BLM
Northwest Oregon District Office

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Environmental Assessment
DOI-BLM-ORWA-N030-2020-0002-EA

Siuslaw HLB Landscape Plan Environmental Assessment

Northwest Oregon District
Siuslaw Field Office

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1. Introduction

1.1 Introduction and Background

The Siuslaw Field Office manages approximately 166,852 acres primarily distributed in a checkerboard pattern across Lane, Douglas, and Benton Counties in Oregon, west of Interstate 5. Approximately eight percent of this land is in the Harvest Land Base (HLB) land use allocation located in Lane County. The majority of the field office is in reserve land use allocations: Late-Successional Reserve, Riparian Reserve, and District-Designated Reserve.

The Bureau of Land Management (BLM) is obligated to manage revested Oregon and California (O&C) lands for sustained yield timber production under the statutory requirements of the O&C Act (43 U.S.C. §1181a et seq.) and the Federal Land Policy and Management Act (FLPMA, 43 U.S.C §1701 et seq.). The BLM established specific management direction for sustained-yield timber production through the 2016 Northwestern and Coastal Oregon Record of Decision/Resource Management Plan (2016 ROD/RMP). The 2016 ROD/RMP was developed under the requirements of the FLPMA, while in compliance with other laws and statutes including the O&C Act.

This landscape plan outlines a multi-decade strategy for the Siuslaw Field Office to contribute timber volume to the Eugene sustained yield unit[1] (SYU) annual declared Allowable Sale Quantity (ASQ). ASQ is defined as "the timber volume that a forest can produce continuously under the intensity of management described in the RMP for those lands allocated for permanent timber production" (USDI - Bureau of Land Management, 2016a, p. 289). The SYU is "an administrative unit for which an allowable sale quantity is calculated; in western Oregon, the six sustained yield units correspond to the Coos Bay, Eugene, Medford, Roseburg, and Salem Districts, and the western portion of the Klamath Falls Field Office" (USDI - Bureau of Land Management, 2016a, p. 305). This project does not consider restoration actions within Late-Successional Reserve, Riparian Reserve, Areas of Critical Environmental Concern, or other overlapping land use allocations.

The BLM has developed this proposed action in conformance with the management direction from the 2016 RMP. This direction is an approach that "…incorporate(s) principles of natural forest development, including the role of natural disturbances, in the initiation, development, and maintenance of stands and landscape mosaics" (USDI - Bureau of Land Management, 2016a, p. 23). These activities include:

- regeneration harvest with varying levels of retention within bounds directed by the RMP;
- protection of larger and older trees, including retention of all trees greater than 40" diameter at breast height (DBH) and established prior to 1850;
- commercial thinning to increase or maintain vegetative diversity and create growing space for hardwood(s); and
- silvicultural treatments to adjust age class distribution and produce complex early successional ecosystems (USDI - Bureau of Land Management, 2016a, pp. 59-63)

Associated actions from commercial timber harvest include tree planting and site preparation, activity fuels reduction, snag creation, grouped and dispersed retention areas, road construction, road renovation, road improvement, road maintenance, and road decommissioning.

Over the past two decades the Siuslaw field office has managed BLM land and produced timber volume through the implementation of multiple landscape plans. These plans include the Upper Siuslaw Landscape Plan Environmental Assessment (DOI-BLM-ORWA-E050-2007-0002-EA), the Long Tom Environmental Assessment (DOI-BLM-ORWA-E050-2009-0006-EA), the LSR 267 Landscape Plan (BLM/OR/WA/PL-04/003+1792), and the North Lake Creek Landscape Plan (OR090-04-07). All of these landscape plans treated far fewer acres than are evaluated, this is due to that fact that many stands do not fall within the sideboards of the analysis and thus would not be treated. Below is a summary of the field office landscape plans over the past 15 years.

[1] The Eugene Sustained Yield Unit is comprised of both the Siuslaw Field Office and the Upper Willamette Field Office, Northwest Oregon District, BLM

- Upper Siuslaw Landscape Plan evaluated 9,400 acres that resulted in approximately 4,109 acres of treatment. Harvest occurred through timber sales implemented from 2008 to 2018.
- Long Tom Environmental Assessment evaluated 8,650 acres with approximately 4,860 acres of treatment. Harvest occurred though timber sales implemented from 2012 to 2018.
- LSR 267 Landscape Plan evaluated 8,400 acres with approximately 1,559 acres of treatment. Harvest occurred through timber sales implemented from 2005 to 2010.
- North Lake Creek Landscape Plan evaluated 5,500 acres with approximately 4,436 acres of treatment. Harvest occurred through timber sales implemented from 2005 to 2011.

This project, along with the N126 LSR Landscape Plan (DOI-BLM-ORWA-N030-2018-0022-EA), continues this comprehensive management approach for the Siuslaw Field Office.

1.2 Project Area Location

The project area for the EA (see Project Area Map, Appendix F) includes approximately 13,225 acres of HLB; of these acres, BLM analyzed a range across alternatives, between 1,470-3,889 acres per decade, for harvest. See issue 3.1 “How does regeneration harvest adjust the age class distribution within the Harvest Land Base-Moderate Intensity Timber Area and Low Intensity Timber Area land use allocation in Siuslaw Field Office?” and issue 3.2 “How each alternative meets the Siuslaw Field Office’s contribution to the Eugene SYU allocated ASQ, per decade” for a detailed description of proposed harvest acres.

All of the Moderate Intensity Timber Areas (MITA) and Low Intensity Timber Areas (LITA) within the Siuslaw Field Office and are not designated as Areas of Critical Environmental Concern, are included in this project. The overlapping Areas of Critical Environmental Concern are different from the remaining HLB because of their unique relevant and important values. This uniqueness does not lend itself to programmatic evaluation and so these acres are excluded from this analysis. Any future action occurring within these excluded acres would be evaluated in a separate NEPA document. The project area is located within Lane County, Oregon, west of Interstate five. The majority of the analysis area is located in the east foothills of the Oregon Coast Range; but also includes areas further west and one parcel three miles east of Florence. This project area encompasses portions of 9 Hydrologic Unit Codes (HUC) 10 and 10 watersheds (formerly known as 5th field watersheds). This project occurs in the following watersheds: Lake Creek, Long Tom River, Wild Cat Creek, Wolf Creek, North Fork Siuslaw River, Upper Siuslaw River, Muddy Creek-Willamette River, Upper Coast Fork Willamette River, and Lower Coast Fork Willamette River. The largest amount of these acres is located in the Long Tom Watershed which contains 42percent of the analysis area.

Table of Acres Included and Excluded from the Project Area

Land Use Allocation, Overlays, or ESA Habitat	Acres Within the Siuslaw HLB Landscape Plan Project Area	Acres That Would Be Treated Under This Environmental Assessment
Riparian Reserve	0	0
Late Successional Reserve	0	0
Areas of Critical Environmental Concern	0	0
Congressionally Reserved Land & National Conservation Lands	0	0
Recreation Management Areas	0	0
Harvest Land Base	13,225	1,470-3,889 / decade

Land Use Allocation, Overlays, or ESA Habitat	Acres Within the Siuslaw HLB Landscape Plan Project Area	Acres That Would Be Treated Under This Environmental Assessment
Habitat adjacent (300' of buffer) to marbled murrelet occupied sites.	163[2]	0
Spotted owl suitable habitat, core area or home range, adjacent to suitable segments of the Siuslaw River with the Outstanding Remarkable Value for wildlife.	192[2]	0
Suitable habitat in core areas[3] of known spotted owl sites with site centers outside of the Harvest Land Base.	88[2]	0

1.3 Purpose and Need

1.3.1 Need

The primary need of this project is to harvest timber in conformance with management direction in the 2016 ROD/RMP. The BLM has a need to "conduct silvicultural treatments to contribute timber volume to the Allowable Sale Quantity" (USDI - Bureau of Land Management, 2016a, p. 59). Timber harvest within the project area would contribute to the Allowable Sale Quantity (ASQ) each fiscal year. The Eugene SYU has an annual declared ASQ of 53 million board feet (MMbf) with a 40 percent variation on an annual basis and 20 percent variation per decade; that is, between 32 and 74 MMbf annually and between 420 and 640 MMbf per decade (USDI - Bureau of Land Management, 2016a, p. 6). The potential variation in ASQ is included "…to acknowledge the practical difficulties in predicting annual implementation levels, to reflect the foreseeable year-to-year variation in BLM capacity to offer timber volume…" (USDI - Bureau of Land Management, 2016a, p. 6). To provide this declared ASQ volume for the Eugene SYU, the BLM developed an internal target for the Siuslaw Field Office of 7 MMbf annually. The target is based on the acre distribution in the Eugene SYU for the HLB and the age class distribution within the HLB acreage, see Internal Memorandum: Eugene Sustained Yield Unit – Harvest levels (USDI - Bureau of Land Management, 2019a). This agreement is consistent with the modeling projections, created for the Proposed RMP/Final EIS, for total volume of 69,732 MMbf for the first decade. To meet the Eugene SYU's declared ASQ, the Siuslaw Field Office has a need to provide between 56-84 MMbf of volume per decade.

1.3.2 Purpose

The purpose of this action is to conduct commercial timber harvest to contribute timber volume to the Allowable Sale Quantity (USDI - Bureau of Land Management, 2016a, p. 59).

- For volume to contribute to the ASQ in a given fiscal year, it must be offered within that year, and eventually sold, or as much thereof as can be sold at reasonable prices on a normal market (USDI – Bureau of Land Management, 2016a, p. 5). The Siuslaw Field Office has a decadal target of 56 to 84 MMbf to contribute to the declared ASQ for the Eugene SYU. The BLM would conduct commercial

[2] Habitat acreage amount represents a snapshot of current habitat conditions at time of analysis. These acres would be updated over time based on most recent survey information and would not be treated under this Environmental Assessment.

[3] Core areas include nest patches.

thinning or regeneration harvest in stands that are in the 30-year age class[4] or older to meet the decadal target of 56 to 84 MMbf.

1.4 Decision to be made

The BLM would decide on a management approach for the majority of the land managed for sustained timber production (HLB – MITA and LITA) in the Siuslaw Field Office. This decision would not authorize any specific action but outline the strategy that the Siuslaw Field Office would use to meet its contribution to the Eugene SYU's declared ASQ. The decision associated with this project will comply with the governing land use plan (see section 1.5) in place at the time a decision is made by BLM.

Specific project implementation would verify that treatment effects fall within the range of effects described for the selected alternative under this Environmental Assessment (EA) and would be consistent with the selected management approach. BLM would evaluate whether specific projects could be implemented using a Determination of NEPA Adequacy (DNA) and Decision Record (if appropriate), based upon the analysis in this EA. For example, if BLM determined through a DNA that a specific project would occur within HLB - MITA or LITA stands of similar structural condition, harvest sideboards, and effects to site-specific resources which represent a sub-set of total effects disclosed in this programmatic Environmental Assessment, then BLM would issue a Decision Record based upon the DNA without preparing a second Environmental Assessment. As a part of this programmatic approach, the Siuslaw Field Office will continue track specific project implementation actions, to verify that that specific project effects fall within the range of effects described for the selected alternative under this EA.

