and multiple large limbs. The most important feature for determining suitable murrelet habitat is the presence of platforms for potential nesting structures (Grenier and Nelson 1995). However, other elements needed for successful nesting are lacking. When these trees are scattered, and lack an assemblage of upper canopy cohorts, they interact with the understory cohort, but there is little cover for protection from predation by corvids and other birds; predation is considered one of the main threats against successful murrelet reproduction (USDI FWS 1997). There is very little interior habitat or protective microclimate.

Because some of the remnant trees appear to have a few limb platforms greater than 4 inches in size and these trees are within 20 miles of the ocean, the BLM conducted several surveys to confirm lack of use by the murrelet. Within Units 1 and 2, there are nine of these trees scattered in the stand. The BLM conducted PSG (Pacific Seabird Group) protocol surveys in 2013 preceded by tree climbing in the fall 2012 to determine nesting. One year of surveys and climbing combined were acceptable to the USFWS to verify non-occupancy. All but one of these trees would be contained in aggregates and all would be protected from harvest with a ½ site-potential tree buffer. There are other remnant trees (in Unit 3 adjacent to Unit 2), which have these same characteristics. The BLM conducted two years of PSG protocol surveys in 2013 and 2014 and verified non-occupancy of this site on the west side of Unit 3.

The BLM also conducted these surveys in the southern and eastern portion of the action area (within 1/4 mile of the project area). While no indications of nest sites (fecal ring, eggshell fragments, nest cup) have been found; murrelet occupied behaviors were detected in three separate stands and the BLM delineated these areas as occupied habitat per RMP guidance (USDI 1995). One of these sites extends across the eastern project area boundary, and overlaps a 14-acre portion of the original project area. The ID Team modified the original unit, but subsequently dropped the entire unit (Unit 3) for other reasons (e.g. logging feasibility). This resulted in more than a 1,100 foot spatial separation from harvest area boundaries. The other closest delineated site is south of Unit 2 but it is also at least 600 feet from harvest area boundaries. This distance is more than the minimum recommended (300-600 feet) in the Marbled Murrelet Recovery Plan to mediate the effects of edge and provide for the protection of interior forest habitat (USDI-FWS 1997).

The District office received notice from a group not affiliated with the BLM, or adjacent landowners, that they had visited the project area and adjacent lands looking for murrelets. The information provided indicated that they did not follow accepted survey protocol (PSG protocol; Evans Mack et al 2003) but claim to have detected murrelets on private land adjacent to the project area. As discussed above, BLM met NWFP survey and protection standards and guides for marbled murrelets. Therefore, this additional information does not change the analysis.

Disturbance/Disruption
Heavy renovation activities on the haul route would occur within the disruption distance (0-100 yards) of 6.9 acres of occupied habitat. There are 24 acres within the disturbance distance (100-440 yards) of the harvest unit for burning activities. Seasonal restrictions for these activities are included in the project design features.

Other Special Status Species
Biologists have conducted surveys for SSS species within the Mill Creek 5th field watershed. The only non-federally listed SSS species known to occur in the analysis area are the bald eagle (*Haliaeetus leucocephalus*), fringed myotis (*Myotis thysanodes*), and Townsend's big-eared bat (*Corynorhinus townsendii*).

There are five bald eagle nest territories to the north of the project area along Loon Lake and on Mill Creek in the analysis area. The action area offers little habitat value for bald eagles primarily because it is located over two miles from a water body and lacks nesting habitat. There are also no available habitat resources that would be impacted for either of the bat species. Since there is no likelihood of eagles or bat species to be present within the project area, the BLM will not discuss them further in this EA.

Survey and Manage Species
The BLM is utilizing IM-OR-2003-062 and the updated Red Tree Vole Survey Protocol (Nov 2012; Huff et al. 2012) which programmatically identified certain watersheds within a "pilot" area of the red tree vole range as not requiring surveys or site management in the Matrix. The project is located in the Mill Creek 5th field watershed. These documents identify this watershed as a HIGH watershed in which pre-disturbance surveys are not required and allows for any identified red tree vole sites to be released from management direction. The analysis concluded in the "pilot" area indicated HIGH watersheds have a large amount of current (83-100%, with 93% on average) and likely future red tree vole habitat in reserve land allocations, such that additional site management in the Matrix is not needed in order to provide a reasonable assurance of species persistence.

However, the BLM conducted ground surveys in the spring and fall of 2012. The fall surveys (October 2012) were in conjunction with the tree-climbing murrelet surveys of the scattered remnant trees present in the western portion of the project area. Surveyors found only one inactive nest. Using the process outlined in the two documents above, the BLM is designating this project area (295-acre polygon) as being a non-high priority site and releasing the area from red tree vole habitat management (Appendix B, Table B-4).

Migratory Birds
A Memorandum of Understanding between the Bureau of Land Management and the U.S. Fish and Wildlife Service was signed on April 12, 2010 to promote the conservation of migratory birds. In this MOU, the BLM agreed to evaluate the effects of planned actions on migratory bird populations. The BLM also agreed to consult "The Birds of Conservation Concern" 2008 list (USDI-FWS 2008) as shown in Table B-5, Appendix B. The two species that this project could affect are the olive-sided flycatcher (*Contopus cooperi*) and rufous hummingbird (*Selasphorus rufus*).

Olive-sided flycatchers are associated with early-seral broadleaf habitat, especially where burns have left scattered large snags, live trees and relatively open canopies. The decline of this species and many others is associated with the decline in diverse early-seral broadleaf habitats (Betts *et al.* 2010).

Spies *et al.* (2007) have projected that on BLM and Forest Service lands within the Coast range, habitat for the olive-sided flycatcher would decline 23% in 100 years under the current management direction under the Northwest Forest Plan.

Currently, the project area contains little or no habitat for rufous hummingbirds since the stand is relatively dense and it is less likely to contain large enough quantities of flowering plants that hummingbirds use as food. Rufous hummingbirds seem to prefer a high canopy and well-developed understory for breeding.

Snags and Down Wood Inventory

Inventories indicate that an average of 2.6 snags per acre (decay class 1-5, >11 inches dbh) exist within the project area. Down wood varies in quantity and quality but these inventories indicate a deficiency of decay class 1 and 2 down wood in regards to RMP standards (see page 10). Smaller diameter down wood resulting from suppression mortality occurs more uniformly throughout the project area. Due to tree size, most of the snags and coarse wood in the project area would provide foraging substrate but would not provide nesting habitat except for the smallest of cavity nesting species. Longevity of the snags and down wood would be short (< 10 years) due to the overall small size of the material and swiftness of decay.

No Action Alternative

In the harvest area, forest stand conditions would continue to develop along the general current trends until the next harvest or disturbance. In the absence of future disturbance, the existing forest stand would continue through a series of suppression related mortality stages before gradually developing late-successional characteristics. A single story canopy, small crowns, and similar age range would continue to dominate the stand for many decades. Stand complexity would remain relatively unchanged over the next several decades. Individual tree crown development would continue to be narrow, with small branches.

The current trajectory of snag and coarse wood development would continue. Snag and coarse wood recruitment would primarily come from the suppressed crown classes and would be generally smaller than produced by dominant overstory trees. As suppression mortality continued, there would be an increase in species associated with this habitat as flushes of snags and coarse wood become available. Species utilization depends on the size of the material, stage of decay, as well as amount on the landscape.

Primary cavity excavators such as the pileated woodpecker (Dryocopus pileatus) utilize a variety of size snags for foraging, but generally utilize larger snags for nesting. Due to tree size, most of the snags and coarse wood in the project area would provide foraging substrate but would not provide nesting habitat except for the smallest of cavity nesting species. Longevity of the snags and down wood would be short (< 10 years) due to the overall size of the material and swiftness of decay.

Owl use of these stands for dispersing or foraging would not likely occur until the stand becomes multi-layered and the barred owls are no longer present. The presence of remnant tree clumps would continue to aid habitat development, however late-successional conditions, which would provide suitable nesting habitat for spotted owls, would be delayed due to high inter-tree competition and stocking.

Murrelets would not likely use the remnants until the stand canopy develops height/structures to provide protective cover/microclimate to these nine trees and interior conditions become available (50+ years).

Proposed Action Alternative

Consistent with the revised Recovery Plan, this project would include application of ecological forestry approaches (i.e., VRH) on Matrix lands in vacant dispersal and foraging habitats of the northern spotted owl. The intent of ecological forestry is to conduct active management activities now to provide complex, resilient habitat to contribute to longer-term spotted owl recovery (USDI FWS 2011). The proposed alternative would create 88 acres of complex early-seral openings. The prescription for the VRH would include 73 acres of un-harvested areas (aggregates and Riparian Reserves), individual green tree retention, and snag and down log creation in order to promote development of structurally complex early-seral habitat.

All remnant tree limb structures would be maintained through the retention of surrounding habitat for a distance of ½ site-potential tree height around each individual remnant tree. Aggregates and, in some cases, Riparian Reserve are also connected to these buffers, increasing the protection acreage for the microclimate of these remnant trees. Protection of these features will contribute to the future complexity of the resulting developing stand. Large aggregates were also designed to provide some dispersal connectivity across the project area and/or between Riparian Reserves. The only remnant tree not within an aggregate is located adjacent to a yarding corridor but design features ensure protection of this tree. The tree is adjacent to a previously-used yarding corridor and was undamaged during that harvest.

Northern Spotted Owl

The harvest of 88 acres would have no short-term direct effects to spotted owls. The proposed action would result in the removal of 37 acres typed as foraging and 51 acres of dispersal-only habitat for spotted owls. Nesting and roosting habitat would not be affected by this action. While the harvest would remove dispersal and foraging habitat from the landscape, the lack of the presence of spotted owls within the action area (which may continue indefinitely) would result in no direct affect to spotted owls.

Several factors in harvest prescriptions and unit design encourage development of complex owl habitat: 1) 45 percent of the management unit would be retained, 2) "biological legacies" (Swanson et al. 2011) such as green tree clumps, snags, downed logs, and cull trees, would be retained, 3) connectivity between untreated areas would be maintained due to the arrangement of aggregates and Riparian Reserves, 4) all remnants would be maintained and buffered by a minimum ½ site-potential tree from harvest activities, 5) cumulative green tree retention would be higher than the RMP requirements, and 6) down wood would be supplemented as needed through post-harvest monitoring. These project design features would ensure the development of complex, multi-story habitat in the long-term.

Disturbance/Disruption

There would be no effects to spotted owls from disturbance/disruption activities because there are no nesting pairs in the area and the BLM would implement additional seasonal restrictions limiting burning activities to outside the critical breeding period. Some activities of this project may be implemented during the spotted owl nesting season including timber falling and yarding, road renovation, sample tree falling, and fuels treatment. No activities would be within the disturbance or disruption distances of spotted owl nest sites, however approximately 21 acres of suitable habitat exists within the disturbance distance (65-440 yards) of proposed harvest units. These activities are not expected to cause disruption because application of project design features (seasonal restrictions) at the appropriate distances would prevent any disruptive activities (noise levels above ambient or smoke) from taking place near suitable nesting habitat during the critical part of the breeding season.

Therefore, the BLM does not anticipate any effects to owls potentially nesting within the disturbance or disruption distances of harvest activities.

Critical Habitat

Harvest activities would transition 88 acres of habitat from a mid-seral to a complex early-successional forest condition. These 88 acres constitute 0.06 percent of the total dispersal acreage within the 147,283 acre CHU sub-unit. While this action would remove dispersal and foraging habitat, the short-term effects would not diminish the conservation support of this CHU because of the long-term benefits of creating high quality spotted owl foraging habitat using ecological forestry principles (USDI FWS 2014). As stated by the USFWS "the lower stocking levels and the presence of edge habitat in the treated area in the early phase of stand re-growth, and the retention of older forest habitat adjacent to the treated area are also to enhance the conservation support function of CHU-2." The long-term creation of future complex habitat would provide better conditions to ensure owl survival when the birds are able to re-colonize the area.

Dispersal Habitat

Removal of 88 acres of dispersal habitat through harvest would reduce or alter the short-term (< 30 year) overall effectiveness of the habitat to function for owls dispersing across the watershed. At the watershed scale – these 88 acres would constitute 0.16 percent of the available dispersal habitat in the Mill Creek Watershed. The opening of this canopy would preclude dispersal activities (Miller et al. 1977). However, there will likely be no discernable impact to owls dispersing within the watershed because 1) aggregate and Riparian Reserves are designed to have connectivity to allow for dispersal from adjoining stands, 2) the watershed would continue to have over 54,000 acres of dispersal habitat (60% of watershed), and 3) the presence of a barred owl nest core overlaying the project likely precludes spotted owl dispersal through the area.

Within this watershed, spotted owl habitat connectivity appears to be sufficient in that over 60 percent of the watershed currently is in dispersal habitat condition, when viewed the context of the Thomas et al. (1990) recommendations (i.e. the "50-11-40" rule-landscapes consisting of at least 50 percent spotted owl dispersal habitat is more likely to successfully accommodate dispersing owls). In addition, dispersal habitat function and connectivity for spotted owls do not appear to be limiting in the Oregon Coast Range Province or in the NWFP area (Lint et al. 2005, Davis et al. 2011, Forsman et al. 2002).

Dispersal conditions would develop under a longer timeframe because of the prolonged early-successional conditions of the regenerated stand, but the high-quality conditions that would result in the long-term would benefit dispersing owls by providing more complexity and connectivity.

Foraging-only Suitable Habitat

In the short-term (< 30 years), the project would preclude the availability of 37 acres of spotted owl foraging habitat until on-site forest habitat conditions are re-established. Although treatment would remove habitat for arboreal prey species such as red tree voles, it may improve habitat for non-arboreal species that are more associated with early seral habitats (western red-backed voles and deer mice). Edges can be areas of good prey availability or potentially increased prey vulnerability (i.e., better hunting for owls) as some arboreal prey species will venture into adjacent forest a short distance for food. (Anthony et al 2006). Therefore, some foraging opportunities may be available (Folliard 1993, Irwin et al. 2013). However, the location of the barred owl nest core and the lack of occupancy in the historic spotted owl home ranges likely preclude any use of these stands for foraging in the immediate future. Therefore, the effects to spotted owls from the removal of 37 acres of foraging habitat are not discernable.

Spotted owl prey species in this portion of their range, consist primarily of northern flying squirrels, red tree voles, woodrats and a variety of other small mammals (Forsman et al. 2004). Flying squirrels, which are tied to complex mid-storied canopies, are likely to decrease in abundance with removal of habitat. Red tree voles were not found within the proposed harvest stand, so there would be no impact to the vole

population in this area. By reducing potential food sources and nesting structure, the harvest would affect the local population of woodrats. However, reserve areas and would maintain a moderate level of cover for prey species to occupy until burned areas have vigorous regrowth of cover to promote repopulation. There would be a long-term benefit to woodrats with the growth of shrubs or hardwoods and creation of ecological edges (USDI FWS 2014).

Habitat quality for spotted owl and their prey species is expected to improve in the long-term (> 30 years) as the harvested area canopy reestablishes and regains structure favorable to the prey species. The treated area is likely to support high quality spotted owl foraging habitat in the future (> 30 years) because of managed in-growth at lower stocking levels would more effectively promote the development of trees with structural features that are beneficial to spotted owl foraging and roosting, especially in combination with the continued presence of older trees in untreated areas.

Marbled Murrelet

Treatments would not occur directly adjacent to any occupied murrelet habitat and no suitable murrelet habitat would be removed in this project. Although proposed treatments would occur near murrelet suitable habitat, in this case defined by individual remnant trees, application of PDF's and aggregate design would place remnant trees at least 110' from harvested edge. This would offer adequate protection for remnant structures with adjacent trees at or close to the same height.

The creation of edge adjacent to suitable murrelet habitat may alter microclimate conditions. However, depth from edge would potentially reduce interior gradations in microclimate (Chen et al. 1995; 1999). Available literature suggests that altering conditions to the sides of a stand would have little meaningful effect on the microclimate in the upper and middle canopy levels, because that microclimate is already strongly driven by solar and air movement inputs from above (Sillett 1995).

The rate of murrelet habitat development within the VRH unit would be modified. Canopy removal would delay short-term (< 30 yr.) canopy development within the harvested areas by decreasing the number of individual trees that could contribute to potential platform development. However, the rate of canopy and potential platform development would be increased along forested edge. Although an undamaged tree's crown continues to expand as the tree grows, development of platform structures is delayed within closed canopy forests due to branch mortality from self-shading / inter-tree competition and meager epicormic branch development (Van Pelt & Sillett 2008). However, forces such as wind damage, shading, and mortality are continually present that deflect this trajectory. The rate of epicormic branch growth and canopy development may be increased near forested edge (Ishii & Wilson 2001). However, growth of canopy structures is also dependent upon the number and intensity of disturbance events, and tree age (Van Pelt & Sillett 2008). Long-term (> 50 yr.) recruitment of murrelet habitat would be benefited by project PDF's which would promote and maintain wider spacing within the areas of regenerating forest. This would provide higher potential for rapid canopy development with increased numbers of large limbed trees with potential platform structures.

Although no occupancy behavior has been found within the suitable habitat directly adjacent to the management unit, proposed treatments could influence habitat quality for predators because openings may improve predator hunting efficiency along edges of harvested areas. Most studies on murrelet nest predation have focused on the effects of fragmentation (e.g., Marzluff et al. 2000, Marzluff & Restani 1999).

The effects of these treatments would not affect occupied habitat or appreciably alter the microclimate or cover in a majority of the habitat trees nearby as no suitable murrelet habitat would be removed.

There are approximately 21 acres of suitable habitat within the disturbance distance (100-440 yards) of post-harvest burning activities. Burning activities generates smoke that could inundate suitable or occupied habitat. However, seasonal restrictions would lessen the potential for disruption. Therefore, no disturbance effects to murrelet occupied or murrelet critical habitat are expected.

Road renovation and closure activities connected with the action alternative of this project are not expected to have effects on murrelet or their habitat. These activities would have seasonal restrictions if conducted within the disturbance distance of known murrelet sites or suitable habitat.

Harvest activities that may occur on non-Federal lands in and adjacent to the action area have the potential to affect individual murrelet nest trees potentially adjoining those areas. However, no significant cumulative effects to murrelets are likely to occur on non- Federal lands in the action area due to the current degraded condition of forest habitats on these lands relative to the life history requirements of murrelets.

Survey and Manage Species

Special management of identified red tree vole sites is not required because of the non-high priority watershed designation. This is because the Mill Creek watershed has a large amount of reserve allocations that are currently red tree vole habitat or are capable of developing into habitat. This includes the Riparian Reserves within the project area as well as the retained aggregates.

Harvest would not remove any active nest sites. The inactive nest site is located within an aggregate and would be protected from harvest. The prescribed unit design, which includes retained and/or interconnected forest patches, would preserve the best available habitat.

Over the long-term, aggregates (with larger tree retention) and Riparian Reserves would allow future red tree vole habitat to develop with interconnected canopies amongst larger trees.

Game Species

Some native species such as deer, black bear, and elk rely on early-successional habitat for at least a portion of their foraging needs. Many ungulates, including blacktailed deer (*Odocoileus hemionus columbianus*) and elk (*Cervus elaphus*), preferentially use early seral areas with high availability of browse plants (Nyberg and Janz 1990, Geist 1998, Toweill et al. 2002). When feeding, elk tend to select open, brushy habitats in forested landscapes of the Oregon Coast Range (Witmer and deCalesta 1983). These studies concluded that early seral can contribute towards elk forage in these landscapes. The proposed action in the Soup Creek project may provide some foraging benefits to individual deer or elk; however, due to the limited size and scope, this project would have no appreciable effect on deer or elk populations.

Migratory Birds

The creation of complex early-successional habitat with retention of structures for perching would benefit the local population of olive-sided flycatchers for approximately 30 years until canopy cover closes. Betts *et al.* (2010) found that "the positive response of olive-sided flycatcher, often considered a late-seral associate, to the amount of early-seral habitat at a fine spatial scale (150 m) likely reflects this species' use of high-contrast edges (i.e., between late- and early-seral stages for foraging (Rosenberg and Raphael 1986)."

For rufous hummingbirds, the creation of complex early-successional habitat would benefit this species at a local scale. Flowering shrubs would be a feature maintained in the regenerating stand, from which nectar is a large portion of their diet. They also feed on small insects, which are also associated with

early-seral habitats. The aggregates adjacent to the regenerating area would provide nesting habitat. The size of the treatment area is too small to cause a reversal in the decline of the overall population even at the watershed scale.