1.5 Conformance with Land Use Plan

The BLM signed a Record of Decision approving the Northwestern and Coastal Oregon Resource Management Plan (2016 ROD/RMP) on August 5, 2016. The Siuslaw Field Office initiated and designed the Siuslaw HLB Landscape Plan EA to conform to the 2016 ROD/RMP. The 2016 ROD/RMP addresses how the BLM will comply with applicable laws, regulations, and policies in western Oregon including, but not limited to the: O&C Act, Federal Land Policy and Management Act (FLPMA), Endangered Species Act (ESA), National Environmental Policy Act (NEPA), Archaeological Resources Protection Act, Clean Air Act, and Clean Water Act. This EA tiers to the 2016 Proposed Resource Management Plan and Final Environmental Impact Statement for Western Oregon (Proposed RMP/Final EIS).

This programmatic EA follows the "Final Guidance for Effective Use of Programmatic NEPA Reviews" (EOP - Council on Environmental Quality, 2014). This document provides clarification for Federal agencies to use programmatic NEPA reviews in accordance with the National Environmental Policy Act (NEPA), 42 U.S.C. § 4332, and the CEQ Regulations for Implementing the Procedural Provisions of NEPA, 40 C.F.R. parts 1500-1508 (CEQ Regulations).

The BLM is aware that the Council on Environmental Quality has issued revised regulations on NEPA implementation; however, those revised regulations do not apply to NEPA processes, like this EA, that began before September 14, 2020 (40 CFR § 1506.13).

1.6 Scoping and Public Involvement

The Siuslaw Field Office, Northwest Oregon District, BLM contracted with the neutral third party, Kearns & West, to compile a stakeholder assessment during the summer of 2019. The assessment provided BLM with a summary of concerns from interested parties regarding the Siuslaw HLB Landscape Plan project. The BLM held an informational open house on October 2, 2019, for the stakeholders identified in the assessment and the general public. Additionally, the Oregon Department of Forestry, Oregon Department Fish and Wildlife, and National

[4] Each 10-year age class is comprised of stands that are 5 years younger to 4 years older than the number of the age class. For example, the 30-year age class is comprised of stands from 25 to 34 years old.

Marine Fisheries Service were invited but did not attend. Working with the stakeholders and general public helped inform the BLM of public interest in this project; this provided a space for the public to voice opinions and communicate concerns through an impartial facilitator. The BLM incorporated this information into a draft of Chapters 1 and 2 of this EA and sought comments from any interested members of the public during a formal public scoping period.

On November 20, 2019, the BLM mailed a scoping letter and an outline of Chapters 1 and 2 to the Eugene sustained-yield unit NEPA document recipient list, which includes environmental groups, economic interest groups, private citizens, timber companies, tribes, and local governments. Additionally, a legal advertisement was published in the local newspaper, the Register Guard, announcing the scoping period on November 20, 2019. American Forest Resources Council, Oregon Wild, and Cascadia Wildlands provided written scoping comments. External and internal scoping comments have shaped issue and alternative development for the Siuslaw HLB Landscape Plan. BLM staff and the interdisciplinary team have reviewed all comments and used them to build the issues (Section 1.6) and alternatives (Section 2.1) which will drive the HLB management strategy. The BLM addressed each of the topics brought forward during scoping through issues analyzed or issues considered but not presented for detailed analysis (with the rationale provided). The BLM has developed alternatives and has analyzed them to understand how they respond to the purpose and need, and issues presented for analysis; some alternatives were considered but not analyzed in detail (see EA Section 2.4).

BLM responded to comments and concerns throughout the project from concerned members of the public. Chapters 1 and 2 were developed, with the finalized alternative designs, and sent out to the public for a 20-day public comment period on May 21, 2020. The BLM received comments from three public interest groups. The public interest groups that commented during this 20-day public comment period were the American Forest Resources Council, Cascadia Wildlands, and Oregon Wild. The draft EA and unsigned FONSI were available for a 30-day public comment period from August 17, 2021 to September 17, 2021. During the 30-day public comment period, BLM received comments from six individuals, a group of neighbors, and four local interest groups (American Forest Resource Council, Cascadia Wildlands/Oregon Wild [joint comment letter], and the Lane County Audubon Society).

Scoping comment letters and emails are available for review at the Northwest Oregon District – Springfield Interagency Office, 3106 Pierce Parkway, Suite E., Springfield, Oregon.

1.7 Issues

1.7.1 Issue identified for analysis

The BLM gathered external and internal comments from the stakeholder assessment, stakeholder workshops, public scoping, and the interdisciplinary team. These comments led to the issues considered for analysis listed below (Section 1.7 2). A summary of Issues considered, but eliminated them from detailed analysis (Section 1.7.3) can be found in Appendix B. The issues identified during scoping pointed the BLM to possible environmental effects, thus helping to shape the action alternatives, including identifying possible project design features. Issues warrant detailed analysis if (1) analysis of the issue is necessary to provide information to the decision-maker to be able to make a reasoned choice between alternatives presented (that is, it is related to the purpose and need for action); or (2) the analysis of the issue is necessary to determine the significance of the impacts [BLM Handbook: H-1790-1 (USDI - Bureau of Land Management, 2008, p. 41)]. Analysis of these issues provides a meaningful basis for comparing the environmental effects of alternatives, including the no-action alternative, and aids the decision-making process. In this way, issues help the BLM focus EAs on the information needed for the decision-maker to make a meaningful evaluation of the alternatives while avoiding unnecessary detail.

1.7.2 Issues considered for analysis in this EA

- How does regeneration harvest adjust the age class distribution within the Harvest Land Base-Moderate Intensity Timber Area and Low Intensity Timber Area land use allocation in Siuslaw Field Office?

- How would timber harvest meet the Siuslaw Field Office's contribution to the Eugene SYUs declared ASQ per decade?
- How would timber harvest result in different relative levels of complexity for early successional ecosystems?
- How would timber harvest and reforestation affect stand level fire hazard and fire resistance?
- How would timber harvest and reforestation affect fire risk?

1.7.3 Issues considered, but not presented in detailed analysis.

Botany:

- What would be the effect of timber harvest and road construction on Noxious and Invasive Weeds?
- What are the effects of timber harvest on Special Status Plants, Lichens, and Fungi?
- What are the effects timber harvest on common and uncommon botanical species?

Carbon Storage:

- How would the timber harvest affect carbon storage, greenhouse gas emissions and carbon sequestration in the planning area?
- What would be the social cost of carbon from the alternatives?

Fisheries

- What are the effects of timber harvest, timber sale road activities, and timber haul on fish populations and fish habitat?
- How would the alternatives affect blockages to fish passage?
- How would timber harvest, timber sale road activities, and timber haul affect past aquatic restoration efforts?

Hydrology

- How would timber harvest affect the water supply and water purity of the neighboring households?
- How would timber harvest and road construction affect stream temperature?
- How would road construction, renovation, and haul affect sedimentary delivery to streams?
- How would timber harvest affect peak flow events?
- How would timber harvest affect mercury mobilization?
- How would regeneration harvest affect summer low flow?
- What are the effects of timber harvest, timber sale road activities, and timber haul on free flow, water quality, and outstandingly remarkable values of suitable river segments?

Recreation:

- How would timber harvest affect the Visual Landscape / Visual Resource Management?
- How would timber harvest impact dispersed recreation, public safety and illegal or non-sanctioned, nuisance activities?

Soils:

- How would timber harvest affect soil disturbance?
- What would the effects to soils be from new road construction?
- What are the effects of timber harvest and road construction on hillslope stability in the Riparian Reserve?
- What are the effects of tree cutting and timber removal on the soil food web, fungal soil networks, and fungal mats?
- How would the timber harvest affect soil function and soil productivity?
- What would be the effect of road construction and timber yarding on soil erosion?

Silviculture:

- How would retention and reforestation affect future growth and yield?

- How would timber harvest affect sustained yield?
- What are the effects of silvicultural practices on tree growth?
- What are the effects of timber harvest on resistance to drought and insects?
- What are the effects of silvicultural practices on the value of a stand over time, e.g., clear grain wood?
- What are the effects of silvicultural practices on forest structure, species, and structural diversity?

Wildlife:

- What are the effects of the alternatives on spotted owl habitat?
- What are the effects of the alternatives on known northern spotted owl sites and incidental take of spotted owls?
- What are the effects of the alternatives on spotted owl prey species, e.g., flying squirrel and red tree vole?
- What are the effects of the alternatives on spotted owl and barred owl interactions?
- What are the effects of the alternatives on spotted owl suitable habitat considering competitive interactions with barred owl?
- What are the effects of the alternatives on marbled murrelet nesting habitat?
- How would the alternatives affect altered microclimate and nest predation of marbled murrelets?
- How would the alternatives affect wildlife species due to fragmentation and how would the alternatives affect landscape connectivity?
- How would the alternatives affect Bureau Sensitive Species such as songbirds, salamanders, and invertebrates such as butterflies?
- What are the effects of the alternatives on the recruitment of snags and dead wood?
- What are the effects of the alternatives on fisher habitat?
- What are the effects of the alternatives on Pacific marten habitat?
- What are the effects of timber harvest on birds observed in the Fox Hollow area?

2 Alternatives

2.1 Alternatives

The following five action alternatives will analyze management strategies on 13,225 acres within the HLB. The BLM will also analyze a no-action alternative that does not include harvesting timber. In the alternatives below, the rotation age[5] is being used to indicate a range of acres per decade that will be regeneration harvested and thinned for analysis purposes. Rotation age, as it relates to regeneration harvest, represents what a regulated forest would eventually look like and drives the number of acres of regeneration harvest per decade. When achieved, the regulated forest would have an equal number of acres in each age class grouping at and below the rotation age. The rotation age would be an eventual outcome of implementation of each alternative but would not be a minimum threshold that would qualify a stand for harvest.

2.1.1 Actions Common to All Action Alternatives

All Best Management Practices (BMPs) described in the 2016 ROD/RMP Appendix C (USDI - Bureau of Land Management, 2016a, pp. 139-180) and the specific design features for this assessment described by the interdisciplinary team, found in Appendix E, apply to the action alternatives.

All action alternatives would include tree planting and site preparation, activity fuels reduction, snag creation, grouped and dispersed retention areas, road construction, culvert installation, road renovation, road improvement, road maintenance, and road decommissioning. All action alternatives would follow management direction outlined for the HLB land use allocation in the 2016 ROD/RMP. During timber harvest, this includes retaining untreated areas in live green trees, retaining snags and down wood, creating one snag per acre, replanting trees, and more. These management "sideboards" are briefly summarized here in the bulleted list below, please refer to pages 59-63 in the 2016 ROD/RMP for a complete description of the management direction.

- Thinning stands to reach a relative density (RD) of approximately 25 – 45 percent (USDI - Bureau of Land Management, 2016a, p. 60)
- Creating one snag per acre, > 20" DBH (USDI - Bureau of Land Management, 2016a, p. 61).
- Retaining live green trees within the harvest unit during regeneration harvest.
    - 15-30 percent in LITA (USDI - Bureau of Land Management, 2016a, p. 62)
    - 5-15 percent in MITA (USDI - Bureau of Land Management, 2016a, p. 63).
- Use natural or artificial regeneration or both to reforest a mixture of species appropriate to the site.
    - at least 130 trees per acre within 5 years of harvest in LITA (USDI - Bureau of Land Management, 2016a, p. 62).
    - at least 150 trees per acre within 5 years of harvest in MITA (USDI - Bureau of Land Management, 2016a, p. 63).

To the extent allowable by management direction, each action alternative varied these actions, which are described in the narratives below.

2.1.2 Alternative 1 – No Action Alternative

Under this alternative, the BLM would not harvest timber within the HLB and not produce ASQ volume, within the Siuslaw Field Office. This alternative would not meet the purpose and need for action. Additionally, this alternative would not be in conformance with the RMP. Therefore, the BLM could not select this alternative without an RMP amendment. It is a reference analysis that is presented here for context and comparison. This project's use of reference analysis is modeled on the approach utilized in the Proposed RMP/Final EIS, where the reference

[5] Rotation Age - The planned number of years between the establishment of an even-aged or two-aged forest stand and its regeneration harvest.

analysis provides context and “a point of comparison…to analyze and interpret the effects of the alternatives” (USDI Bureau of Land Management, 2016b, p. 100).

2.1.3 Alternative 2

Under this alternative, the BLM would achieve ASQ volume through the exclusive use of commercial thinning. Stands would be thinned to reach a relative density (RD) of approximately 25 – 45 percent and creation of group selection openings[6] would occur around oaks and in other areas, up to approximately 10 percent of the harvest unit. Small pockets of regeneration would occur in group selection openings but stands would not be regeneration harvested at a stand level. Snags would be created with methods that cause the tree to either die from the top down or at the base. Where feasible, commercial thinning areas would function as shaded fuel breaks[7], with some areas receiving additional understory fuels treatments.

2.1.4 Alternative 3

Under this alternative, the BLM proposes to produce ASQ volume by using timber harvest to emulate natural disturbance distribution patterns. Stand density would determine if harvest units would be treated with regeneration harvest or commercial thinning. Thinning would occur to attain a relative density of approximately 50 percent by the end of the rotation period to maintain growth and vigor of the stand. BLM would manage stands on a 110-year to 140-year rotation in the MITA and 140-year to 170-year rotation in the LITA.

If treated with regeneration harvest, the predominant method for reforestation would be natural regeneration. Replanting would occur if the minimum density required by RMP management direction is not achieved by natural regeneration within five years of harvest (USDI Bureau of Land Management, 2016, pp. 62, 63). If the minimum is not met, replanting would consist of at least 3 species of trees (including hardwoods) and the selected species would be resilient to drought, insect pressure, and disease in susceptible areas. Reforestation would occur at 130 trees per acre [TPA] in LITA and 150 TPA in MITA.

This alternative would retain an average of 30 percent of pre-harvest stand basal area in live trees in LITA and an average of 15 percent in MITA. The retention would consist of both dispersed and aggregate configurations. Dispersed retention would include large diameter trees, including trees with defects. Aggregates would be clumped around existing snags; large trees with cavities, large branches or broken tops; hardwood trees; seeps or springs; unique biological or cultural features inside the unit; and would include created snags. All hardwood trees would be retained.

Snags would be created with methods that cause the tree to die from the top down, such as high girdling, tree topping, or other methods that cause the tree to die slowly. This alternative would retain[8] larger diameter and/or wildlife trees with cavities, broken tops, large limbs, or other deformities. At least 50 percent of the existing snags

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[6] Group Selection Openings – are defined as areas with ≤ 2 live trees ≥ 7” DBH per acre.

[7] Shaded fuel break is a strategic location along a ridge, access road, or other defensible location where fuels have been modified to increase the probability of success for fire suppression activities. This is a thinning of dense vegetation, so fire does not easily move from the ground into the overhead tree canopy. A shaded fuel break is not the removal of all vegetation in a given area. The intent of the fuel break is to create a fuel model or vegetative arrangement where wildfire reduces intensity as it burns into the fuel break. A ground fire is the desired fire behavior. An arrangement which, provides the desired fire behavior effects, involves an area where ladder fuels are removed and tree or brush canopies will not sustain fire, and where the contiguous fuels arrangement is interrupted.

[8] Generally, retain large diameter and wildlife trees. However, site specific conditions may benefit from retaining more numerous, smaller diameter trees (for example in the drier sites of the valley fringe or as a buffer to protect snags). In most cases, retain trees with characteristics that are used by wildlife (e.g., wolfy, forked tops, trees with cavities, etc.) if available.

≥ 20 inch DBH would be paired with buddy trees[9] and/or existing snags. Snags would be created such that heart rot can spread and the trees die slowly.

In areas with oak (Quercus spp.), this alternative would maintain and enhance oak persistence and structure by removing competing conifers (USDI - Bureau of Land Management, 2016a, p. 87) and protect all hardwood species.

This alternative would address fuels concerns by broadcast underburning. Where strategic (see shaded fuel break definition in the footnote), BLM would use commercial thinning to create shaded fuel breaks.

2.1.4.1 ***Alternative 3 – Sub-Alternative snagging in the retention***

This sub-alternative would be implemented as described above. An additional 1-2 trees per acre within the retention would be used for creating snags beyond the one created snag per acre specified by the 2016 ROD/RMP (USDI - Bureau of Land Management, 2016a, p. 61). These additional snags would come from retention trees in excess of the RMP minimum of 5 percent in MITA or 15 percent in LITA.

2.1.5 Alternative 4

Under this alternative, the BLM proposes to achieve ASQ volume by meeting timber production goals while emulating natural disturbance patterns. Stand density and potential future growth would determine if harvest units would be treated with regeneration harvest or commercial thinning. Thinning would occur so that a relative density of approximately 50-55 percent is attained by the end of the longest rotation period. BLM would manage stands on an 80-year to 100-year rotation in the MITA and 120-year to 140-year rotation in the LITA.

If treated with regeneration harvest, use natural regeneration to reforest on up to approximately one-third of the stand. If the minimum density required by RMP management direction is not achieved by natural regeneration within five years of harvest (USDI Bureau of Land Management, 2016, pp. 62, 63); Replanting would occur at 130 TPA in LITA and 150 TPA in MITA, and include at least 3 species of trees (including hardwoods). On the remaining two-thirds of the harvest unit, replanting would occur at 185-220 trees per acre [TPA] in LITA and 220-260 TPA in MITA). Replanting would consist primarily of Douglas-fir with a mix of at least 2 species that focus on species resilient to drought, insect pressure, and disease in susceptible areas.

This alternative would retain an average of 25 percent of pre-harvest stand basal area in live trees in LITA and an average of 10 percent in MITA. The retention would consist of both dispersed and aggregate configurations. Dispersed retention would include large diameter trees, including trees with defects. Aggregates would be clumped around existing snags; large trees with cavities, large branches or broken tops; hardwood trees; seeps and springs; unique biological or cultural features inside the unit; and would include created snags.

Snags would be created with methods that cause the tree to die from the top down, such as high girdling, tree topping, or other methods that cause the tree to die slowly. This alternative would retain[8] above larger diameter and/or wildlife trees with cavities, broken tops, large limbs, or other deformities. At least 50 percent of the existing snags ≥ 20 inch DBH would be paired with buddy trees and/or existing snags.

In areas with oak (*Quercus* spp.), this alternative would maintain and enhance oak persistence and structure by removing competing conifers (USDI - Bureau of Land Management, 2016a, p. 87) and protect all hardwood species.

[9] Buddy trees are those that grow adjacent to the snag and remain in a retention patch around the snag. This protects the snag from logging damage that may cause the snag to break or fall.

This alternative would address fuels concerns by broadcast burning. Prescribed fire would be utilized for site preparation prior to replanting. Reforestation would utilize fire adapted species. Where strategic, BLM would use commercial thinning to create shaded fuel breaks.

2.1.5.1 ***Alternative 4 – Sub-Alternative snagging in the retention***

This sub-alternative would be implemented as described above. The additional snags would be implemented as described in Sub-Alternative 3.

2.1.6 Alternative 5

Under this alternative, the BLM proposes to achieve ASQ volume by maintaining relatively high levels of timber stand growth and yield through the length of the rotation. Stand density would determine if harvest units would be treated with regeneration harvest or commercial thinning. Thinning would occur to attain a relative density of approximately 55 percent by the end of the rotation period in order to maintain growth and vigor of the stand. BLM would manage stands on an 80-year to 100-year rotation in the MITA and 120-year to 140-year rotation in the LITA.

All regeneration harvested units would be replanted to achieve full stocking. Replanting would consist of predominantly Douglas-fir, at 450 TPA. Burning would be utilized for site preparation prior to replanting. BLM would treat portions of residual activity fuels following timber management activities for both site preparation and fuel reduction purposes.

This alternative would retain an average of 15 percent of pre-harvest stand basal area in live trees in LITA and an average of 5 percent in MITA. Retention trees and the creation of one snag per acre would be arranged in aggregate configurations around at least 25 percent of existing snags (with ≥ 20 inch DBH) and hardwood trees. Aggregates would be located along the edges of the harvest unit. At least 25 percent of the existing snags ≥ 20 inch DBH would be paired with buddy trees and/or existing snags. Half of the created snags would be created such that the tree dies slowly, and half would be created by base girdling. All oaks and 50 percent of the other hardwoods would be retained.

Commercial thinning would not be used to create shaded fuel breaks.

2.1.7 Alternative 6

Under this alternative, the BLM proposes to achieve ASQ through the exclusive use of regeneration harvest. BLM would manage stands on an 80-year rotation in the MITA and in the LITA.

When treated with regeneration harvest, replanting would occur on 100 percent of the harvest unit. Replanting would consist of predominantly Douglas-fir at 450 TPA. Burning would be utilized for site preparation prior to replanting. BLM would treat portions of residual activity fuels following timber management activities for both site preparation and hazardous fuels reduction purposes.