Betts *et al.* (2010) found a direct negative relationship to the amount of early-seral broadleaf forest and 42-year population trends; species most associated with this habitat type declined at the greatest rates. Currently declining species that had positive associations with complex early-seral habitats include rufous hummingbird, American goldfinch (*Spinus tristis*), olive-sided flycatcher, orange-crowned warbler (*Oreothlypis celata*), pacific-slope flycatcher (*Empidonax difficilis*), black-throated gray warbler (*Dendroica nigrescens*), and purple finch (*Carpodacus purpureus*). Overall, of the 25 species included in their study, 16 were significantly associated with early-seral cover type.

Other studies researching early-seral species associations have found that songbirds species richness and diversity increases with creating open stand conditions (Klaus *et al.* 2010); and broadleaf plants (Ellis and Betts 2011). One study showed a peak in shrub-associated birds in year 10 following the regeneration harvest (Schlossberg and King 2009). Ground-dwelling beetles communities (Heyborne *et al.* 2003) and many butterflies and moths (Miller and Hammond 2007) are also positively associated with early-seral habitats.

Food Resources

A key attribute of early seral communities is the compositional diversity of the vascular plant community they contain, including forbs, shrubs, and trees (Swanson et al. 2011, Dale et al 2005). The provision of food resources through fruit and seed production is a very important role of early seral forest ecosystems (Swanson 2012). For example, huckleberries (genus *Vaccinium*) are an ecologically-important food resource (Minore 1972, Minore and Dubrasich 1978). Bryophytes achieve higher diversity with a greater diversity of substrates (Rambo 2001), such as mineral soil, hardwood tree bases, and well-decayed coarse woody debris. Many of these substrates are present in early succession, and some bryophytes are very competitive colonizers of post-disturbance environments (Swanson 2012). Therefore the proposed action may provide benefit to wildlife by offering a wider variety of potential food resources (e.g. berry-producing shrubs, palatable browse, vascular and non-vascular plants) and nesting habitats (shrubs and hardwoods) compared to typical early seral habitats produced by traditional/industrial timber harvest methods.

Simplified early seral forest may constitute a sink habitat for some amphibians (Welsh et al. 2008) due to loss of microclimatic protection and other factors. However, diversely structured early successional ecosystems with abundant biological legacies and a diverse early seral plant community can be rich in vertebrate species (Swanson 2012). Table B-6 in Appendix B provides a reference of vertebrate species known to be associated with early seral forest ecosystems.

Snags and Down Wood

Existing snags would be reserved from cutting except those that must be felled to meet safety standards. Snags felled or accidentally knocked over would be retained on site. Residual trees, snags and down wood which are retained in the treated stands would provide some cover for owl prey species over time and would help minimize treatment impacts to some of these species. The following project design features would provide habitat for some small mammals: 1) less aggressive fuels treatments that would protect down wood, 2) retention of larger trees within aggregates, and 3) retention of 10% of the slash piles to provide cover and potential habitat for small mammals. Clumped, rather than scattered, distribution of snags and down logs provides more benefits to cavity nesters and foragers. Additional retention in the form of single trees dispersed within the harvest area would provide a source of distributed snags and down wood within the harvest unit. Green tree retention would typically be

composed of the largest available trees in order to meet RMP specifications for snag and down wood recruitment goals. Based upon existing snag inventories, retention of one (1) additional tree per acre (> 20" dbh) would assist meeting or exceeding RMP requirements for snags "within a timber harvest unit at levels sufficient to support species of cavity-nesting birds at 40% of potential population levels" (USDI, BLM 1995). Since inventories indicate a deficiency of decay class 1 and 2 down wood, retention of one (1) additional tree per acre (> 20" dbh) is planned to meet these RMP requirements. Some of these trees may be felled after site preparation activities if post-treatment surveys show they are needed to meet the RMP direction.

Cumulative Effects

Private lands do not notably contribute to the viability of spotted owls or murrelets because these lands are intensively managed for timber harvest on short rotations (approximately 40 years). However, private lands do provide some dispersal habitat for owls and may allow for connectivity between blocks of late-seral habitat. Assuming a regular rotation of 40 years, at any one time, approximately 25% of the State and private land base within 1.5 miles of the project area would be dispersal habitat for spotted owl. Management practices are not expected to change within the foreseeable future. Oregon Forest Practice Rules requires landowners and operators to leave a minimum 70-acre "core area" around known spotted owl nest sites; considered to be the best available suitable habitat in the vicinity of the owl nest site. The effects of non-Federal actions within and adjacent to the action area are not expected to affect owl critical habitat because these lands are most likely marginal habitat.

The effects of the BLM action, variable retention harvest, would not add any additional impacts to spotted owl or murrelets within the watershed. Over time (>50 years), the proposed action would ensure development of complex, multi-canopy stands that would provide better quality habitat for owls and murrelets. In particular, active management of these stands is encouraged by the USFWS to achieve recovery goals for the northern spotted owl, particularly in vacant stands of critical habitat.

BOTANY

Affected Environment and Effects by Alternative

The proposed project area exhibits mostly various plant associations of coniferous forests with some hardwood woodlands and some open grasslands. The most extensive plant associations are the early to mid seral stage western hemlock conifer stands.

Douglas-fir (*Pseudotsuga menziesii*) is the dominant overstory species with western hemlock (*Tsuga heterophylla*) as a minor component. The primary hardwood species present is red alder (*Alnus rubra*), which occurs mainly in riparian areas and along old skid trails. The understory hardwood tree component is patchy with minor amounts of golden chinkapin (*Chrysolepis chrysophylla*) on the upper slopes and scattered bigleaf maple (*Acer macrophyllum*) and Oregon myrtle (*Umbellularia californica*) in a widely scattered pattern. Remnant legacy trees composed of 100 years and older Douglas-fir, with the exception of one hemlock, can be found scattered in several patches amongst the younger trees within the project area.

Understory shrub and herbaceous plant communities are underdeveloped in many areas due to the dense canopy layer. Rhododendron (*Rhododendron macrophyllum*), blue huckleberry (*Vaccinium ovatum*) and Oregon grape (*Berberis nervosa*) typically dominate the drier ridge tops, upper slopes, and south and west aspects. Vine maple (*Acer circinatum*), salal (*Gaultheria shallon*) and red huckleberry (*Vaccinium*

parviflorum) typically dominate the more moist lower slopes, drainage bottoms, and north and east aspects which usually contain a low herbaceous cover typified by sword fern (*Polystichum munitum*) and sorrel (*Oxalis oregana*) in varied dense amounts in the semi-shaded canopied areas. Other fairly common shrubs and herbs found in the majority of the area are ocean spray (*Holodiscus discolor*), creeping blackberry (*Rubus ursinus*), salmonberry (*Rubus spectalibis*), bedstraw (*Gallium aparine*), redwood violet (*Viola sempervirens*) and trillium (*Trillium ovatum*).

Lichen diversity is often low in dense younger stands due to limited light. Lichens typically are more abundant on the edges of these stands, in riparian areas where there are hardwood components, and in areas where there are canopy gaps and sunlight can penetrate the lower canopy and forest floor. Older mature hardwood shrubs such as ocean spray (*Holodiscus discolor*) contain the greatest species richness for macrolichens and bryophytes (Muir et al. 2002).

Log and stumps within project area generally provide excellent habitat for a diverse array of bryophyte and lichen species particularly when they are uncharred from past post-harvest slash burning. A study shows that bryophyte cover also appeared to be the greatest on older shrub stems (Muir et al. 2002).

Fungi quantity and species diversity is often fairly high in closed canopy stands. Habitat is potentially present for special status fungal species with the project area (Table B-9, Appendix B) mirroring similar habitats in other timbered areas outside the project area. Various-sized patches of larger remnant trees which, serve as one of the many suitable host species for fungi, are scattered in the proposed project area. Studies show that the older the trees present, the number of fungi species associated with it not only increases, but the variety of species also changes (Molina et al. 2001).

SPECIAL STATUS SPECIES

Botanical surveys are deemed practical only if they meet the criteria established in the "Practical Pre-Disturbance Surveys" section of the Final Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines (USDA, USDI 2007, Vol. 2 p. 26). We evaluate the species-habitat association, presence of suitable or potential habitat, review the existing survey records, inventory, and spatial data, review scientific literature, and use professional judgment. Determinations for surveys are grounded in substantiated professional knowledge, research and conservation strategies, and staffing and funding constraints. Sensitive species require pre-disturbance surveys if the project is within the range of these species, if there is potential habitat within the project area, or the project may cause significant negative effect as determined by environmental analysis on the species' habitat or persistence.

Survey and Manage (S&M)

Only 11 of the 23 Survey and Manage (S&M) category A & C species are within range of the project area (Table B-8, Appendix B). Required pre-disturbance surveys (IM OR-2011-063) have been completed for S&M category A & C vascular and nonvascular plant species that are known or suspected to occur in a proposed project area (Table B-8). Surveys are not conducted for species that are considered impractical to survey (USDA, USDI 2007). Incidental finds such as other S&M plant species such as category B, E or D would also be managed if located in project area (USDA, USDI 2001). Guidelines for management for any category A or C S&M species would be implemented either under the Final Supplemental Environmental Impact Statement (FEIS) or under the Record of Decision (ROD) 2001.

Currently

As of July 2007, the Interagency Special Status/Sensitive Species (ISSSS) Program staff developed a new criterion for two categories of SSS: Sensitive and Strategic. (IM OR-2007-072) Sensitive Species

policies as described in the BLM National manual 6840 apply to just sensitive listed species. Sensitive species are those that: (1) corresponds to Oregon Biodiversity List 1 or List 2 (for Oregon); (2) are documented on at least one OR/WA BLM District or Region 6 Nation Forest; and (3) includes all documented or suspected Federal Candidates, State Listed T&E, or De-listed Federal species (USDA, USDI 2007). To comply with Bureau policy to assess the effects of a proposed action on Sensitive species, the District may use one or more of the following techniques: (1) evaluation of species habitat association, (2) application of conservation strategies, plans, or other conservation tools, (3) review existing survey records, inventories, and spatial data, (4) use professional research and literature, (5) use professional judgment, and (6) complete pre-project surveys. Surveys are warranted if the project is within the range of these species, if there is potential habitat within the project area, or the project may cause significant negative effect as determined by environmental analysis on the species' habitat or persistence. Strategic species are not considered as SSS for management purposes; however, if sites are located, field units are required to collect occurrence data on these species.

PRE-FIELD REVIEW

There are no Threatened and Endangered species known or suspected to occur in the project area.
Of the 87 known or suspected special status plant species on the Coos Bay District, there are 23 Bureau Sensitive species either known or suspected of occurring in the Soup Creek project area (Table B-7, Appendix B). This determination is based on whether the proposed project overlaps the known or suspected range of a species as well as the likelihood that potential habitat is present. Potential habitat is determined by aerial photographic interpretation, ground work and review of information on each species habitat requirements. The data for known sites are located in both the GeoBob and the ORBIC database generated from numerous botanical surveys completed throughout the Northwest Forest plan. Surveys are recommended if Bureau sensitive species are known or suspected to occur in a proposed unit. The 57 special status fungal species in (Table B-9, Appendix B) suspected of occurring in the project area are all considered impractical to survey (Cushman & Huff 2007), thus there are 23 special status plant species for which surveys are recommended (Table B-7, Appendix B). Surveys are not conducted for Bureau Strategic species although occurrence data is collected if they are incidentally encountered during formal surveys.

The Soup Creek VRH has open areas along the roadsides which contain marginal potential habitat for two Bureau Sensitive species: California globe mallow (*Iliamna latibracteata*), and the wayside aster (*Eucephalus vialis*), which is also a Species of Concern (SoC) and listed as threatened by US Fish and Wildlife Service (ORBIC 2010). California globe mallow occurs in two general areas near the towns of Powers and Remote. The range of wayside aster extends into the northern portion of the district in dry upland Douglas-fir sites along trails and road systems.

There is a medium probability for potential habitat of one Bureau Sensitive hornwort: *Phymatoceros phymatoides*. *P. phymatoides* grows on soil on outcrops and boulders on grass covered rocky steep meadows and has been located in areas just north of proposed project area in similar habitat.

There is also potential habitat for three Sensitive lichens: *Bryoria subcana, Hypotrachyna revoluta* and *Lobaria linita*. *Bryoria subcana* is sometimes located on the Coos Bay District in younger western hemlock and Douglas-fir stands containing older trees located on ridge tops. *Hypotrachyna revoluta* is located on bark in the Coast Range. *Lobaria linita* is found in mature to old growth forests, oak forests with rock outcrops and late-mature tan-oak and madrone forests.

There is also potential habitat for two Bureau sensitive mosses: *Schistostega pennata* and *Tetraphis geniculata*. *Schistostega pennata* occurs on mineral soil in shaded pockets of overturned tree roots, often

with shallow pools of standing water at the base of the root wad in Coast Range. *Tetraphis geniculata* grows in moist coniferous forest on the ends of large down logs and class 3, 4 or 5 rotted logs or stumps in the Coast Range. Habitat for Special Status fungi is marginally present for most of the analysis area with the exception of the patches of older larger remnant trees. Sensitive fungi species are considered impractical to survey (USDA, USDI 2007)

Survey Methods

Field surveys for Special Status plant species (SSS) are conducted by professional botanists and completed according to approved survey protocols. These typically involve using the intuitive controlled method where high likelihood habitats are surveyed more intensively than other areas within the project (USDA, USDI 1997). This approach may be one of the more reliable methods for locating rare species and it relies on knowledge, experience, observation, and intuition of the surveyor. Comprehensive species lists of vascular plants and lichen and bryophytes are also documented during plant surveys. Survey routes, dates of survey, and any suspected sites will be flagged in the field and recorded on data sheets and topographic maps.

Project Design Features

Protection measures ensure that actions authorized, funded or carried out by the BLM do not contribute to the need to list any Sensitive plant species (BLM Manual 6840.02). Protection measures of Strategic species are not required yet if located, information is gathered and recorded in Geobob database.

Management recommendations would be followed to protect microclimate and maintain local persistence of any SSS plant species found in any proposed unit (Castellano & O'Dell 1997, Brian et al. 2002). For some species, maintaining canopy cover and micro-site conditions is just as important as establishing buffers to ensure no disturbance of the plant site and its adjoining habitat. Other species and sites may not be negatively affected by and may even benefit in long term pro-active management that would enhance habitat or reduce competition from brush, trees, or other herbaceous species. In those instances, a smaller buffer or no buffer may be adequate. All Bureau sensitive species found during pre-disturbance surveys would be buffered if considered necessary to protect the microsite so that the species persists at the site. Conservation assessment would be used to assess the effects of the proposed action on any Bureau sensitive fungal species suspected of occurring in the project area.

No Action Alternative

DIRECT/INDIRECT EFFECTS: SPECIAL STATUS AND SURVEY AND MANAGE (S&M) PLANTS

No action would leave any potential special status or Survey and Manage plant sites undisturbed. No surveys would be done for special status fungal species because fungi are not considered practical to survey (USDA, USDI 2001 pg. 25).

There would be no discernable direct impacts to Threatened and/or Endangered (T&E) or Special Status Species (SSS) or Survey and Manage (S&M) vascular, lichen or bryophyte plant species. Dense canopy that cover the stands would continue to limit vascular plant growth in some areas where other areas, the understory would continue to expand. Understory shrub and herb cover would be very low in most stands except were occasional gaps occur in the stands due to natural events such as windthrow. Under the no action alternative, it is probable that the stand would exhibit suppression mortality while in its current developmental trajectory. The herbaceous/shrub layer would show little development until the canopy can be opened up to accommodate other varieties of vegetation through less competition of light, soil and moisture.

The No Action Alternative would forego an indirect opportunity to manage for attributes favorable to special status plants associated with the understory of multistoried stands.

Proposed Action Alternative

DIRECT/INDIRECT EFFECT: SPECIAL STATUS PLANTS AND SURVEY AND MANAGE (S&M) PLANTS

Two S&M lichen species were found during botanical surveys in the proposed action area. The first one was Category F lichen (*Chaenotheca furfuracea*), which requires no site management to protect the microsite in which the species was located (ROD and S&G 2001 pg.67). The other S&M lichen located is a Category E which does require site management. Four of the five sites of the Category E lichen sites would be located within aggregate retention areas so only one site would require a no activity buffer around it. No other special status plant species were located within the project area.

Fungi are not considered practical to survey for (USDA 2007 p.25, Cushman & Huff 2007) so no surveys would be done for any special status or S & M fungal species within the project area. Protection of known sites along with large-scale inventory work (i.e. Strategic surveys) will provide the measures and means to meet agency policy. The proposed action area is in a stand that averages 67 years of age with a few scattered legacy trees greater than 100 years of age. However, legacy trees would be included in aggregate retention areas. The aggregate retention and riparian reserve areas would reduce potential habitat disturbance impacts to the substrate and any fungal organisms present (Cushman and Huff 2007) by limiting or eliminating changes to habitat conditions created by edge influences. Table B-9 (Appendix B) has a list of the 57 special status and S & M fungal species (some just S & M, others both special status and S & M) that could possibly occur on the project area in the few areas where trees greater than 80-100 years of age are concentrated. However, it is unknown whether any of the suspected Bureau Sensitive fungal species actually occur in the proposed project area. Although potential habitat for these special status fungal species would be reduced by the proposed action, it remains unknown whether or not any actual SSS would be impacted by the proposed action. Some special status species may not be affected, and may even benefit, from active management practices; such as opening up areas for those that thrive in light. There are some species that require disturbance openings, early seral stages for substrates, or even reduced competition from non-native brush, trees or other herbaceous species. However, due to indeterminate habitat needs and to maintain species persistence, any special status plant sites located would be buffered to protect the microclimate of the species.

Cumulative Effects

It is expected that timber harvest and other activities would continue in the future on state and private ownerships. It is also assumed that Special Status species in the area would be protected only on BLM-administered lands within the watershed. Because there will be no direct effects from the proposed action on these species, no cumulative effects are expected.

FUELS MANAGEMENT

Affected Environment and Effects by Alternative

HISTORY

(From the Mill Creek-Lower Umpqua River Watershed Analysis v.2.0, Sept. 30, 2005) - No systematic fire history work has been done in this watershed. Data from other watersheds on the Umpqua Resource Area, and the appearance of the trees in this watershed suggest that the mid-1700s fires and the Coast

Range fires around 1850 burned parts of the watershed. With few exceptions, the oldest stands regenerated following fires in the 1700s. The 1868 fire burned over land west of Mill Creek, Loon Lake and over into the Elliot State Forest. The 1933 Soup Creek fire is the most recent large fire in the watershed. The Soup Creek Fire burned an estimated 320 acres (USDI, BLM 2005).

Moist Forests belong to plant associations that were historically characterized by infrequent high severity, stand-replacement disturbance regimes, although mixed and low-severity disturbances also occurred, often as a part of a large disturbance event (Johnson and Franklin 2009). Landscape level vegetation patterns were altered through fire exclusion (Southard 2011), agricultural practices, and logging. Fire as a natural or prehistoric aboriginal disturbance process is now restricted by fire control efforts. Active fire exclusion has eliminated a major disturbance process, which formerly affected stand structures and densities leading to the development of the kinds of old-growth stands characteristic of the southern Oregon Coast Range (Weisberg 2004). This eliminates a major factor responsible for multistory multi-age stands, large snag recruitment, large down log recruitment, and fire maintained natural openings. Due to fire exclusion, most prevalent current stand replacement process is timber harvest with subsequent reforestation. Prescribed use of fire on the Coast Range of Oregon federal lands is currently limited to site preparation. The fires that do occur are typically human caused, usually burn surface fuels and are commonly put out before they exceed a half acre.

CURRENT CONDITION

LANDFIRE National Map Data (2008 Refresh) suggests that the analysis area is predominantly in natural Fire Regime Groups 3 and 5 with a mean fire return interval of 30 to 200+ years. Fire severity in Group 5 can be of any class (low to replacement) and in 3 as low to mixed. LANDFIRE Fire Regime Condition Class (FRCC) for the analysis area is predominantly a 2, indicating a moderate departure from historical reference conditions. However, based on recent disturbance history for the specific project area, the project level FRCC is more likely categorized as 1 which is within the normal range variability.