This alternative would retain an average of 15 percent of pre-harvest stand basal area in live trees in LITA and an average of 5 percent in MITA. Retention would be exclusively located along the edges of the harvest unit (unless an 1850 tree > 40 inches is within the unit, which the BLM is required by the RMP to retain p. 62, 63). BLM would retain all oaks within the harvest unit, but no other hardwoods. Snags would be created by base girdling and existing snags would not be protected from logging damage by buddy trees.

Commercial thinning would not be used to create shaded fuel breaks.

2.2 Table 1 Comparison Action Alternatives

	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Rotation Age	No rotation age	MITA: 110-140 year LITA: 140-170 year	MITA: 80-100 year LITA: 120-140 year	MITA: 80-100 year LITA: 120-140 year	MITA: 80 years LITA: 80 Years
Regeneration	No regeneration harvest	Conduct regeneration harvest to achieve a regulated forest at the rotation age.			
Thinning	Thin to reach 25 - 45 RD by rotation age.	Thin to reach 50 RD by rotation age.	Thin to reach 50-55 RD by rotation age.	Thin to reach 55 RD by rotation age.	No thinning.
Retention	Retain trees with characteristics used by wildlife[8] within thinning.	Average retention 15% in MITA and 30% in LITA. Retain trees with characteristics used by wildlife[8]. Arrange retention in aggregates and dispersed configurations. Aggregates clumped around existing snags, hardwood trees, springs, seeps, etc.	Average retention 10% in MITA and 25% in LITA. Retain trees with characteristics used by wildlife. Arrange retention in aggregates and dispersed configurations. Aggregates clumped around existing snags, hardwood trees, springs, seeps, etc.	Average retention 5% in MITA and 15% in LITA. Arrange retention in aggregates clumped around existing snags and 50% of hardwood trees (with at least 25% of existing snags ≥ 20 inch DBH clumped with buddy trees and created snags). Some aggregates located along edges of harvest unit.	Average retention 5% in MITA and 15% in LITA. Retention located along edges of the harvest unit to create relatively lower logging costs than Alt 2-5.
Oaks and other Hardwoods	Retain hardwoods and place gaps around oak areas.	Retain hardwoods. In oak areas manage for oaks - following management direction.	Retain hardwoods. In oak areas manage for oaks - following management direction.	Retain oaks and 50% of other hardwoods in stand.	Retain oaks, but do not retain other hardwoods.
Snags and Down Wood	Create 1 snag per acre.	At least 50% of existing snags ≥ 20 in DBH clumped with buddy trees & created snags. Create 1 snag per acre – tree dies slowly. Sub-Alternative: Portion of retention would be reserved for creating additional snags.	At least 50% of existing snags ≥ 20 in DBH clumped with buddy trees & created snags. Create 1 snag per acre – tree dies slowly. Sub-Alternative: Portion of retention would be reserved for creating additional snags.	At least 25% of existing snags ≥ 20 inch DBH clumped with buddy trees & created snags. Create 1 snag per acre. Half of created snags – tree dies slowly.	Existing snags not protected by buddy trees or aggregate retention. Create 1 snag per acre using base-girdling or equivalent method.
Reforestation	Create 10% gaps. Reforestation in gaps, min 150 TPA.	Mixed reforestation (≥ 3 species including hardwoods) to meet minimum RMP guidelines for the land use allocation. Natural regeneration on the entire stand.	Mixed reforestation for a fully stocked stand. Natural regeneration on 1/3 (≥ 3 species including hardwoods) and replanting on 2/3 of the stand (2 species including hardwoods).	Replanting at 450 TPA, predominantly Douglas-fir with some minor spp. (not including hardwoods).	Replanting at 450 TPA, predominantly Douglas-fir with some minor spp. (not including hardwoods).
Site Preparation	No burning for planting gaps.	Consider broadcast underburning for site prep (strategically consider within the Valley Fringe).	Consider broadcast underburning for site prep (strategically consider within the Valley Fringe).	Consider post-harvest density where we can burn for site prep.	Consider post-harvest density where we can burn for site prep.
Fuels Treatments	Piling and pile burning for slash disposal. No underburning or broadcast burning.	Piling, pile burning, and broadcast underburning for slash disposal.			
Shaded Fuel Breaks	Create shaded fuel breaks.	Create shaded fuel breaks.	Create shaded fuel breaks.	No shaded fuel breaks.	No shaded fuel breaks.

2.3 Table 2 Comparison of Effects by Issues and Alternatives

	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Rotation Length Range MITA, LITA (Years)	N/A	MITA 110-140 LITA 140-170	MITA 80-100 LITA 120-140	MITA 80-100 LITA 120-140	80
Expected Volume per Decade from thinning and regeneration (MMbf)	70	61-79	58-82	60-73	77
Total Acres Range HLB Regeneration Harvested per Decade (Acres)	N/A	846-1,050	1,126-1,361	1,126-1,361	1,470
Total Acres Range HLB Thinning Harvested per Decade (Acres)	3,889	1,444-1,944	278-944	0-556	N/A
Overall Early Successional Ecosystem Complexity Rating on treated acres (Rating)	N/A	High	1/3 acres rated High, and 2/3 acres rated Medium	Low	Low
Change in Wildfire Risk in Decade 1	No Change	No Change	No Change	No Change	No Change
Wildfire Hazard Rating in Decade 1 of harvested acres **(Rating - Averaged Acres)**[10]	Moderate 3,889	Moderate 2,667	Moderate 1,946	Moderate 1,522	Moderate 1,470

[10] *Wildfire Hazard ratings for the combined and harvest (Regeneration and Thinning) acres per decade across the project area over time. The first and fifth decade are shown; see section 3.4 for full results.*

2.4 Alternatives considered but eliminated from Detailed Analysis

The BLM is required to include a discussion of all reasonable alternatives to the proposed action. Reasonable alternatives include alternatives which are technically and economically feasible, and which meet the purpose and need for the project (40 CFR 1502.14(a); Question 2a, CEQ, Forty Most Asked Questions Concerning CEQ's NEPA Regulations, March 23, 1981). The BLM may eliminate from detailed analysis any alternatives that are not reasonable. An alternative need not be analyzed in detail if:

- it does not meet the purpose and need,
- it is technically or economically infeasible,
- it is inconsistent with the basic policy objectives for the management of the area,
- its implementation is remote or speculative,
- it is substantially similar to an alternative being analyzed in detail, or
- it would have substantially similar effects to an alternative being considered in detail (USDI - Bureau of Land Management, 2008a, p. 52).

The interdisciplinary team considered several other alternatives for analysis during the interdisciplinary process. The majority of these alternatives were submitted in the form of public comments during scoping. A summary of these alternatives considered and the reasons why the BLM eliminated them from detailed analysis can be found in Appendix C. The list of alternatives considered but not analyzed in detail follows; an alternative that would:

- Defer the Conrad Creek acres from harvest for recreation and education purposes.
- Focus on conservation.
- Avoid marbled murrelet occupied sites.
- Mitigate the impacts of commercial timber harvest and roads to fish habitat.
- Not harvest in stands over 80 years old.
- Conduct thinning only in young stands.
- Use an age class rotation of 300 years.
- Retain the largest size class of trees in the stand.
- Delay harvest to create high-quality clear grain wood.
- Harvest tree species other than conifers.
- Maximize retention in logging units.
- Follow the principles of sustained yield, at the declared ASQ harvest level.
- Follow the vegetation modeling from the Final EIS.
- Develop a Quarry.
- Conduct Watershed analysis and use the Riparian Reserve buffers from the Northwest Forest Plan.
- Conduct timber harvest in the Riparian Reserve.

3 Affected Environment and Environmental Consequences

3.1 How does regeneration harvest adjust the age class distribution within the Harvest Land Base-Moderate Intensity Timber Area and Low Intensity Timber Area land use allocation in Siuslaw Field Office?

The BLM decision maker identified this issue as important to the final decision that selects a management strategy for the project area Because the 2016 ROD/RMP provides HLB management direction to "Adjust the age class distribution in each sustained-yield unit." As such, the BLM is analyzing this issue in detail to inform the decision maker and the public on how harvest will adjust the age class distribution across the Siuslaw HLB.

3.1.1 Background

The analysis in this issue compares how regeneration harvest levels across alternatives contribute to adjusting the age class distribution within the HLB land use allocation in the Siuslaw Field Office, as directed in the 2016 ROD/RMP (USDI - Bureau of Land Management, 2016a, p. 59), and further refined by the field office, as described in the background section of this project. The 2016 Proposed RMP/Final EIS analysis modeled a repeated cycle of harvest and regrowth within the HLB to provide for a non-declining ASQ and produce a sustained yield of timber in perpetuity (USDI Bureau of Land Management, 2016b, pp. 1183-1227). The timing and sequence of these harvest treatments were expected to vary based on the current and desired future condition of the stands (USDI Bureau of Land Management, 2016b, pp. 1183, 1189-1193). The model redistributed age classes within the HLB and eventually achieved forest regulation with a relatively even distribution of acres within forest age classes (USDI Bureau of Land Management, 2016b, pp. 316-317)

Rotation age is the "planned number of years between the establishment of an even-aged, or two-aged forest stand and its regeneration harvest" (USDI Bureau of Land Management, 2016b, p. 1078). For this project, BLM used rotation ages to determine the target number of 10-year age-classes (subsequently referred to as "age classes") and resulting number of acres in each age class. These target acres-per-age-class were used to estimate the number of regeneration harvest acres available per decade, or the number of acres that would subsequently revert to the "0" age class. The Proposed RMP/Final EIS vegetation modeling had ranges of assumed rotation lengths based on percentages of MITA and LITA regeneration harvested per decade. Those assumptions show MITA having a range of 7 to 18 percent regeneration harvested per decade or rotation ages between 60 and 140 years, and LITA having a range of 6 to 10 percent regeneration harvested per decade, or rotation ages between 100 and 170 years (USDI Bureau of Land Management, 2016b, p. 1215).

BLM considered the change in the age-class distribution of the Eugene Sustained Yield Unit, post Holiday Farm fire, based the BLM's draft RMP 5-year evaluation findings (Internal Memo on Age class Distribution in the Eugene Sustained Yield Unit before and after the Holiday Farm fire: Description of baseline conditions in comparison with the Proposed RMP / Final EIS Analytical Assumptions, 12/2020). The BLM found that the wildfires did not alter the effects of RMP implementation on age class distribution, structural stage distribution, or inventory described in the Proposed RMP / Final EIS, only the context of those effects. The change in the context of the effects does not alter basic analytical conclusions in the Proposed RMP / Final EIS that implementation of the RMP would result in: 1) the Harvest Land Base generally trending towards regulation in age classes 0–100 years in the moist forest (RMP FEIS, pp. 316-317), and 2) that the Harvest Land Base mostly trend towards multilayered stands and structural stages with structural legacies, with Mature Multi-layered Canopy and Structurally-complex stands occupying around 50 percent of the area in 100 years (RMP FEIS, p. 325). Therefore, no change or revision is needed to this Issue due to the Holiday Farm fire.