Following the commercial thinning in 1996, at an approximate age of 52 years, smaller size class post-thinning activity fuel (slash) <3 inches has decomposed leaving mostly larger material > 3 inches. The post-thinning response of understory vegetation is most evident on the south aspects where dense and continuous shrub covers of rhododendron, huckleberry and vine maple are present. North aspects display less response in understory vegetation growth probably due to greater amounts of shade. The timber canopy is now mostly closed and this will limit further growth and development of understory brush or minor conifer species.

Stand level fuel conditions in the project area are classified as fuel models 5, 8, and 10. Fuel model 8 is characterized by closed canopy stands with little under growth and a litter layer composed primarily of duff, needles, twigs and wood less than 3 inches in diameter (Anderson 1982). Under normal conditions, fire behavior in these timber stands would be slow burning surface fires with low flame lengths. Fuel model 10 is characterized by heavier loadings of down dead wood greater than 3 inches diameter resulting from natural mortality, stem exclusion, disease pockets and other natural events like mass soil movement causing “jack straw” patches, snow break and wind throw. Landscapes dominated by Fuel Model 10 are prone to more extreme fire behavior including torching; spotting and short crown fire runs (Anderson 1982). Other factors including weather, topography, and aspect may contribute to more extreme fire behavior (crown fire potential) regardless of the fuel model present. The project north aspects are predominantly a fuel model 8. Project area south aspects are a combination of fuel model 8 and 5 except where pockets of larger trees have fallen due to wind disturbance creating a fuel model 10. Fuel model 5 is a brush model where fire is generally carried in the surface fuels that are made up of litter cast by the shrubs and the grasses or forbs in the understory. The fires are generally not very intense because surface

fuel loads are light, the shrubs are young with little dead material, and the foliage contains little volatile material.

The project area has a history of use by the public for both harvest of special forest products such as firewood, mushrooms, and ornamental vegetation. Dispersed recreational activities include hunting. These activities can, and often, occur during periods of high fire danger.

Public and private lands (both industrial and non-industrial land owners) within the analysis area are intensively managed for forest products, primarily lumber and plywood manufacturing. Recent harvest activities in the last (10-15 years) on BLM managed lands were limited to commercial thinning and density management. Landing and roadside slash from those operations were treated by piling followed with burning. Oregon Department of Forestry and private industrial operations occur intermittently throughout the analysis area, mostly in the form of clearcuts. These lands usually received some form of site preparation or fuels treatment following harvest operation in order to prepare for reforestation or reduce activity related fuel loadings. These treatments were accomplished using a variety of methods including (1) broadcast burning (2) machine pile and or hand piling and burning and (3) herbicide application. The resulting effects are stands of conifer, primarily Douglas fir, which are densely stocked, uniform in age and composition and generally lacking in diversity.

No Action Alternative

No-action would allow for the previously thinned stand to continue to grow and develop on its current trajectory. Natural fuel buildups would continue to occur, though at a relatively slow rate. As the over story canopy continues to close and increase in bulk density, understory vegetation would begin to die off and would contribute to periodic and irregular pulses of small diameter fuel. Because of the small size classes involved these contributions would be short-lived as the vegetation decomposes at a relatively rapid rate. Trees that die from suppression or other disturbances would eventually break apart and fall to the surface contributing to widely scattered pockets of heavier fuels that would remain present on site for longer periods of time.

Proposed Action Alternative

The BLM proposes to conduct 111 acres of Variable Retention Harvest in the GFMA. No treatments would take place in Riparian Reserves (50 ac.). Approximately 23 acres of timberland outside the Riparian Reserve would be retained in an untreated state as reserve tree aggregates. Fuels treatments would take place within 88 acres while no fuels treatments would be planned within aggregates.

SITE PREPARATION/HAZARD REDUCTION

Pre-harvest down, dead, woody fuel loading is estimated to be an average of 8.9 tons per acre (PNW-GTR -51, Series 1-DF-3-PC, 1976). The anticipated post-harvest fuel loading (PNW-GTR-231, Series 1-DFWH-PRE-02-07, 1989) in harvest units would require slash treatment to; (1) prepare the sites for regeneration, and (2) reduce hazardous fuel loading. Hazard reduction treatments are desirable due to the project areas close proximity to non-industrial private ownerships (Wildland Urban Interface, aka WUI) and its history of intensive public use for recreational activities. Untreated activity slash would contribute to extreme fire behavior in a wildfire event that would likely result in stand replacement and this fire severity would place desirable legacy features within the project area at risk. Multiple site preparation options are available and would be chosen for each activity site based on slope, aspect, access, cost, risk and effectiveness. The actual post-harvest fuel loading will vary based on several factors including slope, aspect, pre-harvest stocking levels, understory density (brush) and harvest methods used, but is expected to range from a low of 20 tons per acre up to 40 tons per acre.

Activity fuel hazards (slash) would be reduced by conducting site preparation activities in the form of broadcast burning and hand piling and burning. These treatments would target specific size classes of fuels and would be expected to reduce surface fuel loading and fire hazard by up to 90% in treated areas. These fuel reduction activities would have the beneficial effect of lowering hazardous fuel loading back to near pre-harvest levels (approximately 8 -10 tons per acre) until such time that the replanted or naturally regenerated trees start to make measureable contributions to surface fuel loading in the project area. Needle cast and small limbs that gradually accrue beneath the conifers would contribute to an increase in surface fuel loading/hazard for a short period of time but because of the seasonally long moist conditions that are present in the project area, these fine fuels would quickly decompose to become organic ground fuels (duff). In the absence of larger and continuous surface fuels necessary to contribute to extreme fire behavior and the most extreme type of fire weather conditions, it is very unlikely that the conifer reproduction in itself could support or sustain independent crown fire or other extreme fire behavior. Even individual tree torching is improbable without the benefit of heavier concentrated surface fuels burning underneath and preheating canopy vegetation.

The project area topography is varied. An east-west oriented ridgeline is the dominant topographical feature of the project area with distinct north and south facing aspects. Both aspects are further dissected by north-south oriented spur ridges and draws. Draws with intermittent and perennial stream channels are all protected within no-harvest Riparian Reserve buffers. The north aspect slopes average approximately 55%. South aspect slopes average approximately 45 %. The pre-existing logging road that provides the access to the project follows part of this ridgeline on the south aspect

BROADCAST BURN

The south half of the project area with predominantly south aspects would be suitable for late winter through early summer broadcast burning as a method of site preparation and hazard reduction. These slopes would receive adequate solar exposure and heating that would dry targeted fuels (fuels < 3 inches in diameter) earlier in the season. It is possible that winter burning (February-March) prior to nesting season for special status species could be accomplished if extended dry periods occur in January, February or March. Winter, spring, and early summer broadcast burning share similar site conditions. High soil moisture, high fuel moisture in the exposed larger coarse fuels (>3inches), and high fuel moisture in shaded fuels of all size classes are conditions favorable for maintaining soil productivity with less consumption of the litter and duff layers and would reduce fire impacts to coarse wood. A shade analysis of the 42 acres proposed for broadcast burn indicates that, depending on the month the burning takes place, an area ranging from approximately 4.5 acres (in February) to 1.5 acres (in June) along riparian and aggregate reserves may be left unburned due to shaded conditions. This would have the effect of softening the burn edges along the reserve areas thus maintaining a moderate level of vegetative cover. The amount and level of shade areas retained or consumed would have a direct correlation to the actual month of burning.

Fuels in shade lines created from riparian reserve or reserve aggregate trees would not burn well if at all during the early season due to high moisture content whereas burning conducted later in the season (early summer) would result in greater consumption of most fuel size classes due to the expected lower fuel moisture and the smaller size of shaded areas. Reserve areas (assumed to be shaded) tend to remain moist well into the summer and under normal conditions would not support active fire from a slop over beyond the immediate edges where some drying of natural fuels due to solar exposure is expected to take place. Fire trails and pre-burn watering of areas, pre-determined to be potentially problematic for holding actions would reduce the potential for slop over. Early burning would reduce the mop up effort required and could lower costs. The moderate to gentle slopes on the south aspects are suitable for hand ignition. Prescribed fire managers have better control over firing patterns and resultant fire intensity using hand ignition rather than helicopter ignition.

In some locations where burn intensity is higher due to heavier slash concentrations, receptive seed bed conditions for natural regeneration may develop. The intensity, duration and depth of a burn can influence how quickly natural regeneration may develop and how soon other vegetation may reemerge and become competitive. A low intensity burn (late winter/early spring) would result in reestablishment of certain early seral species, such as those currently known to be present in the project area, sooner than in a burn with high intensity (late spring/early summer). Many species would emerge as sprouts from brush stubs or stumps. Hardwood stumps would quickly sprout new basal growth. Big leaf maple could be expected to have new stems in the range of four to ten feet at the end of the same year the unit is burned. Higher intensity burning, such as around landing sites, may foster establishment of fire-dependent early seral species, such as ceanothus (*spp.*), not currently represented within the treatment area. Disturbance dependent noxious weed species currently known to have established populations in the project area such as scotchbroom (*Cytisus scoparius*) could be stimulated by broadcast burning.

SMOKE MANAGEMENT

Burning of forest fuels, either natural or activity related is regulated by the Oregon Department of Forestry Smoke Management program (OAR 629-048). Daily instructions for burning are written or issued verbally by ODF Smoke Management forecasters and are designed to minimize the impacts of smoke to downwind human population centers called smoke sensitive receptor areas (SSRA). If burning can be conducted outside of the nesting season for spotted owl and marbled murrelets (before March 1), then any smoke transport direction authorized by Smoke Management would be suitable. However if a suitable burn opportunity does not occur until March 1 or later, then prescriptions for burning would be written that limit the possibility of transporting heavy smoke into suitable spotted owl habitats to the south and east of the project area. Seasonal transport winds known to occur with some frequency in the project area should provide multiple opportunities for burning throughout the late winter and into the early summer. Mass ignition of dry surface fuels should create sufficient heat to lift most smoke up into the transport wind layer and away from potential habitat areas. As the heat from burning subsides and the smoke column collapses, localized surface winds would move smoke in more irregular and unpredictable directions. Mop up of burned areas beginning immediately following burning would reduce the amount of lighter drift smoke produced during the cool down period. After the initial burn day, residual smoke is normally limited to a few smoldering stumps and logs and is quickly dispersed by local winds. Mop up (100%) of a burned unit is expected to be completed within two to three days after burning takes place.

HAND PILE AND BURN

The moderate to steep slopes that occur in the north half of the unit on predominantly north and east aspects are better suited to piling and burning as a method of site preparation and hazard reduction. Hand piling is an effective method for reducing hazardous fuel loading and to prepare a unit for replanting. Hand piling and burning would provide only short term reductions (0-2 years) in competing vegetation by killing or setting back surrounding vegetation. Shallow root systems underneath the footprint of the burn piles may be killed or setback providing very localized control of vegetation for a period of several years dependent on the intensity and duration of the pile burning.

Approximately 46 acres of hand piling are identified in the project area. Piling treatments would occur in the north half of the project area (north of the 23-9-29.4 road). A small area around the south end of the aggregate located in the center of the south aspect of EA Unit 1 would be hand piled and burned to provide a fuels reduction buffer to the aggregate when broadcast burning takes place. Estimated post-harvest fuel loading indicates that up to 100 ± hand piles (avg. 6'W x 4'H x 8'L = 48 ft² footprint) per acre may be constructed. Approximately 10% of the hand piles would remain uncovered and would not be burned providing small scattered brush pile habitats and cover to small mammals and birds that would otherwise be absent. This equates to approximately 5 acres of the hand piled regeneration harvest area that would be covered in slash piles to be retained on site. The remaining 90% of hand piles would be

covered with polyethylene sheeting (PE) that is 4 mil thick and black in color. The PE sheeting provides protection from wetting rains allowing for ease of ignition and better consumption of piled fuels. Pile burning (including landing piles) would take place in the fall and winter months when surrounding fuel and soil moisture are at seasonally high levels. Pile burns during this time period are at very low risk of escape. All pile burning including landings would take place outside of seasonal restriction timelines, which limit burning activities to outside the critical breeding/nesting period for wildlife species of concern (see Wildlife section, and Table II-4).

BURNING EMISSIONS

Estimated carbon outputs from broadcast and pile burning were computed using Consume 3.0 software and the Piled Fuels Biomass and Emissions Calculator both developed by the USDA Forest Service PNW Research Station. The burning target would be to achieve at least a minimum 90% rate of consumption. The following tables estimate burn emissions by pollutants in (metric tons, t).

Table: III-11. Estimated Pollutant Emissions for Broadcast Burning - 42 ac. (Consume 3.0 software)

PM (t)	PM_{10} (t)	$PM_{2.5}$ (t)	CO (t)	CO_2 (t)	CH_4 (t)	NMHC (t)
10.19	7.22	6.60	82.64	1215.75	2.68	1.96

Table: III-12. Estimated Pollutant Emissions for Hand Pile Burning - 46 ac. (Piled Fuels Biomass and Emissions Calculator)

PM (t)	PM_{10} (t)	$PM_{2.5}$ (t)	CO (t)	CO_2 (t)	CH_4 (t)	NMHC (t)
7.39	5.23	4.55	25.62	1122.20	1.89	1.53

Cumulative Effects

It is expected that timber harvest with associated burning activities would continue in the future on state and private ownerships. The BLM has no planned fuels treatments in the watershed in the foreseeable future thus no other BLM/USFS actions in the area that would contribute to cumulative effects relative to fuels.

NOXIOUS WEEDS

Affected Environment and Effects by Alternative

Noxious weeds have the ability to become established easily and can rapidly develop a competitive advantage over native vegetation with their ability to effectively compete for water, sunlight, nutrients, and physical space. Numerous species of noxious weeds can be found within the analysis area, but the primary target species of concern are Scotch broom (*Cytisus scoparius*), and Himalayan blackberry (*Rubus discolor*). The broom species are known for their efficiency at fixing nitrogen and ability to establish themselves on nutrient-poor sites.

The analysis area is on a road system that is open to the public. The area is adjacent to private lands with high road use. Locations of plants are generally scattered and are relatively small in size, often consisting of individual plants that are fewer than 20 in number and sometimes found in isolated areas. However, the project area contains a few locations of Scotch broom with well over a thousand individual plants along the road. On private industrial forestland, noxious weeds are often effectively controlled through the application of herbicides. On public land, herbicide use is presently restricted to areas immediately adjacent to existing roads. Within existing BLM plantations, the broom species are generally controlled by hand pulling or cutting until the conifer seedlings outgrow the competitive height of the broom.

Weeds may be spread by human activities, such as vehicles and equipment, or naturally, as in wind-borne or animal transported seeds. The noxious weeds of concern are commonly found along roads or within disturbed areas adjacent to roads. The majority of the road systems have been inventoried for weeds since 1997 and treatment applications performed in these areas starting in 2002 through 2007. The BLM control reduces the spread of noxious weeds by requiring some equipment and vehicle washing, conducting annual weed surveys, and treating all target noxious weed infestations along BLM controlled roads.

No Action Alternative

Commercial log hauling, administrative traffic, and recreational driving would continue on existing open roads. BLM would continue to monitor and treat existing and new noxious weed populations using manual applications on BLM managed lands and chemical application along BLM controlled roads. Previously treated noxious weed sites would be slower in returning due to the past treatments. The analysis area has been intensively inventoried, treated, and monitored for weeds in the past and regular treatment of known weed sites would continue as funding remains available. Populations of noxious weeds that exist in the area will be subject to change based on disturbance, normal population growth or importation of new species to the area through recreational activity, periodic road maintenance of existing roads, or movement of seeds by natural methods (animals etc.).

Proposed Action Alternative

Road renovation routinely exposes bare soil areas, which may allow for the introduction of numerous pioneer species, increasing the chances of some scattered noxious weed populations occurring along these road systems. Application of rock to the road surface may introduce weed seed from the quarry site of origin; however, this rarely occurs unless the gravel is stockpiled for at least one generation of a weed species. Processing of the rocked roads and hauling of logs is not conducive to establishment of noxious weed seedlings and follow up monitoring and treatment is an effective control method on BLM roads in the analysis area. All logging and site preparation equipment that operates off of the gravel would be required to be washed prior to entering BLM lands. BLM controlled haul routes and potential landing locations would be inventoried for noxious weeds and treated, either mechanically or chemically, prior to road renovation. Under the special provisions of the timber sale contract, the contractor is required to apply a mixture of grass seed and mulch on all disturbed areas establishing a ground cover that is reasonably effective in suppressing noxious weeds. Follow-up monitoring would be performed on a regular basis to identify new invaders and treated using an integrated pest management approach.

Site disturbance associated with harvest treatment would result in exposure of a mineral seedbed. These disturbed areas would be subject to invasion by noxious weeds depending on local seed sources or importation of seed by equipment, animals or humans. The design features outlined in the action alternative would help reduce the risk of noxious weed spread or population increase. In addition, annual inventories identify new populations, and application of control treatments limit the spread along BLM controlled roads. Other District projects such as manual maintenance, pre-commercial thinning, and site prep activities specifically address prevention and removal of noxious weeds through mechanical methods and this has been proven to be effective at treating any potential noxious weed invaders. Any new species of noxious weeds that are discovered and identified by the district as a target species for treatment would also be managed using integrated pest management techniques. Project design features would emphasize control of noxious weed populations through pre-harvest and post-harvest treatments. Therefore the proposed action would have no effect on noxious weed populations.

Due to the active management of noxious weeds by BLM and other landowners within the watershed, no cumulative increase in noxious weed infestation within the analysis area is likely. Most of the existing noxious weeds only thrive in an open canopy environment, particularly in roadside openings. As the canopy levels increase on all ownerships, existing noxious weed sites would be shaded out more over time. Annual inventories would continue to identify any new populations and weed treatments would continue to control the spread along BLM controlled roads.

RECREATION RESOURCES

Affected Environment and Effects by Alternative

The project area is part of the O&C lands in Douglas County and is designated for timber production. Recreation activities occur on these lands along with timber activities and other natural resource management activities.

Recreation in this area is primarily hunting (deer, elk and bear) and mushroom picking. Travel by roads open for public use is the primary way people access this area in their recreational pursuits.

VISUAL RESOURCES MANAGEMENT (VRM)

Under the 1995 Coos Bay District Record of Decision and Resource Management Plan, RMP VRM Class for the Soup Creek VRH Project is VRM IV. The management guidance for this VRM class (1995 RMP) is as follows:

> VRM Class IV objectives are to manage lands for moderate levels of change to the characteristic landscape. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the effect of these activities through careful location, minimal disturbance, and repeating the basic elements of form, line, color, and texture.

Visual Resource Contrast Rating For VRM

The Visual Contrast Rating Worksheet was completed from Key Observation Points (KOPs) as a field tool to assess if the proposed activities would change the natural characteristic of the landscape.

KOPs

KOPs were selected to identify potential effects to the visual resources. For this project, one point was selected from Soup Creek County Road and two points along Loon Lake Road. These areas were assessed to see if the views would be within moderate levels of change to the characteristic landscape and the extent of change the activities would have on form, line, color, and texture.

The visual assessment from these locations considered the season of use, light conditions, angle of observation, number of viewers, and length of time the project is in view as recommended in the BLM VRM Manual 8431.

No Action Alternative

In The No Action Alternative, there would be no new road renovation. Improvements designed to reduce erosion, correct drainage deficiencies, improve water quality, and provide for user safety would not be implemented under this action. This alternative would reduce motorized and non-motorized vehicle accessibility over time as the existing roads continue to grow over with vegetation and become obstructed

(>20 years). Hiking access to project area would persist, with the exception of the interior road system mentioned above, due to the adjacent paved roads (Soup Creek and Carlson).

VISUAL RESOURCES MANAGEMENT (VRM)

The No Action Alternative is not a "static" alternative. Visually, the existing landscape would continue to change with the present economic and environmental conditions and trends, especially on private lands. However, there would be no immediate change to the visual resources on BLM administered lands.

Proposed Action Alternative:

Under the proposed alternative roughly 3.2 miles of road would be renovated and 0.06 miles would be decommissioned. Renovated roads would provide no new net increase in access ability or opportunity for recreationists. Increased traffic due to logging related activities would have a temporary impact on willingness of some users to access the area for recreation, however these activities are not unusual in the subwatershed due to private and State of Oregon timber harvesting activities. Therefore, no net effects to recreation opportunities are anticipated under this proposal.

VISUAL RESOURCES MANAGEMENT (VRM)

Three KOPs were used to view the landscape in the planning area. These KOPs were chosen for their proximity to the project units and the site's ability to provide the maximum viewing area from roads traveled in the area of the project.

KOP #1 is located on Loon Lake Road 0.2 miles north of Soup Creek County Road and is within 0.7 miles of the west unit. Project design features of aggregate retention blocks, riparian reserves and topography all lessen the contrast of the variable retention harvest through screening of openings with transitioning edge. VRM IV allows for a high degree of contrast. The project is expected to present weak to moderate contrast to the overall landscape, thereby meeting the VRM IV objectives.

KOP #2 is located on Loon Lake Road 0.4 miles south of Carlson Road. KOP #2 is within 0.4 miles of the west unit. Project design features such as aggregate retention blocks, riparian reserves and topography would lessen the contrast of the project area to the surrounding landscape through screening of openings with transitioning edge. These irregular forms are common throughout the surrounding agricultural, state, and private forest lands. The sharp and regular diagonal line between the project and state lands on the west end of the project would become less distinct as the ridge top timber is removed. Effects of the proposed action would be weak to moderate to the surrounding landscape and would meet the VRM objectives for class IV.

KOP #3 is located on Soup Creek County Road near mile post 1.0. KOP #3 was chosen for its close proximity to the proposed sale area. KOP #3 would have views of the riparian reserve. The foreground of the variable retention harvest area consists of private lands in an early successional state and is boarded by a strong line of forest to the ridge presenting a very regular grey band of trunks and coarse green tops. After harvest the view would remain relatively unchanged due to the retained east half of the project area. However, some breaks in the upper canopy of the forest may be noticed to the southwest. Effects of the proposed action would present weak to moderate contrast elements in the surrounding landscape and would meet the VRM objectives for class IV.

Cumulative Effects:
No cumulative effects to recreation are anticipated under the no action and the proposed action alternatives.

CLIMATE CHANGE

Affected Environment and Effects by Alternative

Considering information produced since the completion of the 1994 RMP, it is unequivocal[18] that global temperatures have increased (approximately 1°C since late 1800's); it is also likely that temperatures in the PNW have increased (Scientific Consensus Statement (2004), CIG (2004), and 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 2º C at the low end of the uncertainty range to 6 ºC at the upper end of the uncertainty range (IPCC 2007, Miles et al. 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 9º 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 (Scientific Consensus Statement 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% by 2100 (CIG 2009, Hidalgo 2009). This increase would be well within 20th 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 (Millar et al. 2006, Lenihan et al. 2005), fire behavior (Rogers et al. 2011, 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 model predictions attributable to physical processes increases at smaller spatial scales due to the importance of regional climatic patterns (such as ENSO[19]) and local topography (such as the Coast Range) (CIG 2009). Predictive models of temperature and precipitation were developed (down-scaled) for the Pacific Northwest, but have not been developed specifically for the Coast Range Province or for the local 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 have limited utility for describing the cumulative effects of the 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, pg. 217) considered climate change effects as part of long-term planning efforts at the Plan-scale (western Oregon). Although the 1994 RMP FEIS recognized the possibilities of increased incidence of wildfire, insect outbreaks, shifting range of species including Douglas-fir, and forest species

[18] Discussion in this section uses terminology for certainty developed in IPCC (2007, pg. 27).
[19] ENSO is the El Nino southern oscillation.

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, pg. 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 would occur due to climate change, it is not possible to reasonably foresee the specific nature or magnitude of the changes (2008 RMP FEIS, pg. 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 this EA.

Proposed Action Alternative

The Proposed Action would result in a cumulative 50 year flux of greenhouse gasses (GHGs) to the affected environment on the order of 4 thousand metric tons (megagrams (MG)) of $C0_2$ by 2061. At the scale of western Oregon, carbon stores are predicted to increase by 169 million MG under the NWFP by 2106 (USDI 2008) because growth is expected to exceed harvest removals. Action area carbon flux estimates are quantified and described fully below. However, it is not possible with current science to estimate the effects of these GHG fluxes on the local affected environment. The USGS summarized science regarding the effects of local actions on climate change and concluded "Difficulties remain in simulating and attributing observed temperature changes at smaller than continental scales…It is currently beyond the scope of existing science to identify a specific source of $C0_2$ emissions and designate it as the cause of specific climate impacts at an exact location" (USGS, 2008). This memorandum is included by reference.

GREENHOUSE GASES: CARBON STORES AND CARBON FLUX

As an aid to decision-making, this analysis estimates carbon flux to the analysis area associated with the Proposed Action. 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, mineralization, dissolving in the ocean and other processes, balanced by carbon added through plant respiration, harvest/volatilization, concrete production, fossil-fuel burning, volcanic activity, and other processes. Forest harvest may lead to flux of greenhouse gasses (GHGs) in addition to $C0_2$, principally N_2O and CH_4 (Sonne 2006, Jassal et al. 2008). Due to lack of scientific information and lack of adequate models on the effects of forest activities in the Pacific Northwest on non-carbon GHGs, and the (presumably) minor contribution of these other gases to GHG flux associated with the Proposed Action in relation to total flux estimation error, they are not here addressed. The indirect effects of carbon flux following timber harvest are addressed below. Indirect effects of this carbon flux on climate change and the affected environment is addressed in the Climate section.

Carbon flux of the Proposed Action

Estimates of carbon stores for the analysis area as a whole would be fraught with error, could complicate contrast between the Alternatives, and would not facilitate decision making. Instead, this analysis quantifies the net effect of the Proposed Action on greenhouse gas 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 by comparing differences in carbon storage between alternatives fifty years from the present, incorporating:

a) differences in carbon storage in live, dead, and organic soil carbon pools;

b) the intermediary flux from wood products produced by the Proposed Action through this period; and
c) "secondary" C fluxes associated with logging and hauling systems.

Analysis of carbon flux associated with changes in live and dead pools ("a", above) attributable to the Proposed Action used relatively simple tree-/stand-scale models available with the Forest Vegetation Simulator (FVS) modeling package[20] (http://www.fs.fed.us/fmsc/fvs/). This method 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 compared to total stores, and are similar between young and mature stands (USDI 2008, App-29). Soil carbon represents 9-20% of total site carbon but is the most stable C store and the least likely to respond to disturbance. For example, 60-year old forests and 450 year old forests have similar soil carbon storage (Harmon et al. 1990). Flux of carbon from merchantable wood products ("b" in previous paragraph) produced from the Proposed Action during the 50 year analysis window was estimated following synthesis in USDI (2008, pg. App-30). GHG emissions from forestry activities necessary to harvest these units ("secondary emissions", "c" previous paragraph) were estimated following (WRI 2010), and added to FVS estimates (see below).

Carbon Stores of the Proposed Action

The Proposed Action would treat approximately 88 acres of forest, volatilizing some carbon, moving carbon from live tree pools to detritus and wood products pools (representing approximately 7% of Coos Bay Districts yearly ASQ), and storing some carbon in forest products while leaving some residual trees and growing replacement trees. Making a set of very broad assumptions and using the FVS carbon model and assumptions similar to those developed in the 2008 RMP FEIS (USDI 2008); compared to the No Action Alternative the Proposed Action would result in a C flux of 3,548 metric tons (MG) over the 50 year[21] time period from harvest until approximately 2063. GHG emissions from forestry activities necessary to harvest these units ("secondary emissions"[22]) are estimated at 0.1429 MG CO_2/ MBF (WRI 2010). Applying this equation to the Proposed Action suggests an additional 746 metric tons (MG) CO_2 release attributable to harvest activities; this is consistent with Sonne (2006) who predicted a relatively small C flux associated with harvest equipment. The sum of forest treatment and harvest system flux is roughly 4 thousand metric tons (4,295 metric tons). The calculations are summarized below in Table III-13.

Table III-13. Proposed Harvest Area Stored Carbon (above/below-ground, live/dead pools) in Metric Tons[23]

Present Stored Carbon	Proposed Action[24] in 50yrs (PA)	Wood Products derived from Proposed Action after 50yrs[25]	No Action 2061(NA)	50 yr. Flux (NA-PA+C in wood products)
16,223 (5,558 removable as wood products)	25,550	3,923	33,021	3,548 (4,295 w/ secondary emissions)

[20] Climate FVS, which is a similar tool but models growth under different climate change scenarios was not used because it would require an arbitrary selection of a particular climate change scenario (See Climate section). An alternative model, The Forest Sector Carbon model from Oregon State University, is currently only available as a Beta and only for the Western Cascades forest type.
[21] Data were normalized to 50 year time frame in Sonne (2006).
[22] Secondary emissions are here defined as emissions from equipment consuming fuel employed to harvest, yard and load and haul logs to the mill, similar to WRI (2010).
[23] Comparisons based upon 88 acres of proposed harvest.
[24] Model assumes the replacement stand has, on average, 180 trees per acre at age 10 and does not receive commercial thinning due to reduced stem density designed to delay canopy closure of young stand.
[25] From WOPR 2008 Appendix C p.30 uses saw log carbon *emission* of 29.8% at 50 years, or conversely 70.2% *stored*. Most of the harvested wood volume is expected to be milled into dimension lumber.

Estimated short term direct CO2 emissions from post-harvest activities of the proposed action would amount to 2,338 metric tons (Table III-11, III-12). Because this stand is previously thinned, less carbon is currently stored than is estimated in the replacement stand 50 years after harvest; commercial thinning was not modeled in the replacement stand due to reduced stand densities for necessary maintaining early seral conditions following Franklin and Johnson principles. The difference in carbon between the action and no action alternatives would continue to decrease through time because the rate of carbon uptake decelerates after a stand reaches the age of culmination of mean annual increment. When analyzed over a 20 year instead of 50 year timeframe, the carbon flux is approximately 7 thousand metric tons. Although the Proposed Action would be predicted to result in a mid-term flux of additional carbon to the atmosphere, carbon stores in the reserved portions of the action area under the Proposed Action scenario would be predicted to approach a steady state at or above 250 metric tons acre C, which is comparable to storage under the No Action Alternative (depending on the frequency of disturbance).

The total 50 year carbon flux of the Proposed Action compared to the No Action would not produce measurable change in global carbon storage considering current detection, modeling technologies, and associated uncertainty. To place this carbon flux in context, the total 50 year carbon flux associated with the Proposed Action would represent approximately:

- The average annual carbon footprint of 200 Americans, based on information in MIT (2008).
- Less than the carbon legacy of an American female with one child and all descendants, based on data in Murtaugh and Schlax (2009).
- <0.01% of carbon stored on BLM-managed lands in western Oregon (USDI 2008)[26]. BLM-managed lands in western Oregon support approximately 1% of the carbon stored in the western U.S., and 0.02% of global carbon stores in vegetation, soil, and detritus (USDI 2008).
- Below the indicative threshold (25,000 metric tons) set by the EPA under a mandatory reporting rule for non-forestry regulated entities (EPA 2009).
- From the EPA greenhouse gas equivalencies calculator[27], the yearly CO_2 equivalents of emission from 3,056 passenger vehicles, the energy use of 733 homes, or the emissions of 0.004 coal-fired power plants.

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 would necessitate harvest in another location (importation/transportation from other countries or regions) or substitution with other building materials (steel, aluminum, concrete, or etc.) resulting in a comparable (or larger) carbon flux. Because biological sequestration cannot guarantee permanent storage, it is difficult to define how such biological offsets "stack up" against permanent reductions. Forests grown this year for sequestration purposes, for instance, could be harvested in 30 years or could accidentally burn and release stored carbon as a result of natural processes (Marshall, E., & Kelly, A. 2010).

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 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 (USDI 1994, Appendix V, pg. 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" (USDI 1994, pg. 4-1). Based

[26] Note that the C flux associated with Proposed Action includes not just change in stores but flux due to direct emissions.

[27] http://www.epa.gov/cleanenergy/energy-resources/calculator.html (accessed 3/26/2013)

on the small estimated permanent flux of carbon that would be associated with the cumulative effects of the Proposed Action following the 1994 RMP, the high uncertainty in any such estimate of carbon flux (and other sources of GHGs), and the response of global climate to these GHG's, conclusions in the 1994 FEIS remain valid and applicable to the cumulative effects of the Proposed Action.

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 metric tons (growth is expected to exceed harvest levels across all land-use allocations). This sequestration is less than under a "No Harvest" scenario, but does represent a gain in carbon storage. U.S. annual CO2 emissions (circa 2008) were approximately 6 billion metric tons. The flux of 8 thousand metric tons of carbon associated with the Proposed Action (over 50 years) would represent far less than 0.00002% 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 (2008 RMP FEIS, p. 543). 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%: 2008 RMP FEIS, pg. 538). However, estimates of the magnitude and direction in carbon response are probably accurate, and these results may be instructive for comparing the effects of the Alternatives on local (watershed-scale) carbon stores.

RESOURCES NOT ANALYZED IN DETAIL

Due to a lack of concern expressed 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 detailed comparative analysis as directed by CEQ regulation § 1500.0(b), 1500.2(b) and other sections. The analysis file contains the analyses pertaining to these conclusions, which are hereby incorporated by reference.

Cultural Resources

This analysis area has been the location of both prehistoric and historic cultural activities. A review of project documentation and records does not reveal any known cultural resources in the immediate vicinity of the harvest unit. Field reconnaissance did not reveal the presence of any cultural resources. This project would not affect prehistoric or historic cultural resources. However, if any objects or sites of possible cultural value such as historical or prehistoric ruins, fossils or artifacts are found, all activities near the discovery site would immediately stop and the Authorized Officer immediately notified of the findings. Operations may resume at the discovery site upon receipt of written instructions and authorization of the authorized officer.

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. The proposed project is not located within headwaters and is not part of a Drinking Water Protection Area (DWPA). The city of Reedsport is the closest public DWPA (ODEQ) downstream of the project area. Local landowner water rights downslope from the project area would be protected as addressed within the Water Resources section; therefore no impact is anticipated by the proposed action.

Environmental Justice

The proposed areas of activity are not currently known to be used by, or are disproportionately used by, American Indians, minorities, 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 proposed project area. Therefore, the intent of the Environmental Justice Executive Order (EO 12898) is met. Resources may bring gatherers to this area, but their presence should not result in disproportionately high or adverse human health or environmental effects because of the proposed action.

Forest Fuels/ 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). Within the analysis area, most of the area shows a moderate degree of departure, and is classified as FRCC 2. Mechanical treatments such as logging in conjunction with activity fuel treatments would assist in maintaining the same FRCC and/or help shift the analysis area towards a FRCC 1 condition.

Hazardous Materials

Activity resulting from the Action Alternative would be subject to the State of Oregon Administrative Rule No. 340-108, *Oil and Hazardous Materials 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 applicable, the BLM would apply the *Coos Bay District Hazardous Materials Contingency Plan and Spill Plan for Riparian Operations* if a release threatens to reach surface waters or is in excess of reportable quantities.

Unaffected Resources

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

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

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Bill Elam	Fuels Management Specialist
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Mike Kelly	Recreation Specialist
Chris Schumacher	Forester/ District Silviculturalist
John Guetterman	GIS Specialist
Stephan Samuels	District Archaeologist

List of Agencies and Individuals Contacted

The public was notified of the planned EA through the publication of the Coos Bay District's planning update, a scoping notification on the District web site, and advertisement of scoping in The World newspaper.

The following public agencies and interested parties were notified directly:

American Forest Resources Council
Association of O&C Counties
Cascadia Wildlands
Coast Range Association
Confederated Tribes of Coos, Lower Umpqua, and Siuslaw
Division of State Lands
Douglas Timber Operators
Governors Natural Resources Office
Klamath-Siskiyou Wildlands Center
NOAA National Marine Fisheries Service
NW Environmental Defense Council
Ocean Coastal Program
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Oregon Wild
Umpqua Watersheds
USDI Bureau of Indian Affairs
U.S. Fish & Wildlife Service
Numerous Private Citizens
All adjoining landowners

APPENDIX A: MAPS

Figure A-1: Overview of Analysis Area, Land Use Allocations, and General Vicinity.

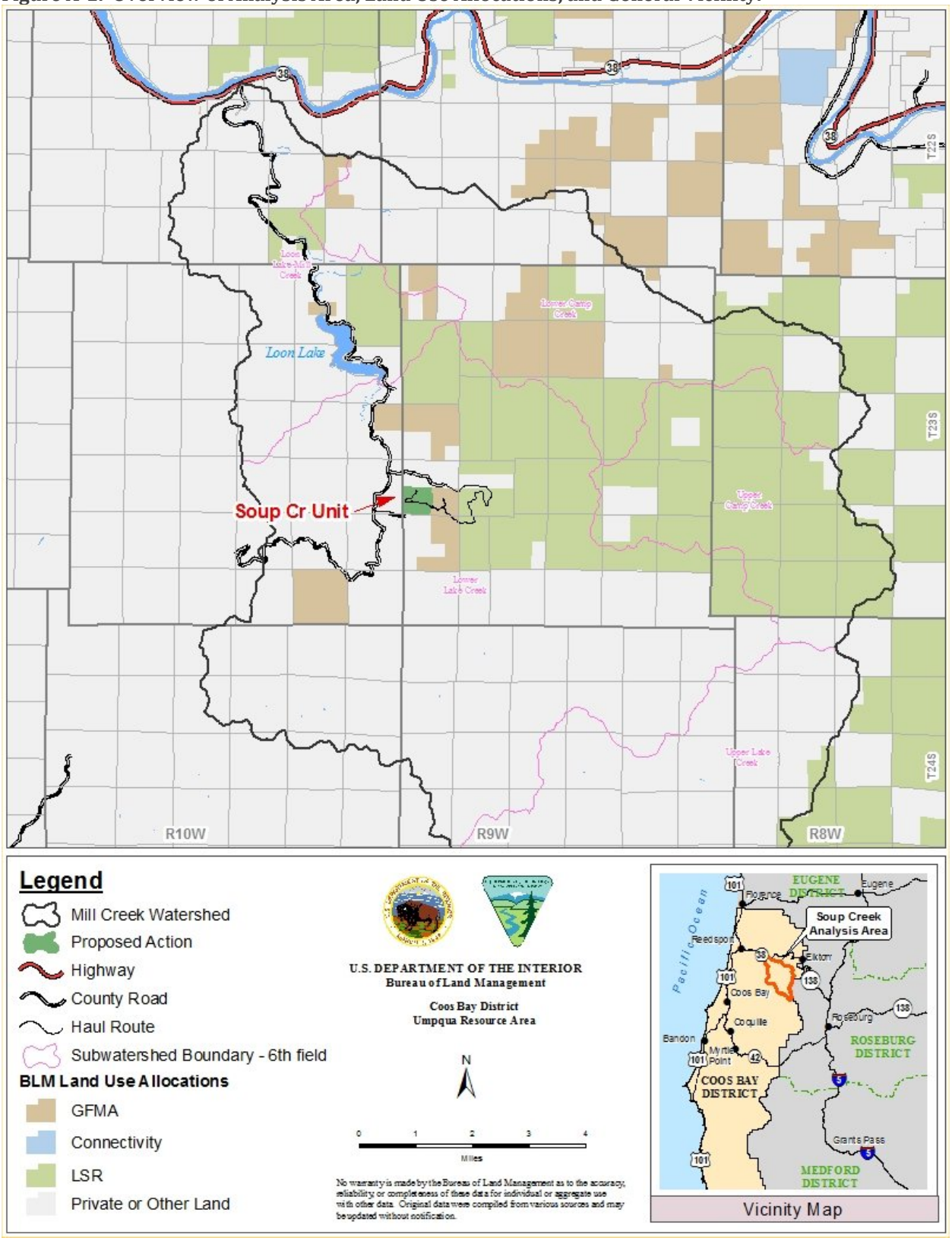


Figure A-2: Proposed Action – Units, Prescription, and Road Work.