3.1.2 Analytical Process

3.1.2.1 *Assumptions*

- A stand that is regeneration harvested reverts to the zero-age class after it is harvested.

- Rotation ages by alternatives are used to determine number of acres in each age class and to estimate the number of regeneration harvest acres available. However, rotation ages presented for each alternative do not necessarily represent the age that stands will be regeneration harvested.
- Age classes are 10-year grouping of ages of stands. For example, a 40-year age class encompasses stands that are 35 to 44 years old. Because stands cannot be less than zero years old, the zero-age class represents stands from zero to four years old.
- Group selection openings are not considered regeneration harvest. They change the vegetative characteristics of the existing stand, but do not count as Early Successional stage classification as a stand-alone unit and are therefore not included in the acres calculations by stand level average structural stage classifications. These openings would be created within commercial thinning units to "provide structural complexity in the post-treatment stand" (USDI - Bureau of Land Management, 2016a, p. 60). These openings would not exceed 10 percent of the harvested stand, and would be implemented the same way, and for the same reason group selection openings are implemented across land use allocations. They would "function as small inclusions, (i.e., functional created canopy openings) of Early Successional habitat within Young, Mature, and Structurally-complex stands" (USDI Bureau of Land Management, 2016b, p. 329). The size of the openings would be smaller than the minimum stand vegetation delineation threshold of five acres (USDI Bureau of Land Management, 2020c, p. 26), and the purpose of these inclusions is to add complexity to the overstory stand.
- An evenly distributed number of acres per age class, in this analysis called even age class distribution, is met when all available acres above the target acres per age class (described in the methods section) are predicted to be regeneration harvested. This would bring the number of acres in the age classes into the target range, as determined by rotation age in each alternative.
- Natural disturbance could create stands that revert to the zero-age class but is not addressed in this issue because BLM cannot predict the location or severity of these events.
- Approximately 225 acres in the 100 to 130-year age class were analyzed under the Nails Creek EA and are scheduled to be regeneration harvested from 2020 through 2025. After harvest, these acres will be reassigned from the 100 to 130-year age class, to the 0-age class. Approximately 50 acres of MITA land use allocation were burned in the 2016 High Pass Road 12.5 Fire. Of the 50 MITA land use allocation acres burned 34 were salvaged. Of the 34 acres, approximately 20 acres were burned severely enough to reset the stand from the 60 to the zero-age class. The trees that died from the fire were salvaged, and the area replanted, which was covered under a salvage Categorical Exclusion.

3.1.2.2 ***Summary of Analytical Methods***

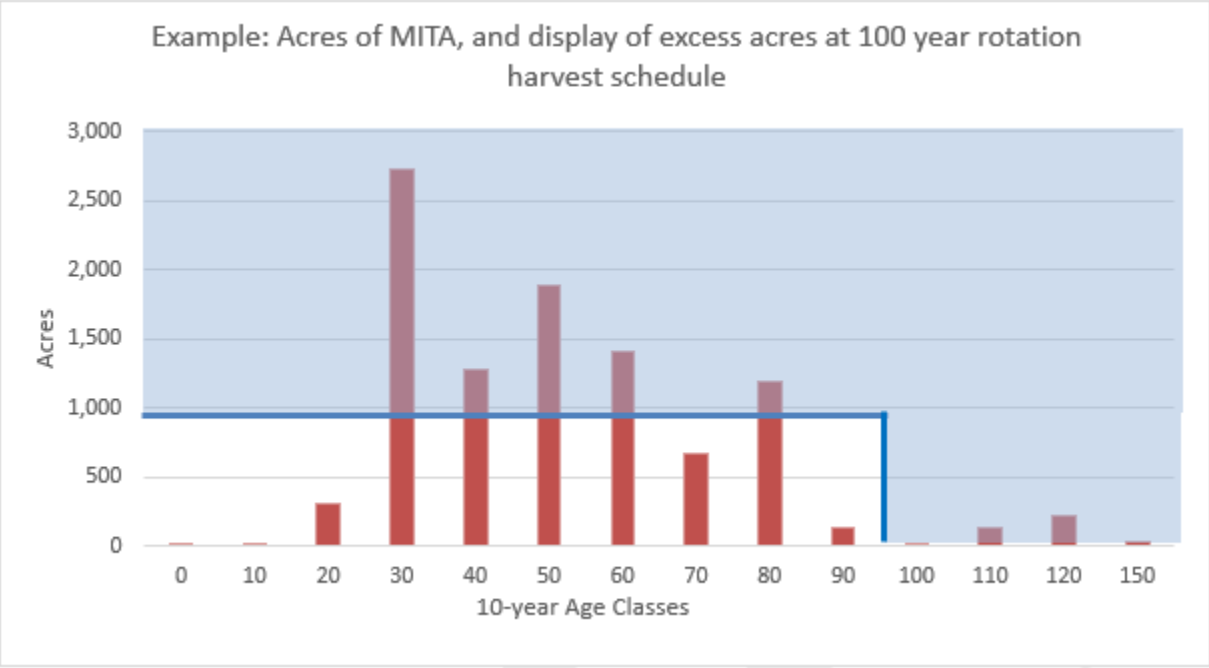
The BLM used current inventory data in Forest Operations Inventory (FOI) to determine the number of acres in each age class. The BLM calculated the range of acres per 10-year age class in each alternative by dividing the number of acres in each HLB sub-classification (MITA or LITA) by the number of the target age classes, including the 0-age class, based on the rotation age. For example, Alternatives 4 and 5 have an upper MITA rotation age of 100 years. A 100-year rotation age would result in 11 age classes. 10,050 acres (project HLB MITA acres)/11 = 913 acres in each age class. In Alternatives 4 and 5, 913 acres of regeneration harvest would be one end of the range for MITA.

Some of the alternatives evaluate a range of rotation ages within the LITA and the MITA. This analysis provides the maximum flexibility possible for regeneration harvest acres and time frames for achieving an even age class distribution. The concept of utilizing a range of rotation ages was based on the method Proposed RMP/Final EIS utilized to determine percent of regeneration harvested per decade. Analyzing only one set rotation age would limit harvest to certain age classes and a set number of acres.

The upper and lower ends of the rotation ages per alternative were used as the target range of acres in each 10-year age class by alternative. This would be a target number of acres for the even age class distribution and could be used as a general reference for timber sale scheduling to meet decadal ASQ targets. The BLM then analyzed how many decades it would take to reach even age class distribution when harvesting from age classes at or

above the rotation age, or in age classes below the rotation age but in excess of the target decadal acres in that age class. In the example of the 100-year rotation age in MITA described above (upper rotation age in MITA for Alternatives 4 and 5), any acres in the 100-year age class or older, and acres within age classes younger than 100 years, but in excess of 913 acres would be available for regeneration harvest. These acres were divided by the number of predicted regeneration harvest acres per decade to determine how many decades it would take to get a roughly even age class distribution. A visual representation is displayed below.

Age Class Figure 1. Example of "excess acres" calculated on a 100-year rotation in MITA.



In the chart above, the blue line running horizontally represents the desired target threshold of 913 acres in each age-class. The blue line running vertically displays the first age class, or in this example the 100-year age class, that has reached the rotation age of 100 years. All acres in the shaded blue area represent acres available, or available acres for harvest. These available acres were used to determine how many decades it would take to get the stands as close to even age class distribution as possible, at the regeneration harvest level calculated by rotation age. To get the full range of regeneration harvest acres in alternatives 3, 4, and 5, these calculations were conducted on the upper and lower rotation ages for MITA and LITA. Alternative 6 has no variation in rotation age.

The 10- and 20-year age classes will remain deficient by more than half of the target acres until they age to the end of the rotation. The only way to add acres to these age classes is to acquire land that have stands within these age classes, which is outside of the scope of this project. With the ranges of target acres per age-class within the alternatives, BLM has flexibility to harvest from other age classes in order to make up for the deficiency in the current 0-, 10- and 20-year age-classes until/when they reach rotation.

3.1.2.3 ***Spatial Scope***

The spatial scope of this issue is 13,225 acres of the HLB, which is the project area of the EA. Of the total acres, the Siuslaw HLB contains 10,050 MITA acres, and 3,175 LITA acres.

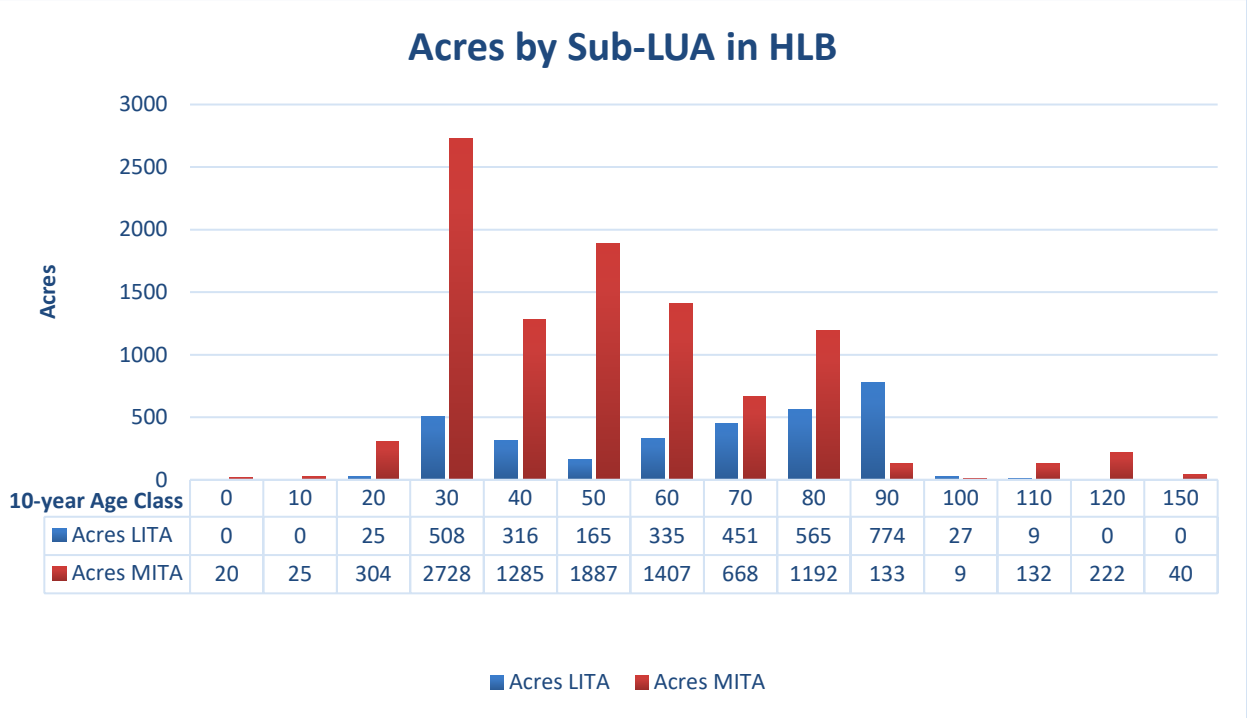
3.1.2.4 ***Temporal Scope***

Temporal scope for this analysis is 110 years, which is the longest time the analysis showed an alternative with regeneration harvest would reach even-age class in LITA (Alternative 3).

3.1.3 Affected Environment

The current age class distribution across HLB on the Siuslaw field office is shown in the table below. No acres are currently in the 130- and 140-year age classes, which are therefore not displayed in the table below. The table was compiled based on 2020 data.

Age Class Figure 2. 10-year age class distribution in the Project Area by Sub-land use allocation in the Siuslaw HLB.



10-year Age Class	0	10	20	30	40	50	60	70	80	90	100	110	120	150
Acres LITA	0	0	25	508	316	165	335	451	565	774	27	9	0	0
Acres MITA	20	25	304	2728	1285	1887	1407	668	1192	133	9	132	222	40

3.1.3.1 ***Impact indicators***

The number of target acres in each 10-year age class by alternative, and how many decades it would take for an alternative to reach even-age class distribution.

3.1.4 Direct and Indirect Effects

3.1.4.1 ***No Action***

Under the no action alternative, harvest, including regeneration harvest, would not take place. Therefore, the age class distribution within the project area would not be adjusted and would not reach an even age class distribution over time.

3.1.4.2 *Alternative 2*

Under Alternative 2, ASQ targets would be met by thinning only. Group selection openings would be created on up to 10 percent of the area. but are not included as contributing acres to the zero age-class (USDI Bureau of Land Management, 2016b, p. 329). This alternative does not contribute to achieving an even age class distribution.

3.1.4.3 *Alternative 3*

Under Alternative 3, the regeneration harvest rotation age-range in MITA is from 110 to 140 (12 to 15 ten-year age-classes), and LITA 140 to 170 (15 to 18 ten-year age-classes). This would result in regeneration harvest of 176 to 212 acres per decade from LITA, and 670 to 838 acres per decade from MITA, or a total of 846 to 1,050 acres per decade between MITA and LITA. Based on the analysis described in section 3.2.2 (methods), it would take between 5.5 and 7.75 decades to reach an even age class distribution in MITA, and 8.0-10.75 decades to reach an even age class distribution in LITA. Variation in acres and decades are due to the range of rotation ages.

3.1.4.4 *Alternative 4 and Alternative 5*

Alternatives 4 and 5 have the same rotation lengths, and therefore the same estimated number of acres regeneration harvested per decade. The regeneration harvest rotation age range in MITA is from 80 to 100 (9 to 11 ten-year age-classes), and LITA 120 to 140 (12 to 15 ten-year age-classes). This would result in regeneration harvest of 212 to 244 acres per decade from LITA, and 914 to 1,117 acres per decade from MITA, or a total of 1,126 to 1,361 acres per decade between MITA and LITA. Based on the analysis described in section 3.1.2.2 (methods), it would take between 4.0 and 4.75 decades to reach an even age class distribution in MITA, and 6.0-8.0 decades to reach an even age class distribution in LITA.

3.1.4.5 *Alternative 6*

Alternative 6 treats MITA and LITA with the same rotation at 80 years (9 ten-year age-classes). This would result in approximately 1,470 acres per decade regeneration harvested and is estimated to reach even age class distribution in 3.75 to 4.0 decades, based on the methodology described in 3.1.2.2.

3.1.4.6 *Combined Comparison*

Age Class Table 1. Acres of regeneration harvest per sub land use allocation, and number of years to reach even age class distribution.

Alternative	LITA acres regen harvested per decade	Decades to reach even age class LITA	MITA acres regen harvested per decade	Decades to reach Even age class MITA	Total Acres Range HLB Regen Harvested per Decade
Alternative 2	NA	NA	NA	NA	NA
Alternative 3	176-212	8-10.75	670-838	5.5-7.75	846-1,050
Alternative 4 and 5	212-244	6.0-8.0	914-1,117	4-4.75	1,126-1,361
Alternative 6	353	4.0	1,117	3.75	1,470

3.1.5 Reasonably Foreseeable/Cumulative Effects

Approximately five acres of HLB in the last five years have been cleared and replanted so landowners adjacent to BLM administered lands can access and harvest their land. These are referred to as yarding wedges, and are covered under reciprocal right-of-way agreements.

Approximately 190 acres of Areas of Environmental Critical Concern overlay the HLB but are not included within the scope of this project. The Nails Creek EA evaluated harvest of 53 acres of MITA with an Area of Environmental Critical Concern overlap. These areas could be regeneration harvested in the future, but the BLM has not proposed any actions or have current plans to do so and would be covered under a NEPA action outside of this project. Natural disturbances, such as wind events or fires could cause mortality, and revert stands to the zero-age class, but the timing, intensity, and scale cannot be predicted. Besides Nails Creek EA timber sales, the High Pass Salvage, Area of Environmental Critical Concern treatments and the past yarding wedges, there are no other past, present, or reasonably foreseeable actions outside of the analysis in the Siuslaw HLB Landscape Plan EA that would affect the age class distribution on the Siuslaw Field Office HLB.

3.2 How each alternative meets the Siuslaw Field Office's contribution to the Eugene SYU allocated ASQ, per decade.

This issue is being analyzed because it directly responds to the BLM's stated purpose and need (see section 1.3 Purpose and Need). As such, this issue's analysis would be used to inform the decision maker on how each alternative would contribute to the Eugene SYU allocated ASQ by using different harvest methods and acres to reach targets.

3.2.1 Background

The Siuslaw Field Office HLB was modeled to produce approximately 7.0 MMbf annually, this amount considers current age class distribution and past treatments (USDI - Bureau of Land Management, 2016c). According to the Northwestern & Coastal Oregon Record of Decision (USDI - Bureau of Land Management, 2016a, pp. 5-6), the 2016 ROD/RMP outlined the breakdown of ASQ by SYU and indicated each SYU has an allowable variance[11] of 40 percent in ASQ per year, and 20 percent in variance per decade. The Upper Willamette and Siuslaw Field Offices make up the Eugene SYU, which has an ASQ production of 53 MMbf per year, or 530 MMbf per decade. Approximately 13 percent of the HLB acres in the Eugene SYU are managed by the Siuslaw Field Office. Taking into consideration current age class distribution and past treatments, the Siuslaw Field Office HLB was modeled to produce approximately 7.0 MMbf (USDI - Bureau of Land Management, 2016c).

Rotation age plays a role in determining the number of acres desired in each age class, and the number of acres needed to reach ASQ by regeneration harvest and thinning. Rotation length is defined as "the planned number of years between the establishment of an even-aged or two-aged forest stand and its regeneration harvest" (USDI Bureau of Land Management, 2016b, p. 1078). For this project, the BLM used the assumptions in the Proposed RMP/Final EIS vegetation modeling for the percentage of HLB regeneration harvested per decade by sub land use allocation in MITA and LITA to determine the range of rotation ages used in the model. The Proposed RMP/Final EIS model allowed for a range of rotation ages in HLB from 60 years (18 percent of the HLB acres per decade) to 170 years (6 percent of the acres per decade) (USDI Bureau of Land Management, 2016b, p. 1215).

3.2.2 Analytical factors and assumptions

3.2.2.1.1 Methods

The BLM predicted the ability for each alternative to meet the Siuslaw's ASQ target of 7MMbf per year, or 70MMbf per decade based on stand inventory data, modeling predictions, and the number of acres in each type of harvest (regeneration or thinning) by alternative. The following methods were conducted to analyze the achievement of the ASQ target by alternative.

BLM used stand exam data collected by BLM contractors to determine current stand conditions for each age class within the project area. The BLM silviculturist input the stand exam field data into BLM software EcoSurvey and Oregon State University program ORGANON for stand metrics. Data was input into ORGANON and resulting treatment conditions were summarized in an output text file. The BLM compiled the model outputs, conducted analysis, and summarized the data in the excel workbook titled "HLB_Data_Outputs_SummaryTables" which is available in the administrative record.

A weighted average of predicted harvest volume was used for volume harvest calculations per decade to describe and analyze an averaged expected outcome per alternative. This was used because the BLM is conducting a programmatic review of a management strategy for the Siuslaw Field Office HLB land use allocation in the project area. As such, the alternatives do not describe where exactly the BLM would conduct harvest or what type of

[11] The potential variation in ASQ is included "…to acknowledge the practical difficulties in predicting annual implementation levels, to reflect the foreseeable year-to-year variation in BLM capacity to offer timber volume…" (USDI - Bureau of Land Management, 2016a, p. 6).

harvest, but instead describe the amount of harvest conducted of either regeneration or commercial thinning per decade. A weighted average of predicted harvest volume in thousand board feet per acre (Mbf/ac) was calculated by taking the estimated Mbf/ac harvested by age class, which ranged from 25Mbf/ac up to 105 Mbf/ac, then multiplying by the percent of that age class across the project area. Those weighted numbers were added together to get an average regeneration harvest and thinning volume by expected retention ranges.

Retention levels affect the volume produced from each alternative; more retention means less volume and the need to harvest more acres to reach the 7MMbf ASQ target. Based on the different emphasis for each alternative, BLM assumed the alternatives would trend towards different retention levels within the specific projects and included those values within this analysis. Alternative 3 would generally have a higher-level retention, with averaged regeneration harvest volume of 45Mbf/ac in MITA, and 30Mbf/ac in LITA. Alternative 4 would have a middle to higher range of retention, with averaged regeneration harvest volume of 50 Mbf/ac in MITA, and 35Mbf/ac in LITA. Alternatives 5 and 6 would retain a lower to middle range of retention, with averaged regeneration harvest levels of 55 Mbf/ac in MITA and 45 Mbf/ac in LITA. These estimated retention levels are to describe the likely differences between alternatives based on the design features within each alternative and incorporated a range of anticipated volume levels.

The BLM determined an average harvest volume for thinning by modeling stands to a thinned relative density within the RMP directed thresholds of 25-45 percent (USDI - Bureau of Land Management, 2016a, p. 60). During the analysis, the BLM used a minimum harvest volume of 8mbf/ac, which is the same as the Proposed RMP/Final EIS model, and is based on “historical timber sale experience” (USDI Bureau of Land Management, 2016b, p. 1192). The BLM found that the 30-year age class not previously thinned, and the recently (within 15 years) previously thinned stands could not meet the 8Mbf/ac harvest threshold at the minimum relative density thinning threshold of 25, and therefore were excluded from consideration when calculating the averaged thinning volume for this analysis. BLM modeled thinning to relative densities between 25 - 35 and determined that thinning to a relative density of 30 would meet all the parameters described above. BLM applied the thinning to a 30-relative density across age classes, and took a weighted average by age-class of the harvested volumes across the HLB, which produced an average thinning volume of 18Mbf/ac. This weighted average encompasses a range of expected harvested volume from thinning between 8Mbf/ac to 42Mbf/ac.