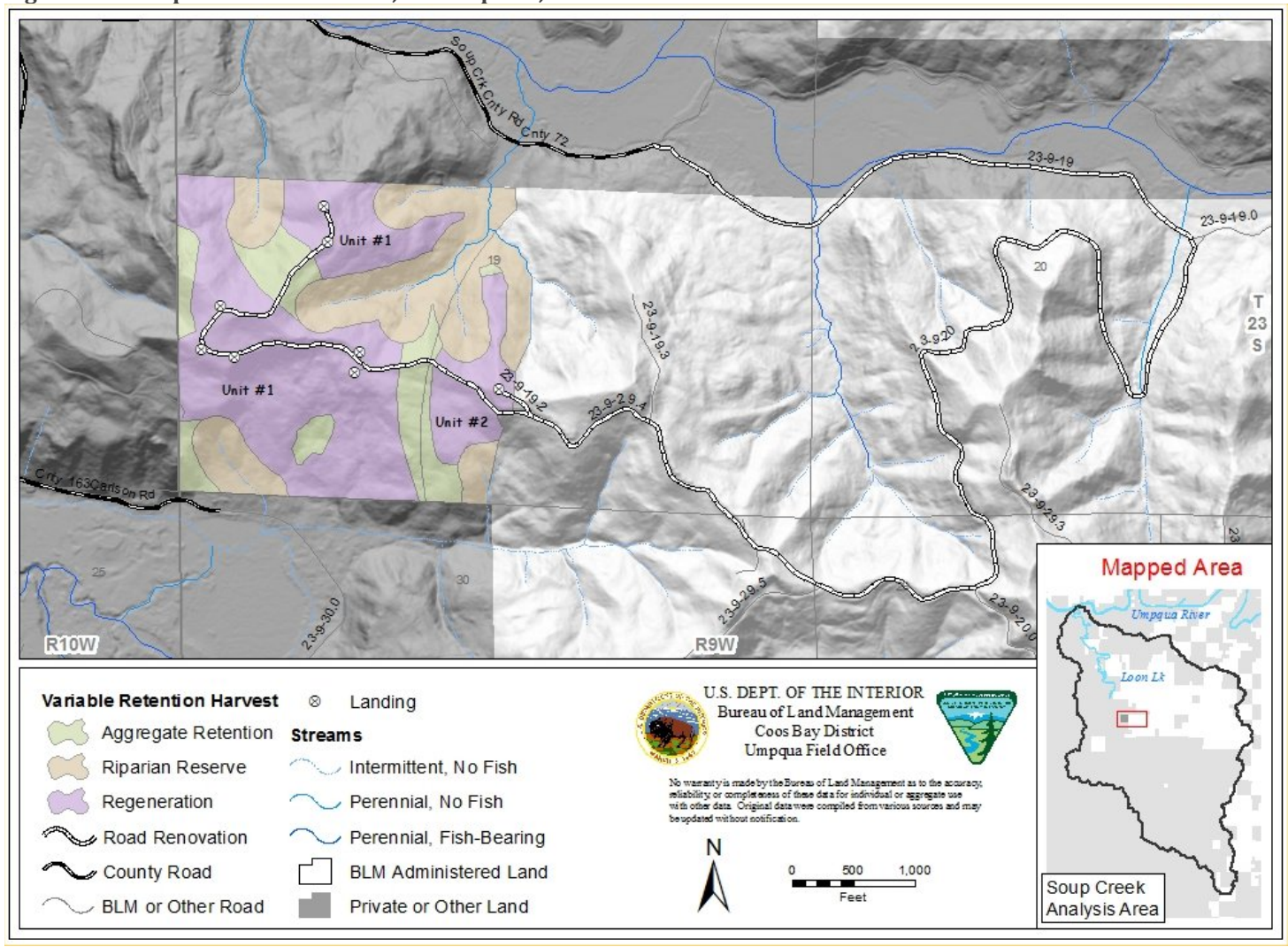


Figure A-3: Proposed Site Preparation and Reforestation Methods.

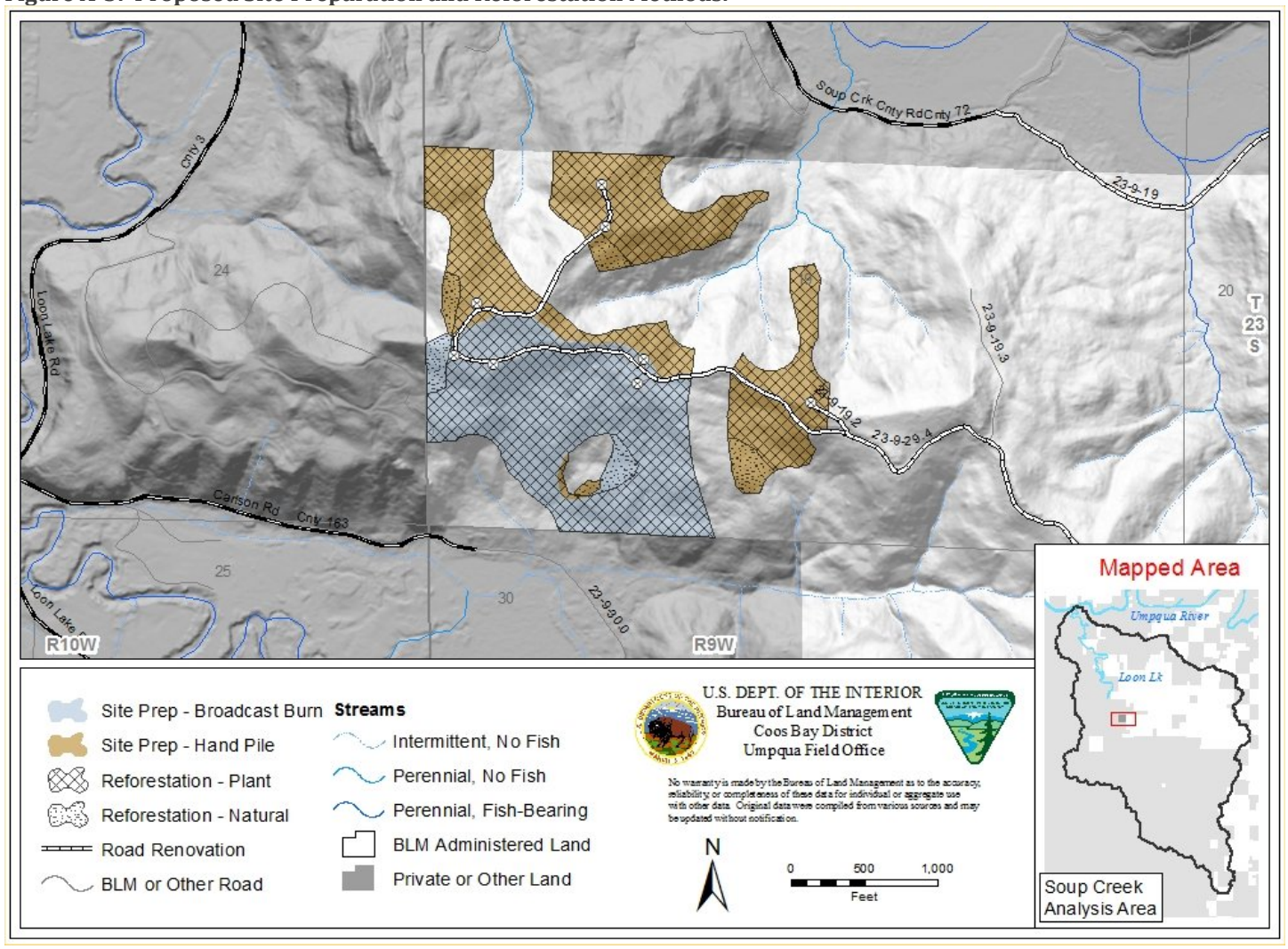


Figure A-4: Primary Stream Shade Zone within the Proposed Action.

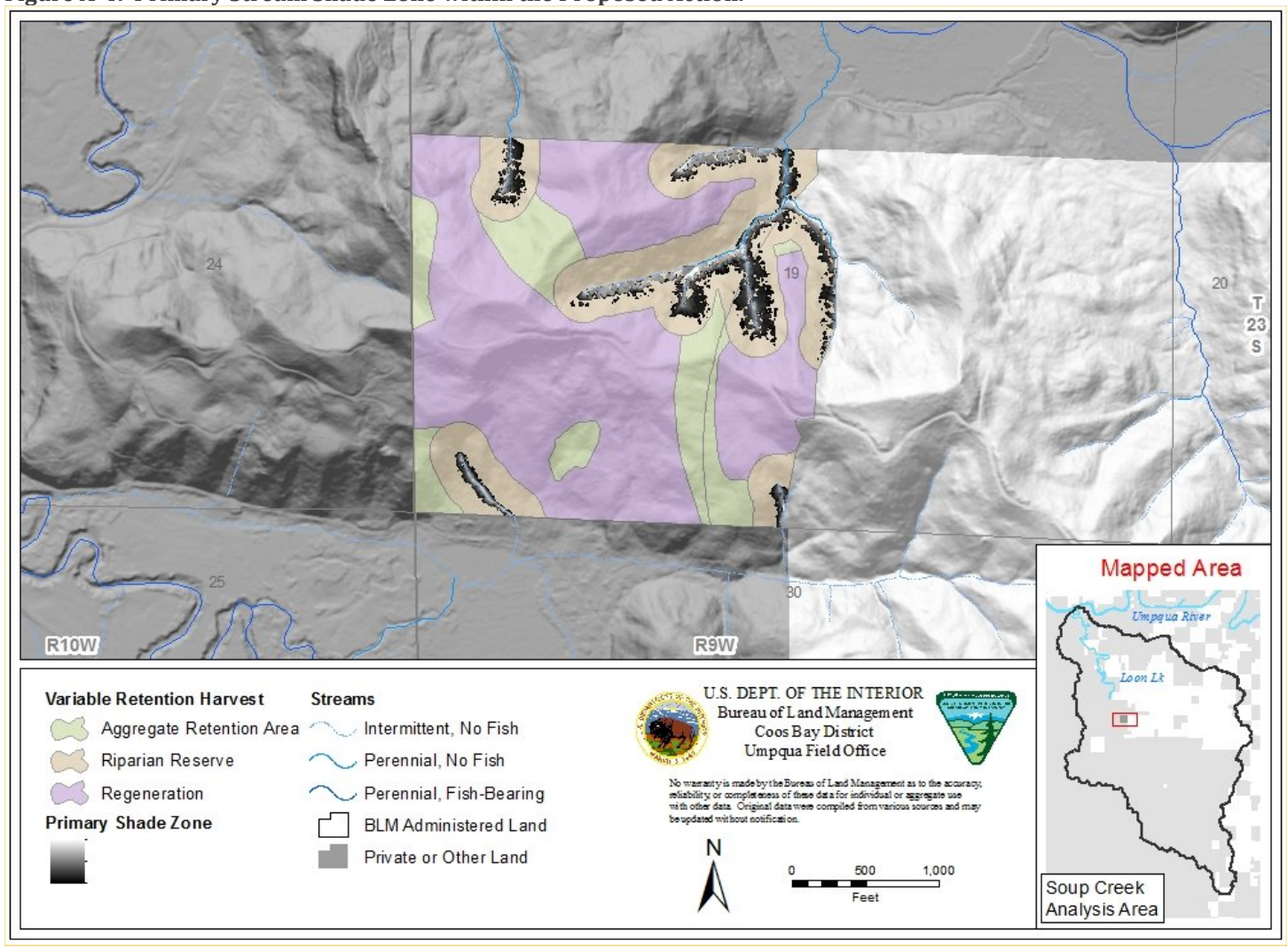
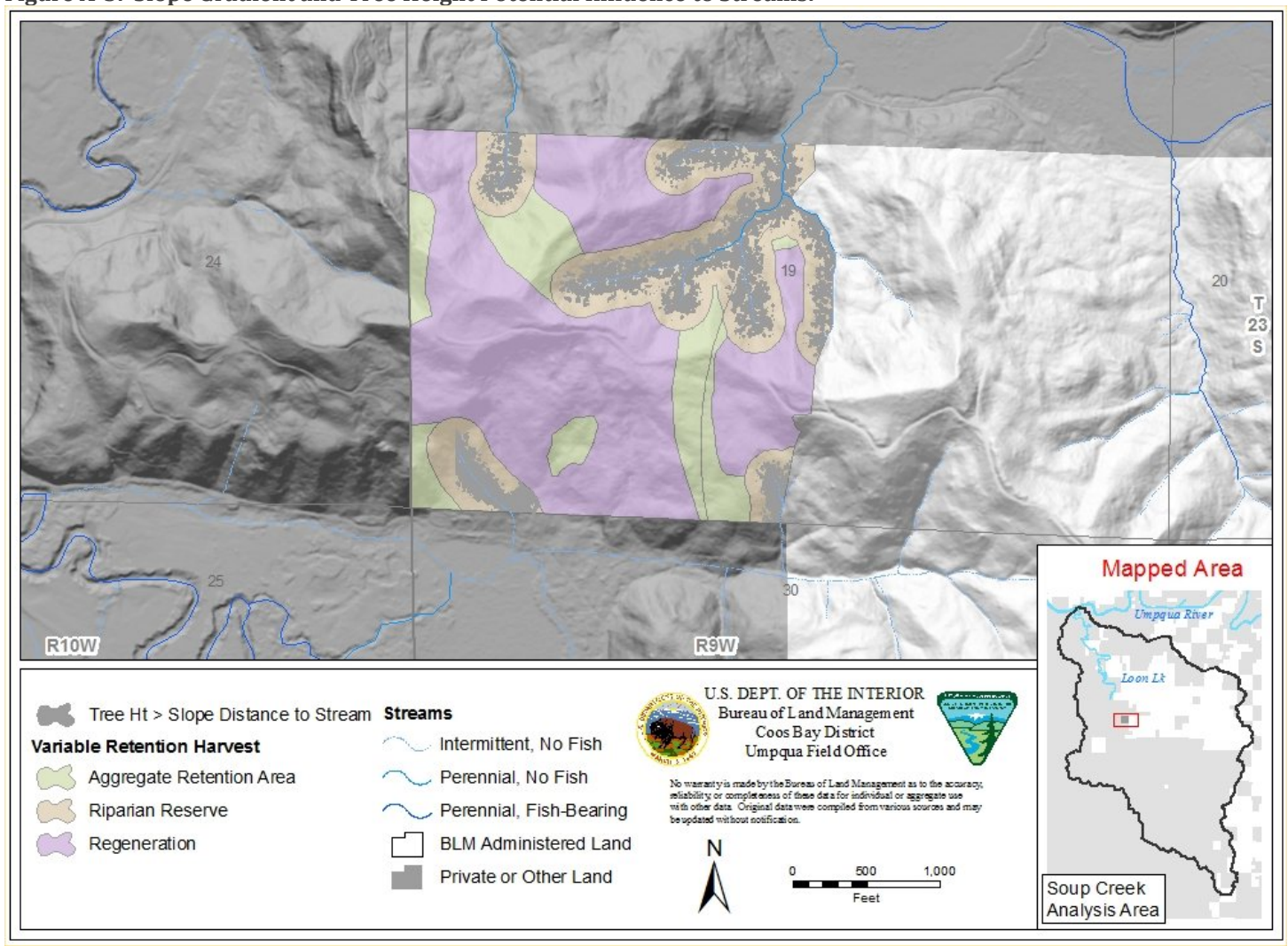
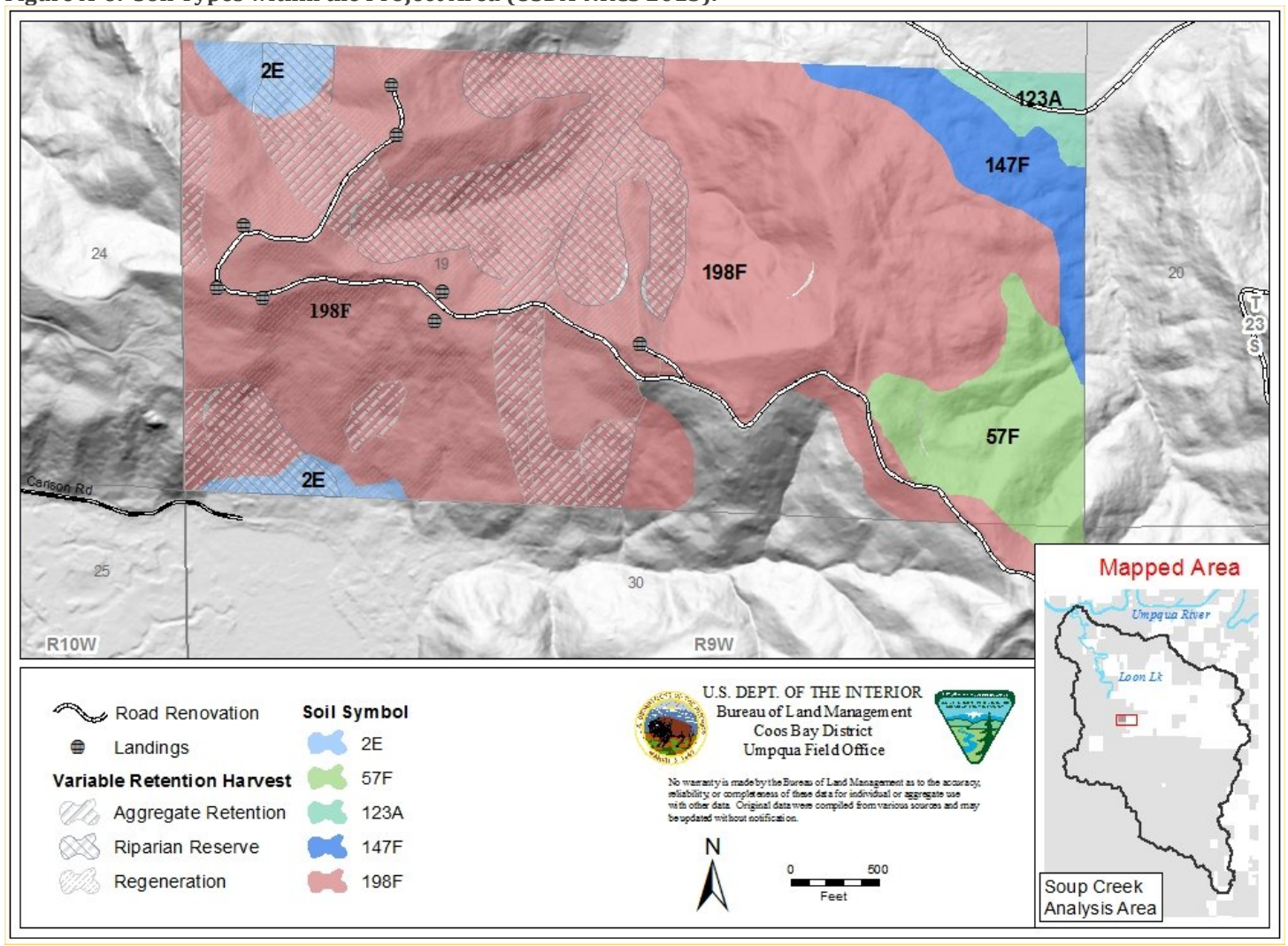


Figure A-5: Slope Gradient and Tree Height Potential Influence to Streams.