The HLB acres under consideration in this project were divided into potential treatment acres by decade based on the rotation length range under each alternative. The amount of volume produced decadally by regeneration harvest was calculated by using the weighted average harvested volume and the estimated regeneration acres by alternative based on rotation age. The number of thinning acres was then calculated dividing the remainder of the ASQ target minus the regeneration total, by the estimated weighted average thinning harvest volume (18mbf/ac). For example, if an estimated 65MMbf would be produced decadally by regeneration harvest, 5MMbf would need to be produced decadally by thinning (5MMbf [5,000Mbf] divided by 18Mbf per acre = 278 acres per decade).

To determine acres regeneration harvested in each alternative based on rotation ages, the BLM used current[12] inventory data in FOI to determine the number of acres in each 10-year age-class. The BLM calculated the range of acres per 10-year age-class in each alternative by using the number of acres by HLB sub-classification (MITA or LITA), and dividing the number of acres by land use allocation by the number of decades, including the 0-age class based on the rotation age. For example, an 80-year rotation age would have 9 ten-year age classes. 13,225 acres (project HLB acres)/9 = 1,470 acres in each 10-year age class.

The BLM used the vegetation modeling to analyze environmental effects and to estimate the ASQ for each alternative in the Proposed RMP/Final EIS. The vegetation modeling in the Proposed RMP/Final EIS is not a part of the 2016 ROD/RMP and is not included in the management direction. As such, it is inappropriate to use the vegetation modeling to evaluate the conformance of a resource management action with the RMP. However, it is useful as a point of comparison between alternatives. The alternatives were compared to tables created with the Proposed RMP/Final EIS stand data and modeling assumptions, which projected first decade harvest on HLB,

[12] Data was compiled in 2020.

broken out by field office, MITA, LITA, thinning and regeneration harvest, and the anticipated volume produced under each category (USDI - Bureau of Land Management, 2016c). This Proposed RMP/Final EIS model output shows the Siuslaw Field Office regeneration harvesting approximately 1,502 acres to produce 61,029 Mbf (61MMbf) and thinning 362 acres to produce 8,703Mbf (8.7MMbf), for a total first decade volume of 69,732 Mbf, or 69.8MMbf. It was from this table that the memo was written for the breakout of volume by field office in the Eugene SYU (USDI - Bureau of Land Management, 2019a). For this project, the BLM used 7.0 MMbf as the field office target ASQ annually and expanded that to a decadal target of 70MMbf. The differences in alternatives to meet the 20 percent variance in ASQ, or of 56 to 84 MMbf per decade can be found in the silviculture report for reference to show the full range of meeting ASQ targets.

3.2.2.1.2 Assumptions

- Decadal ASQ targets for the Siuslaw Field Office would be met by commercial harvest, either through thinning or regeneration harvest within the HLB land use allocation.
- Treatments that are within the modeling assumptions of the RMP (USDI Bureau of Land Management, 2016b, pp. 1190, 1207) would provide for sustained yield forestry into perpetuity, providing predictable average volume outcomes for future rotations (USDI - Bureau of Land Management, 2016a, p. 13); allowing the field office to meet its target over time.
- For commercial thinning, stands would need to meet minimum operational feasibility standards based on volume produced, which in the Proposed RMP/Final EIS and this analysis, is a minimum harvest volume of 8MBF/ac (USDI Bureau of Land Management, 2016b, p. 1192), and be thinned no lower than a Relative Density of 25 post-harvest (USDI - Bureau of Land Management, 2016a, p. 60). Stands not previously thinned in the 30-year age-class and older and stands previously thinned within the last 15 years did not meet the parameters described above, and therefore were not considered for thinning treatment in this analysis.
- Commercial thinning would yield an average of 18 Mbf/ac, based on a weighted average harvested volume by age class, thinning to a relative density of 30.
- Stands would need to be at least 50 years old to be considered for regeneration harvest (USDI Bureau of Land Management, 2016b, p. 1213).
- The upper ends of the rotation age in alternative 3 are 140 years for MITA and 170 years for LITA. This will provide 15 ten-year age classes (including the zero) within the rotation for MITA, and 18 ten-year age-classes for LITA, which produces an estimated regeneration harvest target of 670 acres in MITA (10,050/15) and 176 acres (3,175/18) in LITA per decade.
- The rotation age ranges for alternative 4 are 80 to 100 years in MITA, and 120 to 140 years in LITA. For this analysis, a range of harvested volumes were assumed for this alternative based on retaining a mid-to-high retention level (10 percent MITA, 25 percent LITA). Approximately 30 percent of the stands would have natural reforestation to focus areas on high-quality, complex early and stand establishment successional stages, with approximately 70 percent of the stands planted to ensure the stands are fully stocked by RMP standards.
- The rotation ages and resulting percent HLB regeneration harvested per decade in Alternative 5 is the same as Alternative 4; however, the assumed averaged retention in this alternative was in the low end of the retention range (5 percent MITA, 15 percent LITA), yielding slightly higher averaged estimated harvest volume from regeneration harvest. This also results in fewer thinning acres needed to reach the 70MMbf target, as well as the 20 percent variances. The most intensive timber management practices were assumed for this alternative, using the minimum retention, and reforesting with at least 450 trees per acre of Douglas-fir.
- In Alternative 6, a rotation age would be 80 years would produce 9 age classes (including the zero age class). With minimum retention analyzed (5 percent in MITA, 15 percent LITA), and reforestation at 450 TPA of Douglas fir.

3.2.2.1.3 Impact Indicators

The impact indicators are the number of acres harvested by regeneration and thinning, and the volume predicted from timber harvest decadally.

3.2.3 Spatial Scope

The spatial scope of this issue is 13,225 acres of the HLB, which is the project area of the EA and defined in Chapter One.

3.2.4 Temporal Scope

The temporal scope of this analysis is set at two decades. This analysis period is considered as the longest extent that the direct and indirect effects of the BLM's actions analyzed in this project would occur. Based on past projects, analyzing this issue into a third decade would be speculative. Section 1.1 summarizes previous landscape plan environmental assessments analyzed in the Siuslaw field office. These multiple environmental assessments were implemented over the course one decade and into the beginning of a second decade. However, no project extended into a third decade. Based on this history BLM concluded projecting out more than two decades would be speculative.

3.2.5 Affected Environment/Environmental Consequences

3.2.5.1 ***Project Acres***

Current vegetation data in GIS shows that the Siuslaw Field Office manages approximately 13,225 acres in this project, approximately 10,050 acres in MITA and 3,175 in LITA, (See Admin file "Even_AgeClass_Calculation.").

3.2.6 Direct and Indirect Effects

3.2.6.1 ***Alternative 1 (No Action)***

In the no action alternative, no acres would be treated. The Siuslaw field office would not meet its ASQ target. no volume would be harvested, and the purpose and need for this project would not be met.

3.2.6.2 ***Alternative 2***

Under this alternative, ASQ volume targets would be met through thinning. Approximately 3,070 of the project area's 13,225 acres have been thinned within the last 15 years and would not be immediately available for an additional entry. Based on model information, these acres would be commercially viable for thinning (thin to a minimum relative density of 25, and produce 8Mbf/ac as described in the methods) in 10 to 20 years from this analysis, depending on how recently they were thinned. An additional 3,765 acres are 30 years old or younger and not commercially viable for thinning in the first decade, which leaves approximately 6,415 acres available for commercial thinning in the first decade. With the assumption of thinning producing 18Mbf/ac from timber harvest, approximately 3,889 acres would need to be thinned per decade to meet the Siuslaw Field Office ASQ target of 70MMbf per decade.

3.2.6.3 ***Alternative 3***

With the upper rotation ages for this alternative of 140 years in MITA and 170 years in LITA approximately 30MMbf per decade would come from MITA, and 5MMbf per decade would come from LITA, with a combined 35 MMbf per decade from regeneration harvest. This leaves an additional 35 MMbf to be generated from thinning to meet the Siuslaw Field Office ASQ target decadal target of 70 MMbf. To produce 35 MMbf, 1,944 acres per decade (35,000Mbf/18Mbf/ac) would have to be thinned.

In the lower rotation age range of 110 years in MITA and 140 years in LITA under this alternative, approximately 44MMbf per decade would be produced from regeneration harvest on 1,050 acres (838 acres MITA, 212 acres LITA). To reach the middle ASQ target of 70MMbf, approximately 1,444 acres would be thinned to produce 26MMbf.

Harvesting at the lower rotation age-level would result in the closest regeneration harvest acres to the Proposed RMP/Final EIS model which is approximately 500 fewer acres per decade than the Proposed RMP/Final EIS model output. The lower regeneration harvest acres are made up with higher levels of thinning, which in reaching the middle volume target of 70MMbf is approximately 1,100 acres above the predicted thinned acres on the lower rotation age harvest level.

3.2.6.4 ***Alternative 4***

With the upper rotation ages for this alternative of 100 years in MITA and 140 years in LITA, approximately 914 acres of MITA and 212 acres of LITA would be regeneration harvested to produce 53MMbf per decade (46 MMbf MITA and 7 MMbf LITA). To reach the ASQ target of 70MMbf, approximately 944 acres would be thinned to produce 17MMbf.

With the lower rotation ages for this alternative of 80 years in MITA and 120 years in LITA, approximately 1,117 acres in MITA and 244 acres in LITA would be regeneration harvested per decade, resulting in approximately 65 MMbf per decade (56 MMBF MITA and 9 MMBF LITA) from regeneration harvest. To reach the ASQ target of 70MMbf, approximately 278 acres would be thinned to produce 5MMbf.

Regeneration harvesting at the lower rotation ages yields very similar results to the first decade Proposed RMP/Final EIS modeling output (USDI - Bureau of Land Management, 2016c).

3.2.6.5 ***Alternative 5***

Regeneration harvesting at the upper range of the rotation ages (100 years in MITA and 140 years in LITA) would require approximately 914 acres of MITA and 212 Acres of LITA, producing approximately 60MMbf (50MMbf MITA and 10MMbf LITA). To reach the middle ASQ target of 70MMbf, approximately 556 acres would be thinned to produce 10MMbf.

Regeneration harvesting at the lower end of the rotation ages (80 in MITA, 120 in LITA) would require approximately 1,120 acres in MITA and 244 acres in LITA, resulting in approximately 62MMbf from MITA and 11MMbf in LITA (73MMbf total) per decade from regeneration harvest. This management level exceeds the middle decadal goal of 70MMbf per decade and therefore would not require thinning.