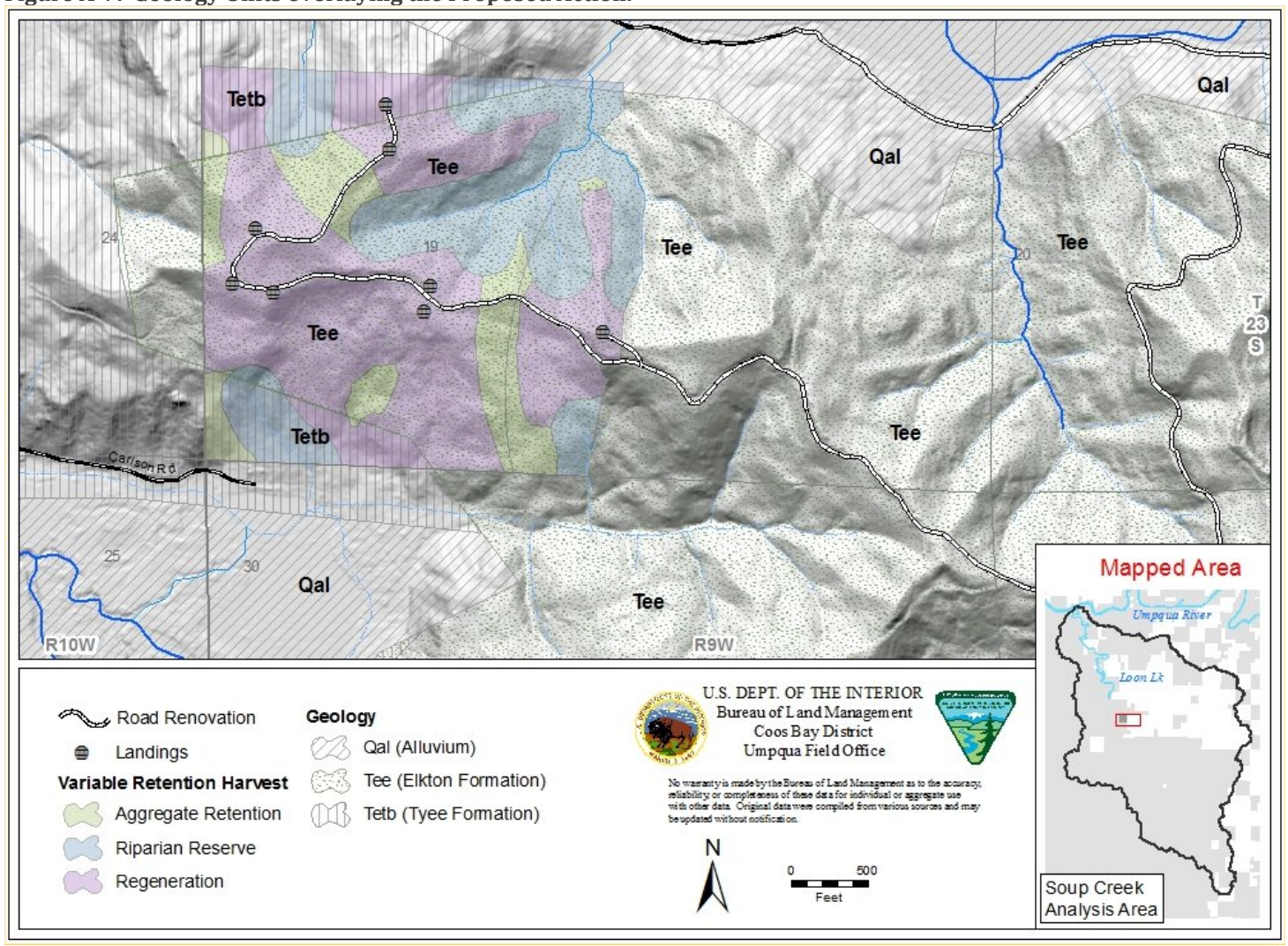
This layer does not show individual trees and shrubs. First return LiDAR elevations that map the canopy were compared with slope distances to the stream.

Figure A-6: Soil Types within the Project Area (USDA-NRCS 2013).



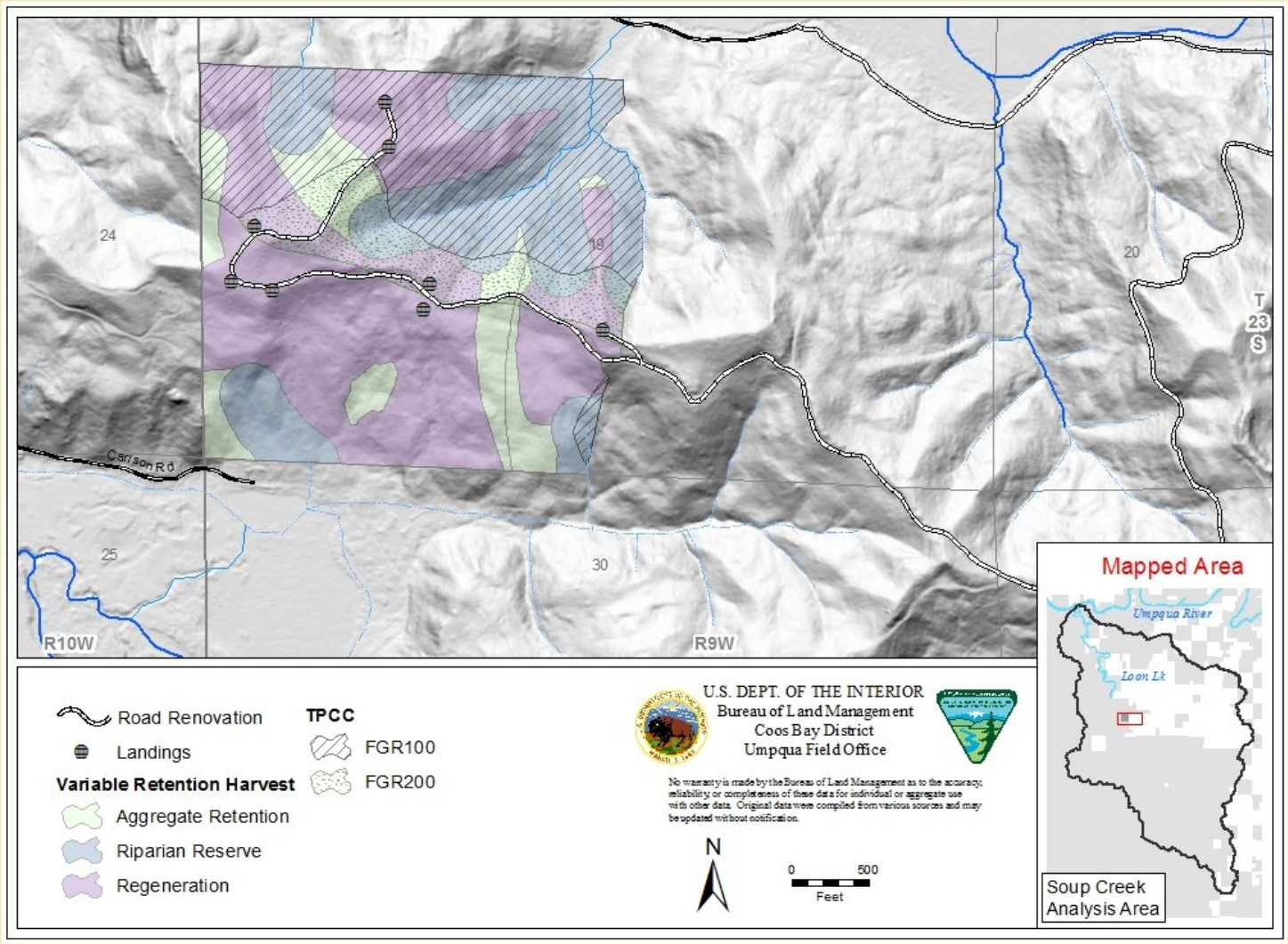
See Soil and Geology section for soil descriptions.

Figure A-7: Geology Units overlaying the Proposed Action.



Mapped by Neim and Neim (1990)

Figure A-8: Timber Productivity Capability Classification in the Proposed Action.



TPCC FGR1 and FGR2: Fragile due to slope gradient but suitable for forest management using appropriate mitigation. The FGR classification is based on landscape features, various soil properties, and reforestation potential. Unmapped lands are not classified as having a fragile gradient.

APPENDIX B: TABLES

Table B-1: Soil characteristic ratings from NRCS (2013). Highlighted rows within the proposed action.

Symbol	Forest Productivity (feet^2/acre/year)	Plastic Limit (Moisture Content) (%)	Compaction Resistance	Erosion Hazard	Windthrow Susceptibility	Fire Susceptibility	Restoration Potential
198F	172	31.9	Low	Severe	Yes	Highly	High
57F	157	30	Low	Severe	Yes	Highly	High
147F	157	29.2	Low	Severe	Yes	Highly	High
2E	186	22.8	Low	Moderate	Yes	Moderate	High
123A	186	22.1	Low	Slight	No	Slightly	High

Table B-2: Estimated amount of soil disturbance in the proposed action.

Disturbance Type	Length (feet)	Width (feet)	Number	Total (sq. ft.)	Total (acres)	Total Disturbance (%)
Yarding Corridors	900	12	35	648,000	8.7	2.9
Fire Line	6,400	3	1	21,000	0.4	0.15
Totals						**3.1**

These disturbances would not result in compaction.

Table B-3: Existing and proposed compaction within the project area.

Year/Project	Project(acres)	Roads (acres)	Landings (acres)	Skid Trails (acres)	Total Compaction (acres)	Total Compaction (%)
Proposed Activity	295	previous	0.5	none	0.5	0.2
1997 to Present	295	3.7	3.0		6.7	2.3
1950s	295	0.3	0.8	2.2	3.3	1.1
Totals					**10.6**	**3.6**

Historical calculations are based on aerial photography. The road and skid trail lengths were measured from GIS. Assumed each landing is 0.25 acres, roads are 14 feet wide, skid trails are 40 feet wide and 21% of the ground-based area would be compacted.

Table B-4: Survey and Manage Tracking

Programmatic Step 3 Evaluation Form for the Identification of non-High Priority Sites for the Oregon Red Tree Vole

WATERSHED INFORMATION

Administrative Unit: Coos Bay District

Resource Area/Ranger District: Umpqua

Contact Person: David Shanley-Dillman

Watershed Name: Mill Creek[1]

Watershed Ranking (High, Moderate, Low): High

SURVEY POLYGON INFORMATION

Survey Polygon ID	Project Name	Does the Habitat Meet the Trigger for Survey Protocol Habitat? (Y/N)			RTV Nest Activity Status (enter # of nests within the survey polygon)			Number of Active RTV *Sites* in the Survey Polygon	ISMS Entry Date (identifying these as non-HP)
		N. Mesic	Mesic	Xeric	Active	Inactive	Unknown		
233612	Soup Creek	No	No[2]	No	0	1	2	None	10/2012

1. In the updated Red Tree Vole Survey Protocol (Nov. 2012) (Huff et al 2012) Mill Creek watershed was one of the watersheds made exempt from pre-disturbance surveys in Matrix and AMA or a combination of Matrix/AMA and Riparian Reserve allocations. These watersheds were thus released for other management priorities. These surveys were conducted prior to the release of the updated protocol.
2. This project area occurs in the Mesic Forest Distribution Zone for RTV for administrative units within the Red Tree Vole Distribution Zones (Amended from FSEIS pg. 379).

Table B-5: Birds of Concern Habitat Requirements and Potential Effects.

Species	General Habitat Requirements	Impacts to Species	
		No Action	Proposed Action
GAME BIRDS			
Band-tailed Pigeon *(Columba fasciata)*	Nest primarily in closed Douglas-fir stands with canopy cover above 70 percent. Key food sources include red elder, cascara and other berry, fruit and mast producing shrubs and trees. Mineral springs/seeps are important and provide essential calcium for nesting.	Continuous overstocked canopy within the stands would preclude the development of forage species.	Increase of forage species due to decreased canopy cover in treated areas would allow establishment of berry, fruit and mast producing shrubs and trees.
BIRDS OF CONSERVATION CONCERN (BCC)			
Olive-sided Flycatcher *(Contopus cooperi)*	Associated with natural or man-made openings with tall trees or snags available for perching and singing. In the Oregon Coast Range, closely associated with edges of older stands with tall trees and snags greater than 21 inches diameter breast height and broken canopy. Conditions are generally absent within the proposed thinning units but often present in adjacent or nearby older stands.	Suitable habitat condition would continue to be absent until suppression mortality created gaps and edge habitat.	Variable retention harvest would create more diverse stand conditions. Early seral habitat would increase shrub growth, contributing to increased insect production over the next 20 years or so. Increased forest edge habitat would also enhance foraging opportunities.
Rufous Hummingbird *(Selasphorus rufus)*	Primarily associated with forest edges and openings with a diversity of flowering plants for feeding and open space Frequently occurs in open habitats that are shrub-dominated, and late-successional forest with a highly developed and diverse understory of herbaceous plants and shrubs, particularly within large openings. Need flowering plants and shrubs.	Stands would continue to be unsuitable because of the lack of understory development until suppression mortality created gaps and edge habitat allowing for the development of forage habitat.	Variable retention harvest create openings where flowering vegetation important for foraging would persist until the canopy cover increases and closes in 10 to 20 years.
Northern Goshawk *(Accipiter gentillis)*	Nests in mature forests with larger trees; relatively closed canopies; and open understories. Average patch size of the core nest area varies based on available habitat conditions, 74 acres found by McGrath et al. (2003) in northeastern Oregon and central Washington.	Some of the project area would continue to be unsuitable because of the overstocked stand conditions and lack of open understory development.	Untreated suitable habitat would remain dispersed throughout the area.
Purple Finch *(Carpodacus purpureus)*	Breeds primarily in moderately moist open or semi open coniferous forests. Also frequently found in mixed coniferous-deciduous forest, edges of bogs, and riparian corridors at low to mid-elevations. In Klamath Eco region, the presence of Ponderosa Pine and oak provide a unique habitat component.	Stands would continue to be unsuitable because of the overstocked stand conditions and lack of open understory development	Treatments would help restore habitats by removing enchroaching, shade tolerant species and reducing dense and decadent overstocked habitats.
EAGLEs			
Golden Eagle *(Aquila chrysaetos)*	Associated with open and semi-open habitats. Nest on cliffs, in the upper one-third of deciduous and coniferous trees, or on artificial structures (e.g. artificial nesting platforms, electricity transmission towers, windmills). On the Roseburg District, primarily documented to nest in large conifer trees within late-seral forests near open habitats (e.g. meadows, valleys, and clearcuts)	High density of trees would limit the stand's ability to create diverse, multi-storied stands. Large trees or snags containing large limbs or structural characteristics to support a nest would be slow to develop.	Benefit from treatment would include creation of early seral habitat for foraging and fostering the development of suitable nesting and roosting habitat, including large overstory trees and multi-layered canopy.

Table B-6: **Vertebrate Species Associated with Early Seral Forest Ecosystems**, West of the Cascade Crest in Washington and Oregon

Class	*Common Name*	*Scientific Name*	*Migratory Status*	*Uses ESFE for…*
Birds	Mountain Quail	*Oreortyx pictus*	Resident/Local migrant	Feeding and Breeding
Birds	California Quail	*Callipepla californica*	Resident	Feeding and Breeding
Birds	Common Nighthawk	*Chordeiles minor*	Migrant	Feeding and Breeding
Birds	Rufous Hummingbird	*Selasphorus rufus*	Migrant	Feeding and Breeding
Birds	Olive-sided Flycatcher	*Contopus cooperi*	Migrant	Feeding and Breeding
Birds	Willow Flycatcher	*Empidonax traillii*	Migrant	Feeding and Breeding
Birds	Dusky Flycatcher	*Empidonax oberholseri*	Migrant	Feeding and Breeding
Birds	Northern Shrike	*Lanius excubitor*	Migrant (winters in OR)	Feeding
Birds	Purple Martin	*Progne subis*	Migrant	Feeding and Breeding
Birds	Bushtit	*Psaltriparus minimus*	Resident	Feeding and Breeding
Birds	Bewick's Wren	*Thryomanes bewickii*	Mostly resident	Feeding and Breeding
Birds	House Wren	*Troglodytes aedon*	Migrant	Feeding and Breeding
Birds	Wrentit	*Chamaea fasciata*	Resident	Feeding and Breeding
Birds	Western Bluebird	*Sialia mexicana*	Local migrant	Feeding and Breeding
Birds	Townsend's Solitaire	*Myadestes townsendi*	Mostly resident	Feeding and Breeding
Birds	Orange-crowned Warbler	*Oreothlypis celata*	Mostly migrant	Feeding and Breeding
Birds	Nashville Warbler	*Oreothlypis ruficapilla*	Migrant	Feeding and Breeding
Birds	Black-throated Gray Warbler	*Setophaga nigrescens*	Migrant	Feeding and Breeding
Birds	MacGillivray's Warbler	*Geothlypis tolmiei*	Migrant	Feeding and Breeding
Birds	Spotted Towhee	*Pipilo maculatus*	Resident	Feeding and Breeding
Birds	Vesper Sparrow	*Pooecetes gramineus*	Migrant	Feeding and Breeding
Birds	White-crowned Sparrow	*Zonotrichia leucophrys*	Resident, but see notes.	Feeding and Breeding
Birds	Dark-eyed Junco	*Junco hyemalis*	Resident	Feeding and Breeding
Birds	Black-headed Grosbeak	*Pheucticus melanocephalus*	Migrant	Feeding and Breeding
Birds	Lazuli Bunting	*Passerina amoena*	Migrant	Feeding and Breeding
Birds	American Goldfinch	*Spinus tristis*	Resident	Feeding and Breeding
Mammals	Vagrant Shrew	*Sorex vagrans*	Resident	Feeding and Breeding
Mammals	Townsend's Mole	*Scapanus townsendii*	Resident	Feeding and Breeding
Mammals	Mountain Beaver	*Aplodontia rufa*	Resident	Feeding and Breeding
Mammals	California Ground Squirrel	*Spermophilus beecheyi*	Resident	Feeding and Breeding
Mammals	Western Pocket Gopher	*Thomomys mazama*	Resident	Feeding and Breeding
Mammals	Deer Mouse	*Peromyscus maniculatus*	Resident	Feeding and Breeding
Mammals	Dusky-footed Woodrat	*Neotoma fuscipes*	Resident	Feeding and Breeding
Mammals	Townsend's Vole	*Microtus townsendii*	Resident	Feeding and Breeding
Mammals	Creeping Vole	*Microtus oregoni*	Resident	Feeding and Breeding
Mammals	Pacific Jumping Mouse	*Zapus trinotatus*	Resident	Feeding and Breeding
Mammals	Black Bear	*Ursus americanus*	Resident	Feeding
Mammals	Striped Skunk	*Mephitis mephitis*	Resident	Feeding and Breeding
Mammals	Elk	*Cervus elaphus*	Resident	Feeding and Breeding
Mammals	Black-tailed Deer	*Odocoileus hemionus columbianus*	Resident	Feeding and Breeding
Reptiles	Northern Alligator Lizard	*Elgaria coerulea*	Resident	Feeding and Breeding

Special Status Botany Species List

Table B-7: Complete list of all Special Status Plant Species known or suspected to occur within the project area
VASCULAR SPECIES

*Scientific and Common Name	Documented (D) or Suspected (S)	Status/ practicality of surveys	Habitat	Likelihood of Occurring in the Project Area**	Management Activity Likely to Impact Species if Found in Project Area	Survey Recommended (if habitat present, mgmt. activity likely to impact species, and practical to survey for)
Adiantum jordanii (California maidenhair fern)	S	Bureau Sensitive (surveys practical)	Perennial herb, moist shaded seeps, hillsides, or moist woods and forests, <1,200 m.	Low. Known from Bear Creek Rec. site T30S-R09W-9.	Yes.	Yes.
Erigeron cervinus (Siskiyou daisy)	S	Bureau Sensitive (surveys practical)	Perennial forb or herb; open, rocky slopes and streamside's, seeps, crevices in walls, meadows, pine to fir woodlands, chaparral, sometimes over serpentine, (50-)900 to 2300 m; California and Oregon.	Low. The habitat this species prefers is scarce in the proposed project area.	Yes.	Yes.
Eucephalus vialis (Wayside aster)	S	Bureau Sensitive (surveys practical)	Dry open oak or coniferous woods with Douglas-fir, golden chinquapin and Oregon white oak, edges between forest and meadow, 200 to 500 m in Lane, Douglas, and Linn Counties.	Low. No known sites on district	Yes	Yes
Iliamna latibracteata (California globe mallow)	S	Bureau Sensitive (surveys practical)	Perennial forb or herb, moist ground and stream banks, blooms June and July, Big Sandy Tie road at T28S, R10W, Sec 31; a site at T31S, R12W, Sec 17 was extirpated during culvert replacement in 1999.	Low. The only known site of this species on district is along the Big Creek mainline. It prefers areas with more light- openings in the forest, recent burns, roadsides, etc.	Yes.	Yes.
Pellaea andromedifolia (Coffee fern)	S	Bureau Sensitive (surveys practical)	Perennial forb or herb, fern, rocky outcrops up to 5900 ft, Cherry Creek Ridge at T27S, R10W, Sec 25, and Irwin Rocks.	Low. The habitat this species prefers is scarce in the proposed project area.	Yes.	Yes.
Polystichum californicum (California sword fern)	S	Bureau Sensitive (surveys practical)	Perennial forb or herb, fern, woods, stream banks, shaded rocky outcrops, Pistol River at T38S, R14W, Sec 22 and Indian Creek Road at T29S, R12W, Sec 24.	Low. This species is rare on district but could potentially show up almost anywhere in the project area.	Yes.	Yes.
Romanzoffia thompsonii (Thompson's mist maiden)	S	Bureau Sensitive (surveys practical)	Annual forb or herb, Mossy covered rock outcrops, 750 to 6,000 ft.; Slater Ridge at T30S, R9W, Sec 33; flowers from March to early August.	Low. The habitat this species prefers is scarce in the proposed project area.	Yes.	Yes.
Scirpus pendulus (drooping bulrush)	S	Bureau Sensitive (surveys practical)	Marshes, wet meadows, and ditches, 800 to 1,000 m, KM Ecoregion.	Low. The habitat this species prefers is scarce in the proposed project area.	Yes.	Yes.
Sidalcea malviflora* ssp. *patula **(**coast checker bloom)	D	Bureau Sensitive (surveys practical)	Perennial herb, open coastal forest, prairie, mixed evergreen forest, grassy coastal headlands and meadows, often in serpentine soils; sea level to 2,600 ft.	Low. Historic site from near Edson Butte, found along roadside in T31S, R14W, Sec 22.	Yes.	Yes.

*Scientific and Common Name	Documented (D) or Suspected (S)	Status/ practicality of surveys	Habitat	Likelihood of Occurring in the Project Area**	Management Activity Likely to Impact Species if Found in Project Area	Survey Recommended (if habitat present, mgmt. activity likely to impact species, and practical to survey for)
Trillium kurabayashii (*T. angustipetalum*) (giant purple trillium)	S	Bureau Sensitive (surveys practical)	Perennial forb, moist forest, montane coniferous forest, foothill woodland, and chaparral at 100 to 2,000 m, known from Grizzly Mountain and Colebrook Butte.	Low.	Yes.	Yes.

Management for Sensitive Species (IM OR-2007-072)
* Comply with BLM National Manual and OR/WA State Policy (BLM 6840)
Surveys are recommended for some Bureau sensitive species that are known or suspected to occur in a proposed unit. If a Bureau sensitive species is known or suspected to occur in the project area but the management activity is not likely to impact the species, then surveys are not recommended. In addition, surveys are not recommended for species considered impractical to survey for (USDA and USDI 2001). Surveys are considered practical "if characteristics of the species (such as size, regular fruiting) and identifying features result in being able to reliably locate the species, if the species is present, within one to two field seasons and with a reasonable level of effort" (USDA and USDI 2001, Vol. 1 p. 479).

***Pre-disturbance surveys are recommended for bolded species.**
** Low = no sites known on District, Moderate = 1 to 9 sites on District, High = 10+ sites on District. For species with known sites nearby the project area the likelihood is increased; for species with known sites away from the project area and primarily in the coastal zone, likelihoods are decreased.

NON-VASCULAR PLANT SPECIES

*Scientific Name	Plant Group	Documented (D) or Suspected (S)	Status/ practicality of surveys	Habitat	Likelihood of Occurring on the Project Area	Management Activity Likely to Impact Species if Found in Project Area	Survey Recommended (if habitat present, mgmt. activity likely to impact species, and practical to survey for)
Arcangeliella camphorata	fungi	S	Bureau Sensitive (surveys impractical)	Associated with pines, especially Douglas-fir and western hemlock, 200 to 950 m, March through November; known from Oregon (Benton, Coos, Curry, and Polk Counties), Washington (Clallam, Grays Harbor, and Jefferson Counties), British Columbia, and Mexico (State of Queretaro, under oaks); CR & KM ecoregions and Washington.	Moderate. Three sites found on district.	Yes.	No.
Cortinarius barlowensis (=C. azureus)	fungi	S	Bureau Sensitive (surveys impractical)	Coastal to montane mixed coniferous forests up to 4,000 feet elevation with western hemlock, Pacific Silver fir, Sitka spruce, and Douglas-fir.	Low. No known sites on District.	Yes.	No.
Rhizopogon exiguus	fungi	S	Bureau Sensitive (surveys impractical)	Mainly grows close to coast. Known site near Mapleton, on the Siuslaw NF. Hypogenous fungi in coniferous forest, CR & KM Ecoregion.	Low. Habitat is present and it occurs in coniferous forest near Mapleton on the Siuslaw NF.	Yes.	No.
Bryoria subcana	lichen	S	Bureau Sensitive (surveys practical)	Coastal forest and high precipitation summit. Several Coos Bay BLM sites; seems to prefer ridgelines.	Moderate-high	Yes.	Yes.
Calicium adspersum	lichen	S	Bureau Sensitive (surveys practical)	Growing on bark on boles of old growth conifer trees.	Low. There are few legacy trees left on the project area and most of these are fire-scarred with hardly any	Yes.	Yes.

*Scientific Name	Plant Group	Documented (D) or Suspected (S)	Status/ practicality of surveys	Habitat	Likelihood of Occurring on the Project Area	Management Activity Likely to Impact Species if Found in Project Area	Survey Recommended (if habitat present, mgmt. activity likely to impact species, and practical to survey for)
					lichens or bryophytes on the boles.		
Leptogium cyanescens	lichen	S	Bureau Sensitive (surveys practical)	Tree bark of deciduous trees, but also occurs on juniper and western red cedar, decaying logs, and mossy rocks in cool, moist microsites, widely scattered. Location in CR Ecoregion in Lane & Lincoln Counties.	Low. No known sites on Coos Bay BLM.	Yes.	Yes.
Codriophorus depressus (*Racomitrium depressum*)	moss	S	Bureau Sensitive (surveys practical)	Forming mats on rocks in perennial or intermittent streams, and in the spray zone of waterfalls, between 400 and 11,000 feet elevation. Forest types include *Pinus ponderosa*, *Pinus jeffreyi*, *Quercus* spp., *Pseudotsuga menziesii*, *Tsuga heterophylla*, *Abies* x *shastensis*, *Abies concolor*, and *Tsuga mertensiana* associations.	Low. There are few legacy trees left on the project area and most of them are fire-scarred and bryophyte depauperate.	Yes.	Yes.
Cryptomitrium tenerum	liver-wort	S	Bureau Sensitive (surveys practical)	Forming small to locally extensive mats on bare, usually shaded and humid soil on hillsides, rock outcrops, and streambanks. In Oregon between sea level and 1000 feet elevation. KM Ecoregion.	Low. No known sites on District.	Yes.	Yes.
Hypotrachyna revoluta	liver-wort	S	Bureau Sensitive (surveys practical)	Usually on bark and rarely on rock, Coast Range and immediate coast in OR, at Cape Arago, also from Rocky and Appalachian Mountains, east coast of Canada, Great Lakes area, and southwest border of US with Mexico.	Low. Mostly found along immediate coast; Blue Ridge area locates known sites on District.	Yes.	Yes.
Phymatoceros phymatoides	Horn-wort	S	Bureau Sensitive (Surveys practical)	Forming small to locally extensive mats on bare, usually shaded and humid soil on hillsides, rock outcrops on grassy steep meadows.	Medium. Several sites are located in areas adjacent to project area.	Yes	Yes
Porella bolanderi	liver-wort	S	Bureau Sensitive (surveys practical)	On outcrops and boulders (limestone, silica, serpentine, or sandstone), soil, and epiphytic on oaks, myrtlewood, bigleaf maple, Douglas-fir, Shasta red fir, redwood, and ponderosa pine; commonly at 100-750 m but known from 0 to 2,000 m; KM & WV Ecoregion.	Low. No known sites on District.	Yes.	Yes.
Schistostega pennata	moss	S	Bureau Sensitive (surveys practical)	Mineral soil in shaded pockets of overturned tree roots, often with shallow pools of standing water at the base of the root wad; attached to rock or mineral soil around the entrance to caves, old cellars, and animal burrows; CR & WC Ecoregions.	Low. No known sites on District.	Yes.	Yes.
Tetraphis geniculata	moss	S	Bureau Sensitive (surveys practical)	Found on down logs in late-seral conifer forests in W. OR and WA.	Low. No known sites on District.	Yes.	Yes.

Table B-8: Survey and Manage Compliance for S&M A& C species (Vascular and Nonvascular)

SURVEY AND MANAGE(S&M) TRACKING TABLE OF THE SOUP CREEK ANALYSIS AREA.

Project Name: Soup Creek Variable Retention Harvest (VRH) project — Prepared by: Jennifer Sperling
Project Type: Variable Retention Harvest (VRH): — Date: September 25, 2012
S&M List Date: 2011 Settlement Agreement — Location: T23S R09W Sections 19

Survey & Manage Botany Species. Species listed below were compiled from the 2011 Settlement Agreement and include those species whose known or suspected range includes the Coos Bay District according to:

- "Survey Protocols for Survey and Manage Component 2 Bryophytes, Version 2.0" (BLM-Information Bulletin No. OR-98-051);
- "Survey Protocols for Seven Protection Buffer Fungi, Version 1.3" (BLM-Instruction Memorandum Number OR-2000-018);
- "Survey Protocols for Component 2 Lichens, Version 2.0" (BLM-Instruction Memorandum Number OR-98-38);
- BLM Conservation Assessments located at: http://www.fs.fed.us/r6/sfpnw/issssp/;
- GeoBob data base;
- Oregon Biodiversity Information Center site located at: http://orbic.pdx.edu/ and
- Survey and Manage Information site: http://www.blm.gov/or/plans/surveyandmanage/mr.htm

Surveys methodology involves using the intuitive controlled method where high likelihood habitats are surveyed more intensively than other areas within the project. This protocol is detailed in the publications listed above.

Survey & Manage Category A &C Botany Species. Pre-disturbance Survey required. Species listed below were compiled from the Record of Decision (ROD 2001) before Annual Species Review (ASR)

Species	S&M Category	Survey Triggers			Survey Results			Site Management
		Within Range of the Species?	Project Contains Suitable habitat?	Habitat Disturbing*?	Surveys Required?	Survey Dates	Sites known or Found?	
S&M Category B, D,E or F of known sites								
Chaenotheca chrysocephala	B	Yes	Yes	Yes	No	2012	5	Yes[6]
Chaenotheca furfuracea	F	Yes	Yes	Yes	No	2012	3	No[5]
FUNGI								
Bridgeoporus nobillissimus	A	No[2]	N/A	N/A	No	N/A	0	N/A
LICHENS								
Bryoria pseudocapillaris	A	No[3]	N/A	N/A	No	N/A	0	N/A
Bryoria spiralifera	A	No[3]	N/A	N/A	N/A	N/A	0	N/A
Cladonia norvegica	C	Yes	Yes	Yes	Yes	2012	0	N/A
Hypogymnia duplicata	C	Yes	Yes	N/A	N/A	N/A	0	N/A
Leptogium cyanescens	A	Yes	Yes	Yes	Yes	2012	0	N/A
Lobaria linita var. tenuoir	A	Yes	Yes	Yes	Yes	2012	0	N/A
Nephroma occultum	A	Yes	Yes	Yes	Yes	2012	0	N/A
Niebla cephalota	A	No[3]	N/A	N/A	N/A	N/A	0	N/A
Pseudocyphellaria perpetua	A	Yes	Yes	Yes	Yes	2012	0	N/A
Pseudocyphellaria rainierensis	A	Yes	Yes	Yes	Yes	2012	0	N/A
Teloschistes flavicans	A	No[3]	N/A	N/A	N/A	N/A	0	N/A
BRYOPHYTES								
Schistostega pennata	A	Yes	Yes	Yes	Yes	2012	0	N/A
Tetraphis geniculata	A	Yes	Yes	Yes	Yes	2012	0	N/A
VASCULARS								
Eucephalus vialis	A	Yes	Yes	Yes	Yes	2012	0	N/A

[1] N/A = Not applicable
[2] Surveys are not required since suitable habitat is not available on this project. This species is found on a host species which is absent from this project.
[3] Species Range outside of the project area. The species only inhabits the immediate coast.
[4] Surveys Are not required since the habitat this species exists in is outside the project area.
[5] Category F species do not meet basic criteria for inclusion as an S&M species. This species appears to be well distributed within its range as the concern for persistence wouldn't require management (ROD and S&G 2001 pg.67)
[6] A fifty foot no activity area would be delineated around these sites in the project area.

Statement of Compliance for S&M table:

The BLM Coos Bay District applied the 2011 Settlement Agreement Species List to the Soup Creek VRH proposed project, completing pre-disturbance surveys for Survey & Manage botanical species and if applicable, management of known sites required by Survey Protocols and Management Recommendations to comply with the *2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines.*

Special Status Fungi

Table B-9: Survey and Manage/Special Status Fungal Species suspected to occur in the Soup Creek project area

Species	Bureau Sensitive Species	S&M Category	Survey Triggers			Survey Results			Site(s) Present on Coos Bay BLM Lands
			Within Range of the Species?	Project Contains Suitable habitat?	Project would affect species/ habitat?[1]	Surveys Required?	Survey Dates	Sites Found?	
Fungi									
Albatrellus caeruleoporus	No	B	Yes	Yes	Yes	No	N/A	No	No
Arcangeliella camphorata	Yes	B	Yes	Yes	Yes	No	N/A	No	Yes
Asterophora parasitica	No	B	Yes	Yes	Yes	No	N/A	No	No
Boletus pulcherrimus	Yes	B	Yes	Yes	Yes	No	N/A	No	No
Catathelasma ventricosa	No	B	Yes	Yes	Yes	No	N/A	No	No
Chalciporus piperatus	No	D	Yes	Yes	Yes	No	N/A	No	Yes
Clavariadelphus occidentalis	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Clavariadelphus truncatus	No	B	Yes	Yes	Yes	No	N/A	No	No
Clavulina castaneopes var. lignicola	No	B	Yes	Yes	Yes	No	N/A	No	No
Collybia racemosa	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Cortinarius barlowensis	Yes	B	Yes	Yes	Yes	No	N/A	No	No
Cortinarius valgus	No	B	Yes	Yes	Yes	No	N/A	No	No
Cudonia monticola	Yes	B	Yes	Yes	Yes	No	N/A	No	Yes
Endogone oregonensis	No	B	Yes	Yes	Yes	No	N/A	No	No
Fayodia bisphaerigera	No	B	Yes	Yes	Yes	No	N/A	No	No
Galerina atkinsoniana	No	D	Yes	Yes	Yes	No	N/A	No	No
Galerina heterocystis	No	B	Yes	Yes	Yes	No	N/A	No	No
Gasteroboletus turbinatus	No	B	Yes	Yes	Yes	No	N/A	No	No
Gomphus kauffmanii	Yes	E	Yes	Yes	Yes	No	N/A	No	Yes
Helvella elastica	No	B	Yes	Yes	Yes	No	N/A	No	No
Leucogaster citrinus	Yes	B	Yes	Yes	Yes	No	N/A	No	No
Leucogaster microsporus	No	B	Yes	Yes	Yes	No	N/A	No	No
Mycena tenax	No	B	Yes	Yes	Yes	No	N/A	No	No
Otidea smithii	Yes	B	Yes	Yes	Yes	No	N/A	No	No
Phaeoco llybia attenuata	No	D	Yes	Yes	Yes	No	N/A	No	Yes
Phaeocollybia californica	Yes	B	Yes	Yes	Yes	No	N/A	No	Yes
Phaeocollybia dissiliens	Yes	B	Yes	Yes	Yes	No	N/A	No	Yes
Phaeocollybia fallax	No	D	Yes	Yes	Yes	No	N/A	No	Yes
Phaeocollybia kauffmanii	No	D	Yes	Yes	Yes	No	N/A	No	Yes
Phaeocollybia olivacea	Yes	D	Yes	Yes	Yes	No	N/A	No	Yes
Phaeocollybia oregonensis	Yes	B	Yes	Yes	Yes	No	N/A	No	Yes
Phaeocollybia piceae	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Phaeocollybia pseudofestiva	Yes	B	Yes	Yes	Yes	No	N/A	No	Yes

Species	Bureau Sensitive Species	S&M Category	Survey Triggers			Survey Results			Site(s) Present on Coos Bay BLM Lands
			Within Range of the Species?	Project Contains Suitable habitat?	Project would affect species/ habitat?[1]	Surveys Required?	Survey Dates	Sites Found?	
Phaeocollybia scatesiae	Yes	B	Yes	Yes	Yes	No	N/A	No	Yes
Phaeocollybia sipei	Yes	B	Yes	Yes	Yes	No	N/A	No	Yes
Phaeocollybia spadicea	Yes	B	Yes	Yes	Yes	No	N/A	No	Yes
Pholiota albivelata	No	B	Yes	Yes	Yes	No	N/A	No	No
Ramaria araiospora	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Ramaria aurantiisiccescens	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Ramaria celerivirescens	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Ramaria conjunctipes var. sparsiramosa	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Ramaria cyaneigranosa	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Ramaria gelatiniaurantia	Yes	B	Yes	Yes	Yes	No	N/A	No	Yes
Ramaria hilaris var. olympiana	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Ramaria largentii	Yes	B	Yes	Yes	Yes	No	N/A	No	No
Ramaria rainierensis	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Ramaria rubribrunnescens	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Ramaria rubrievanescens	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Ramaria rubripermanens	No	D	Yes	Yes	Yes	No	N/A	No	Yes
Ramaria stuntzii	No	B	Yes	Yes	Yes	No	N/A	No	No
Rhizopogon exiguus	Yes	B	Yes	Yes	Yes	No	N/A	No	No
Rhizopogon truncatus	No	D	Yes	Yes	Yes	No	N/A	No	No
Rickenella swartzii	No	B	Yes	Yes	Yes	No	N/A	No	Yes
Sarcodon fuscoindicus	No	B	Yes	Yes	Yes	No	N/A	No	No
Sparassis crispa	No	D	Yes	Yes	Yes	No	N/A	No	Yes
Tremiscus helvelloides	No	D	Yes	Yes	Yes	No	N/A	No	No
Tylopilus porphyrosporus	No	D	Yes	Yes	Yes	No	N/A	No	Yes

[1]Even though habitat may occur for many of these species, they are rarely found even in areas where the habitat seems appropriate and the site is within the range of the species.

APPENDIX C: MONITORING

Reforestation

Monitoring would occur for a minimum of 12 years. The monitoring objective in the 12th year is to ensure that the trees are established and free-to-grow and to schedule precommercial thinning in the near future if warranted. If the stand were pre-commercially thinned, it would be monitored again following precommercial thinning. Monitoring would be done by BLM foresters who would determine trees per acre and relative density for the stand. Precommercial thinning would take place if the amount of trees and the size of trees prematurely interfering with seral conditions by creating too much shade. Thinning treatments would be included in the District's annual silvicultural budget.

Tree planting on the VRH project would be done at an average of 200 trees per acre. This is half of what would be the normal and customary practice. The goal of this treatment is to allow for the development of early successional ecosystems by delaying the establishment of a forest canopy. Planting 200 trees per acre would meet minimum mandated requirements for reforestation and Johnson and Franklin have agreed the intent of their principles would still be met.

Planting on the project is not meant to replace natural regeneration, but rather act as a hedge where natural regeneration likely would fail to occur. To rely strictly on natural regeneration for this project was deemed too risky of an undertaking by BLM foresters based upon experience. Gratkowski et al. (1973) estimated that there were 2.4 million acres of land in the highly productive Coast Range and Cascade foothills of Washington and Oregon occupied by shrubs and brush because conifers naturally failed to regenerate. There are inherent risks in using natural regeneration methods in an Oregon Coast Range setting (Hobbs et al. 1992, Stein 1995, Zaerr et al. 1981). The risks identified in relying on natural regeneration included site-preparation not exposing a mineral soil seed bed, inconsistent conifer seed crops (including predation of the seed crop), and a microclimate environment unsuitable for seed germination and initial seedling establishment (Stein 1995). Less extensive site-preparation would lead to a rapid reoccupation of the site by herbaceous and shrub cover that further reduces the likelihood of natural regeneration being successful (Stein 1995). In the Oregon Coast Range, brush species can become a serious competition problem within two years.

Photo Points

The objective of establishing permanent photo points is to document the current forest stands through the early to mid-seral stages over time. Approximately 9 permanent photo-monitoring points would be installed by the BLM. These plots would be established with a permanent center plot, have aluminum tags at the base of the trees pointing towards plot center and a GPS point taken for location reference. Sites would be visited at pre-harvest, post-harvest, 1 year after planting, 5^{th} year, 10^{th} year and 15^{th} year. Sites would also be visited after any other silvicultural activities, such as pre-commercial thinning.

Cumulative Impacts

Comment: "The EA must consider all impacts, even cumulative impacts of private and state land clearcuts and clearcut impacts that last longer than a decade. NEPA requires the BLM to fully consider all ownerships in the watershed."
Response: The cumulative effects analyses considered all ownerships within the watershed. The vegetation analysis is not limited by time horizon as it is a satellite based analysis of vegetative structure. As stated on EA p. 27, "*Across multi-ownerships of the 85,746 acre Mill Creek watershed, the VRH would increase the amount of complex early seral by approximately 0.1%.*" Support is provided on page 21 that also considered all ownerships. As referenced on the first paragraph of page 21, "*…Landsat satellite (GNN) imagery that covers all ownerships indicates that three percent (3 %) is classed as complex early seral habitat within the Mill Creek Watershed. …Comparatively, the analysis of the watershed indicates that ten percent (10 %) is classed as simplified early seral forest."* Other resource sections of the EA also considered cumulative effects to the entire watershed as referenced on pages 46, 50, 61, 66, 70, 72, and 78.

Comment: "The BLM probably meant to say: "No regeneration harvest *on BLM land* has occurred in the watershed in over a decade." If so, it is unclear why the BLM is restricting the analysis to just BLM lands, or restricting the analysis to just the past decade. "
Response: The sentence before and after this one cited from the EA clearly refers to BLM lands. The referenced sentence is providing a fact for the need statement. However, page 2 of the EA was changed to reflect the comments suggestion. "*The Coos Bay District ROD/RMP (USDI 1995) specifies objectives and management actions to be accomplished in managing the BLM lands in the project area*." Thus the purpose and need only pertains to BLM administered lands. Analysis is found within Chapter 3 - 4.

Comment: "The new EA (page 27) adds BLM's assumptions about other ownerships under the State Forest Practices Act (OFPA). However, the ODF doesn't manage the Elliott under the OFPA. It has its own Forest Management Plan, and the FMP used when the adjoining land was logged required a percentage of clearcuts to not be herbicide sprayed, specifically to produce high-quality early-seral wildlife habitat."
Response: The Elliott State Forest (ESF) FMP is designed for active management consistent with Federal Endangered Species Act and the Oregon Forest Practices Act (FMP p. 4-9, D-11, FMP response to comment). The commenters' previous comments recognized the adjacent state land was sprayed in 2009. The FMP does not recognize that a percentage of regenerated areas are NOT to be sprayed. While the FMP provides direction to limit (not preclude) spraying in some areas and provide snags to benefit wildlife habitat (FMP p. C-9, 10), it was not eliminated or designed "specifically to produce high-quality early-seral" (as defined by Franklin and Johnson). The Ash Valley sale retained visual and riparian buffers to address visual and water quality concerns. The level of snag and down wood retention planned for the Ash Valley School tract was approximately 1/4 of that planned under the BLM's proposed action; the area was sprayed to control vegetation, and planted at 400 trees per acre (Ash Valley pre-op report, 2004). This approach supports the FMP guiding principles for the maximization of revenue to the Common School Fund (FMP p. 3-2) and goals to actively manage to produce stand types in much shorter timeframes (FMP p. 3-10). The BLM considered the ESF in the analysis and found that 0.9% of the watershed contains complex early seral in areas greater than 3 acres (EA p. 22). The ESF was a large contributor. However, incidence coinciding with the Ash Valley tract is predominately due to the effect of increased edge and not interior habitat conditions, thus the structural character of the post-harvest stand is not spatially or biologically equal with the VRH prescriptions goal for producing high quality early seral forest stands.

Comment: "The BLM should consult google earth to come up with a good estimation of early-seral habitat within the watershed."
Response: Google Earth only provides a visual comparison. The BLM used LiDAR and GNN satellite data to scientifically quantify structural and spatial information (EA p. 21).

RMP

Comment: "What the RMP does require is for the BLM to use "prescribed fire to manage seral stage diversity. The EA failed to include an alternative that did this."
Response: The RMP does not "require" but stated to "*…consider using prescribe fire...*" (RMP p. 76). The BLM considered and eliminated this option because it is neither safe nor practical and would carry an extreme amount of risk given the time of year (fire season) that the burning activity would take place.

However, in response to your concern, we have added the following to the EA on page 5 to provide clarity: *"The reintroduction of fire into the stand with sufficient intensity to cause abundant mortality would mean burning in the highest risk periods of the fire season (July-September) and that would put the entire watershed at risk."*

Ecological need

Comment: "There is no ecological need for more early seral habitat in the coast range. In fact there is already far too much early seral forest. The BLM failed …to quantify this assertion."
Response: *"Less than one percent (1%) of BLM-administered lands in the watershed are under 20 years old…"* (EA p. 2). GFMA management objectives include providing early successional habitat (EA p. 3). GMFA management direction analyzed under the *Coos Bay District Resource Management Plan/Final Environmental Impact Statement* (USDI 1994) includes maintaining*"… a well-distributed pattern of early and mid-seral forest across the Matrix"* (RMP p. 53). In addition, the comment fails to recognize the key differences between simplified early seral structure and complex early seral forest structure. Quantification for simplified early seral versus complex is provided on pages 21-22 supported by analysis of satellite (GNN) imagery for the entire watershed. "*…three percent (3%) is classed as complex early seral structure within the Mill Creek Watershed…Comparatively, the analysis of the watershed indicates that ten percent (10%) would be classed as simplified early seral forest structure*" (EA p.21).

Comment: "There are so many early seral acres within the watershed, both industrial forestlands and agricultural lands, that some acres at some times DO have structure like snags and brush. In fact, early-seral habitat within the watershed could be at historically high levels. While the EA points out that "Pacific Northwest moist forests ecosystems are far below historical levels" of diverse early-successional ecosystems, the BLM failed to look at this site-specific watershed to see if that broad generalization holds true."
Response: The EA referenced historical information including the work done for the Mill Creek Watershed Analysis (EA p. 18-19, 66). This watershed analysis contains detailed historical information and includes several maps based on surveys (1900, 1914, and 1930) that show a historical pattern of disturbance. It also contains other known facts about occurrences of other natural disturbance agents in the watershed including large blowdown and insect kill events. Since 71% of the watershed is in private ownership (EA p. 17), the watershed analysis did a thorough search for available records. Weyerhaeuser's 1945-46 inventory data for the Millicoma Tree Farm indicate pre-logging mortality patterns (Wright and Lauterback 1958). The Millicoma Tree Farm includes land in the south of the Mill Creek Watershed. In 1946, stands with birth dates in the mid-1700s comprised 92% of the standing volume on the Millicoma Tree Farm (USDI, BLM. 1995) which is indicative of this historical pattern of disturbance.

To provide clarity in response to your concern, we have added the following to the EA on page 19: *"Based on the earliest available historical survey notes, maps, and inventory data, with few exceptions, the oldest stands in the Mill Creek watershed regenerated following fires in the 1700s (USDI, BLM. 1995)."*

Comment: "Once the amount of early-seral habitat in the watershed is tallied, the next step should be to disclose how much the BLM thinks is needed."
Response: This is a regional scale analysis question and outside the scope of the EA analysis.

However, in response to your concern the following has been added on page 1: *"The RMP projected that in the second decade of the life of the plan (FY05 to FY14); the Coos Bay District would harvest 7,600 acres using regeneration harvest techniques (USDI 1994, Table AA-7). Within the second decade (as of September 2013) the District has regeneration harvested 383 acres which is only 5.0% of the projection (2013 Coos Bay Districts Annual Program Summary, USDI 2013). The RMP projected in the third decade (FY15 to FY24), that the Coos Bay District would harvest 7,900 acres using regeneration harvest techniques."*

In addition the following will be added to page 27: *"The proposed action would contribute 111 acres or 1.4% to the District-wide RMP current decadal projection (FY15 to FY24) for regeneration harvest (USDI 1994, Table AA-7)."*

Marbled Murrelets

Comment: "The new EA (page 54) says that the "current stand proposed for harvest does not constitute suitable habitat for murrelet nesting as the trees lack sufficient diameter and limb size". The next sentence contradicts that statement… How can the EA say there are not murrelet nesting trees in one sentence, and then describe the great murrelet nesting trees the next sentence?"
Response: These sentences are meant to compare the area of harvest versus the entire project area. To provide clarity, the sentences on EA page 54 have been changed to read: "*The area within the stand proposed for harvest does not constitute suitable habitat for murrelet nesting as the trees lack sufficient diameter and limb size. A previous harvest in the 1940s left remnant trees within and near the project area; however, these trees are not within the current proposed harvest.*"

Comment: "The EA seems to conclude that there are big trees, but "other elements needed for successful nesting are lacking", specifically "There is very little interior habitat or protective microclimate." However, the BLM found the eastern half of the original stand occupied by marbled murrelets. It seems there is enough interior habitat for successful nesting."
Response: The eastern half of the project area is not occupied. However, there is a 14 acre area along the eastern boundary delineated where an occupied behavior was detected (EA p. 54). This area contains a large cluster of remnant trees. The vast majority of the project area contains scattered remnant trees. These scattered trees do not provide the cover needed for interior habitat conditions.
To provide clarity, the sentence in the first paragraph on EA page 54 has been changed to read: "*When these trees are scattered, and lack an assemblage of upper canopy cohorts, they interact with the understory cohort, but there is little cover for protection from predation by corvids and other birds*…"

Comment: "And clearcutting 88 acres on the western half isn't going to help increase interior forest habitat. In fact, clearcutting 88 acres adjacent to occupied habitat will harm that habitat."
Response: The EA discloses the variable retention harvest would not help increase interior forest habitat in the short-term due to the creation of forest edge (EA p. 59). The area proposed for harvest is not directly adjacent to occupied habitat. The area within the VRH proposed for harvest is spatially separated from areas that have been delineated as occupied habitat.

To provide clarity, we have added the following to the EA (third paragraph) on page 54: *"This resulted in more than a 1,100 foot spatial separation from harvest area boundaries. The other closest delineated site is south of Unit 2 but it is also at least 600 feet from harvest area boundaries. This distance is more than the minimum recommended (300-600 feet) in the Marbled Murrelet Recovery Plan to mediate the effects of edge and provide for the protection of interior forest habitat (USDI-FWS 1997).*"

Comment: "The BLM doesn't know exactly where all of the murrelet nests are that were found on the east side of the project area. It could be that the clearcut on the west side would open that nest up to edge-impact predation."
Response: Surveys on the east side detected subcanopy flight; thus, were delineated for occupancy per RMP guidance based on behavioral criteria. These detections were isolated to nearby stands and only one was partially within the project area. As noted above, the edge of delineated sites are more than 600 feet from any harvest unit boundary and this exceeds the Recovery Plan recommendations (USDI-FWS 1997, p.140). Potential predation effects to habitat have been analyzed and recognized in the EA (p. 59) and within the Biological Assessment.
To provide clarity, the sentence in the third paragraph on EA page 54 has been changed to read: "*While no indications of nest sites (fecal ring, eggshell fragments, nest cup) have been found, murrelet occupied behaviors were detected in three separate stands and the BLM delineated these areas as occupied habitat per RMP guidance (USDI 1995)."*

Comment: "The new EA says the BLM will conduct one more year of surveys in 2014. Those surveys were done before the new EA came out. The results should have been included and disclosed to the public.
Response: As noted above, these results have been included in the EA on page 54.

Comment: "Since one of the remnant old growth trees is not protected in an aggregate, I would assume it is a dispersed retention with no trees within 110 feet cut down around it. This is unclear, as the EA states earlier there are no dispersed retention trees being left within the project area (EA p.9)."
Response: It is correct that no trees would be cut within 110 feet of the dispersed retention remnant tree. However the EA never stated there would be no dispersed retention. The statement on page 9 intended to say the RMP requirement would be met. The next paragraph on page 10 states, "*Additional retention in the form of single trees dispersed within the harvest area would also occur*" (additional ref. p.24-25, 56). The dispersed retention of green trees for snag and down wood recruitment is described on EA page 10 and 61. Cumulative green tree retention would be higher than the RMP requirements (p.57).

Comment: "If there are dispersed retention, the BLM should be aware that most of the 6 to 8 TPA dispersed retention left in GFMA clearcuts from the 1990's, have died or are dying. Therefore, this analysis should assume that all dispersed retention trees will not persist through to the next rotation."
Response: The general statement that all dispersed retention trees die is not supported as occurrences are site specific. This unit in particular had successful dispersed retention from the 1940s as evidenced by the presence of remnant trees. However, some mortality is assumed. In order to provide clarity, the following sentence on page 10 of the EA (Snags and Down Wood) will be changed to read: *"After site preparation activities, if post-treatment surveys show more snags are needed (i.e., insufficient post-harvest mortality) to meet RMP direction, appropriate measures (topping or girdling) would be taken to meet recruitment goals."*

Global Warming

Comment: "The EA fails to disclose how much carbon is stored under the no action alternative."
Response: Table III-13 on EA page 77 discloses 33,021 metric tons carbon storage under the No Action alternative 50 years in the future. The first column of Table III-13, "*Present Stored Carbon*" applies to both the No Action and Proposed Action.

Comment: "The NEPA analysis focuses on how much carbon is retained under each alternative (which gives the impression of net positive carbon storage) rather than how much carbon is emitted (which highlights the inherent trade-off that logging exacerbates global warming)."
Response: Table III-13 on EA page 77 only represents the 88 acre area of harvest, and not the entire treatment area (161 acres including the riparian reserves, or 111 acres of GFMA). This table shows that this 88 acre area under the No Action Alternative contains more residual carbon after 50 years than the Proposed Action.
However, in response to your concern, Table III-13 will add the following footnote for clarity: "*Comparisons based upon 88 acres of proposed harvest*." And, the following paragraph on page 77 will add the following for clarity: "*Estimated short term direct CO_2 emissions from post-harvest activities of the proposed action would amount to 2,338 metric tons (Table III-11, III-12)."* As stated at the end of the paragraph, *"Although the Proposed Action would be predicted to result in a mid-term flux of additional carbon to the atmosphere, carbon stores in the reserved portions of the action area under the Proposed Action scenario would be predicted to approach a steady state at or above 250 metric tons acre C, which is comparable to storage under the No Action Alternative (depending on the frequency of disturbance*)".

Comment: "The NEPA analysis also minimizes cumulative effects to global warming by saying the carbon emissions associated with this project will have undetectable effects on climate."
Response: The analysis recognizes on EA p. 79 that "*…existing climate models do not have sufficient precision to reflect the effects on climate from such a small fractional change in global carbon storage (2008 RMP FEIS, p. 543)."*
To provide clarity in response to your concern, the first paragraph on page 78 was modified to read: *"The total 50 year carbon flux of the Proposed Action compared to the No Action would not produce measurable change in global carbon storage considering current detection, modeling technologies, and associated uncertainty."*

Fire

Comment: "The BLM claims that fire exclusion is a problem in this moist forest. The BLM ignored our comments pointing out that Drs. Johnson and Franklin found that moist, coastal forests have not yet missed a fire-return interval and are not impacted by fire suppression."

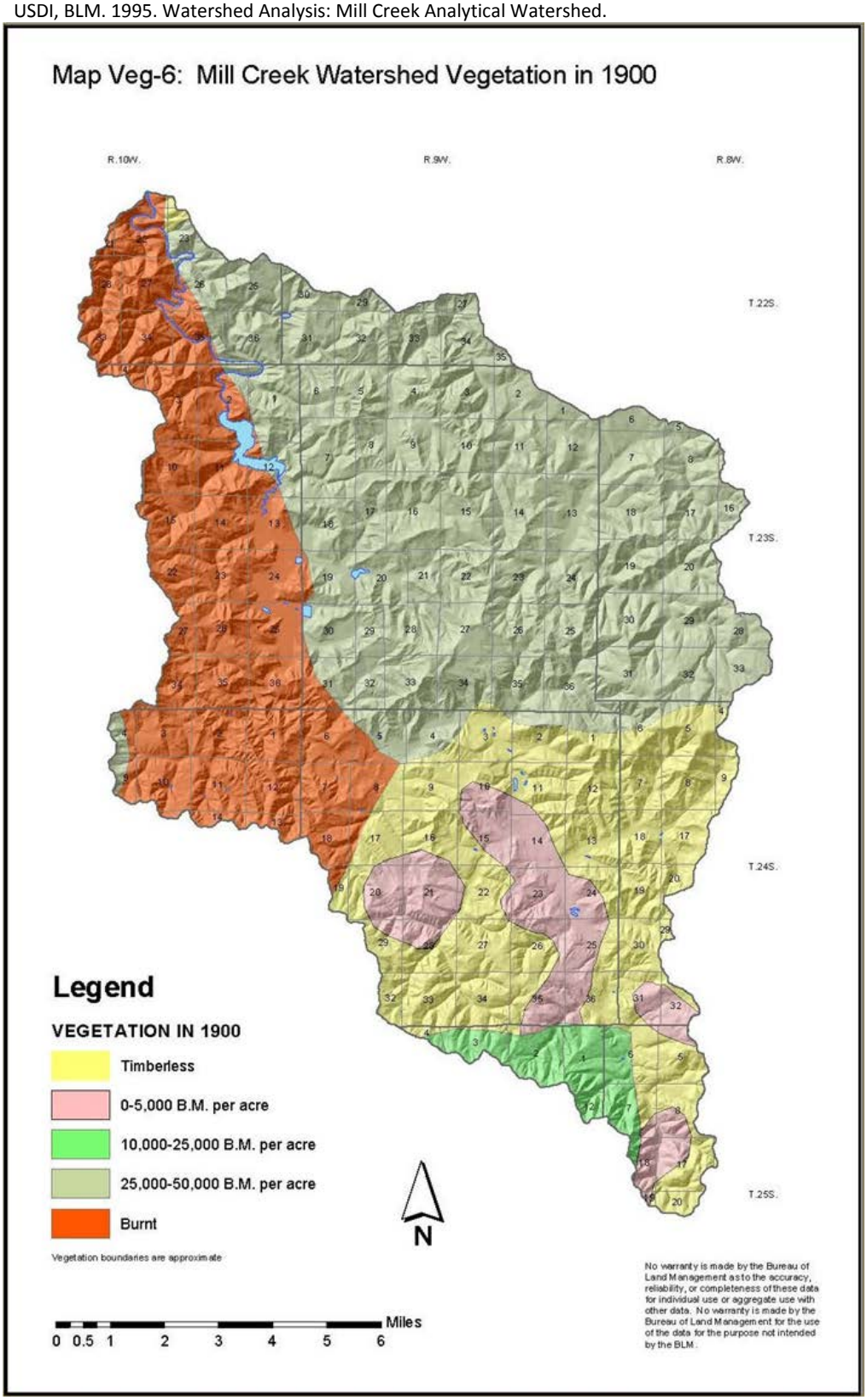
Prior Comment: "The EA (page 21) claims that "fire exclusion has eliminated a major disturbance process" in Ash Valley. We disagree. Franklin and Johnson says that in moist forests ecosystems:

"The composition and structure of intact existing old-growth forests in Moist Forests have not been significantly affected by human activities, as is the case in the Dry Forests. Generally, it will not be necessary to conduct silvicultural treatments to maintain existing old-growth forests on Moist Forest sites. Note that these moist forests are not affected by fire suppression, so the EA should be corrected."

Response: Johnson and Franklin's 2009 writing, Restoration of Federal Forests in the Pacific Northwest: Strategies and Management Implications, is referring to maintaining existing old growth stands. The Soup Creek VRH project does not take place in an existing "old-growth" stand where intact structure is an issue. Johnson and Franklin's 2009 writing also states, "Moist Forest ecosystems have evolved with severe, stand-replacement disturbance events", and "Today most stands and landscapes of both types have been dramatically modified by such activities as grazing by domestic livestock, timber harvest, tree planting, and fire suppression." Therefore it does not dispute the fact that moist forests in western Oregon and the Coast Range, specifically of all age classes, are and continue to be affected by active fire suppression.

However, in response to your concern the following will be added for clarity on page 66: "*Moist Forests belong to plant associations that were historically characterized by infrequent high severity, stand-replacement disturbance regimes, although mixed and low-severity disturbances also occurred, often as a part of a large disturbance event (Johnson and Franklin 2009).*"

USDI, BLM. 1995. Watershed Analysis: Mill Creek Analytical Watershed.



Digitized copy based on a hand drafted 1900 USGS map.