As with alternative 4, this alternative is very close to the first decade modeling outputs for regeneration harvest, however; this alternative is predicted to harvest half of the thinning acres the Proposed RMP/Final EIS model output predicted per decade (USDI - Bureau of Land Management, 2016c).

3.2.6.6 ***Alternative 6***

A rotation age of 80 years would result in 1,117 acres of MITA, and 353 acres of LITA to be regeneration harvested per decade. This level of regeneration harvesting per decade would produce approximately 61MMbf from MITA, and 16MMbf from LITA (77MMbf) per decade. This level exceeds the middle regeneration harvest ASQ target of 70 MMbf per decade, but is within the 20 percent variance between 56MMbf and 84MMbf per decade.

Regeneration harvesting on an 80-year rotation level would meet and exceed the Siuslaw Field Office ASQ target. This alternative does not allow for thinning, while the Proposed RMP/Final EIS model output predicted approximately 362 acres of thinning per decade.

3.2.6.7 ***Comparison of action alternatives***

Each action alternative would meet the declared ASQ and variances by different combination of regeneration harvesting and/or thinning. Alternative 2 is predicted to meet the decadal target by thinning 3,389 acres per decade, with no regeneration harvest. It is the least consistent with the Proposed RMP/Final EIS modeling assumptions that predicted harvest levels based on sustained yield forestry. Alternatives 3, 4 and 5 would meet the 70MMbf decadal target by implementing different combinations of regeneration and thinning harvest acres. Alternative 3 would regeneration harvest 846-1,050 acres and thin 1,444-1,944 acres. Alternative 4 and 5 would regeneration harvest 1,126-1,361 acres, with alternative 4 predicted to thin 278-944 acres, and alternative 5 predicted to thin between 0 and 556 acres to meet the decadal target of 70MMbf. Alternative 6 is consistent with the anticipated regeneration harvest acres predicted in the Proposed RMP/Final EIS model output at 1,470 acres. It exceeds the decadal target of 70MMbf by 7MMbf, and falls within the 20 percent variance range. Thinning would not take place in Alternative 6, which is a divergence from the Proposed RMP/Final EIS modeling. The 80-year rotation harvest levels in alternatives 4 and 5 are the most consistent with the decadal harvest acres predicted for both regeneration and thinning from the Proposed RMP/Final EIS modeling. Alternative 3 is consistent with the model but would rely more heavily on thinning than the Proposed RMP/Final EIS modeling predicted.

ASQ Table 1. Comparison of acres and volume harvested per decade by alternative to meet roughly 70MMbf

Harvest Volume and Acres Harvested by Alternative and Harvest Method							
Alternative	**Rotation Length Range MITA, LITA (Years)**	**Acres of Regen per Decade**	**Volume by Regen Decade (MMbf)**	**Acres of Thinning per Decade**	**Volume by Thinning per Decade (MMbf)**	**Combined Range of Acres Treated per Decade***	**Combined Range of Expected Volume per Decade (MMbf)***
Alternative 2	NA	NA	NA	3,889	70	3,889	70
Alternative 3	MITA 110-140 LITA 140-170	846-1,050	35-44	1,444-1,944	26-35	2,290-2,994	61-79
Alternative 4	MITA 80-100 LITA 120-140	1,126-1,361	53-65	278-944	5-17	1,404-2,305	58-82
Alternative 5	MITA 80-100 LITA 120-140	1,126-1,361	60-73	0-556	0-10	1,126-1,917	60-83
Alternative 6	80	1,470	77	NA	NA	1470	77

* These numbers are based on the lowest predicted regeneration acres plus the lowest predicted thinning acres, and the highest predicted regeneration acres plus the highest predicted thinning acres to show the largest possible treatment range within an alternative. Combined ranges were not confined to specific numbers within a rotation age, rather the most and fewest possible within the alternative across rotation ranges.

3.2.7 Reasonably Foreseeable/Cumulative Effects

Most of the cumulative effects to meeting the ASQ volume targets for Siuslaw Field Office will be from implementation of this HLB Landscape Plan EA. Other contributions to decadal ASQ target for Siuslaw Field Office will be from the Nails Creek EA. Approximately 225 acres between the 100- and 130-year age classes were analyzed under the Nails Creek EA, and are scheduled to be regeneration harvested from 2020 through 2025. After harvest, these acres would be reassigned from the 100 to 130-year age class, to the 0-age class. Approximately 20 acres within the Nails Creek EA is a 50-year-old stand and would be thinned. These sales

would contribute approximately 21MMbf to the first decade harvest. Since the signing of the 2016 ROD/RMP, approximately 940Mbf of ASQ volume has been harvested from salvage, small hazard tree removals, and negotiated right of way clearing or yarding wedges. Approximately 1.3MMbf has been harvested in ASQ volume from modifications to timber sales under the 1995 RMP, but contributed to targets after the 2016 RMP was signed. Using the average modification volume from active sales that contribute to ASQ as a reference, an estimated 325Mbf would be harvested and count towards the annual ASQ target per year, or 3.3MMbf per decade. The only unforeseeable harvested volume that may contribute towards ASQ would be either from third party negotiated right of way clearing and yarding wedges, salvage that occurs from a weather event, fire, or outbreak of disease, modification volume from active timber sales, or a small project within the Areas of Critical Environmental Concern. No tramway or yarding wedges within the HLB are planned. Specific weather/fire events and disease outbreaks cannot be predicted for cumulative effects. However, should they occur BLM would determine the appropriate level of NEPA analysis, and whether implementing a DNA from this EA is appropriate. No projects within the Area of Environmental Critical Concern are currently planned, and if one should be proposed in the future, would also be analyzed under a separate NEPA document. Outside of the sources mentioned, there are no other past, present, or reasonably foreseeable actions not included in the analysis for the HLB EA that would affect contribution of ASQ to the Siuslaw Field Office Target of 70MMbf per decade. Since, the ASQ volume target can only be met by harvest from HLB, and since less than 10 percent of Siuslaw Field Office is HLB, there is low potential for significant ASQ volume to come from other sources, such as salvage of fire or weather events.

3.3 How would timber harvest result in different relative levels of complexity for early successional ecosystems?

The BLM decision maker identified this issue as important to the final decision selecting a management strategy for the project area. Because the 2016 ROD/RMP provides HLB management direction to "Produce complex early-successional ecosystems" (USDI - Bureau of Land Management, 2016a, p. 59). As such, the BLM is analyzing this issue in detail to inform the decision maker and the public about the amount of early successional ecosystem produced per decade and its associated relative complexity.

3.3.1 Background

Under the 2016 RMP, two of the management objectives in the HLB are to provide complex early-successional ecosystems and develop diverse late-successional ecosystems for a portion of the rotation (USDI - Bureau of Land Management, 2016a, p. 63). Implementing management direction for each land use allocation achieves the management objectives for that land use allocation (USDI - Bureau of Land Management, 2016a, p. 3). Therefore, in the HLB, all alternatives would provide some level of complexity in the early successional ecosystem that is created by timber harvest. However, there is a difference in the relative complexity and corresponding habitat quality of early successional ecosystems created under the alternatives in this EA. The difference in relative levels of complexity between alternatives is analyzed in this issue.

3.3.1.1 *What is a complex early successional ecosystem?*

Early successional ecosystems occur in the successional stage between a stand-replacing disturbance (such as wildfire, wind event, volcanic eruption, severe flood, snow avalanche, or logging) and subsequent tree canopy closure (Swanson, Studevant, Campbell, & Donato, 2014, p. 160). Early successional ecosystems, in this document, refers to the forest structural stage as well as the corresponding habitat for the diverse group of species that relies on or uses this stage in forest development.

Two of the structural attributes associated with complex early successional forest in the Pacific Northwest are (1) an abundance of broadleaf vegetation associated with ample light due to a lack of canopy cover and (2) abundant biological legacies from the pre-disturbance ecosystem (Swanson, Studevant, Campbell, & Donato, 2014, p. 161).

Under natural conditions, there is a gradual, decades-long conifer establishment period after a disturbance. This allows non-coniferous vegetation to dominate or co-dominate for approximately 10-50 years (Swanson, Studevant, Campbell, & Donato, 2014, p. 162) before the canopy closes and shade-intolerant species, such as hardwoods, decline. The length of the early successional pre-forest stage and the dominant vegetation varies depending on subsequent disturbances or tree regeneration patterns (Swanson, Studevant, Campbell, & Donato, 2014, p. 162).

In contrast, simple early successional ecosystems are often generated by timber harvest, where stands are typically rapidly replanted to provide future crop trees. Vegetation management and narrow spacing of conifer seedlings in conifer plantations reduce competition from other species and enhance conifer growth. Hardwood trees and shrubs are often cut or sprayed with herbicide to increase growing space for the desired species of conifer (Hagar J. , 2007, p. 108).

3.3.1.2 *Early Successional Structural Stage Characterized in the Proposed RMP/Final EIS*

In this issue, the Early Successional *structural stage* refers to the structural stage of forest development defined in the Proposed RMP/Final EIS, and, as such, refers to forest stands that are in this stage. Early successional *ecosystem* refers to the use of that structural stage by an assemblage of vertebrate species for nesting, foraging, and cover. In general, the more complex the structure, the greater the diversity of ecological niches, which leads to the higher species diversity found in complex early successional ecosystems.

All stands that are regeneration harvested under the 2016 ROD/RMP would have some legacy structures; therefore, the resulting early successional stands are called Early Successional with Structural Legacies in the

Proposed RMP/Final EIS. The BLM analyzed the effects of the Proposed RMP on early successional ecosystems in the 2016 Proposed RMP/Final EIS for the Western Oregon planning area when they analyzed habitat for Bureau Sensitive Species (USDI Bureau of Land Management, 2016b, pp. 833-841); that discussion is incorporated here by reference. The BLM tabulated the percentage of the decision area in each structural stage, comparing current (i.e., 2013) condition with the alternatives, the no timber harvest reference condition, and the average historic condition. Under the Proposed RMP, the Early Successional structural stage in the decision area would increase from two percent in 2013 to 3 percent in 50 years (i.e., 2063) (USDI Bureau of Land Management, 2016b, p. 838). The analysis in this EA builds on the analysis in the Proposed RMP/Final EIS, but this analysis is at a finer scale. In this EA, we analyze *relative* levels of complexity of early successional ecosystems within the parameters established in the RMP and at the Field Office scale.

In the Proposed RMP/Final EIS for Western Oregon, the BLM defines complex early successional stands as having “abundant large trees, large snags, and large down woody material that originated during the development” of the previous stand (USDI Bureau of Land Management, 2016b, p. 833). Complex early successional stands also have “high vegetative diversity (in both the understory and overstory) and long development times for early successional vegetation” (USDI Bureau of Land Management, 2016b, p. 833). “In contrast, simple Early Successional stands have fewer (if any) residual large trees, large snags, and large down woody material” (USDI Bureau of Land Management, 2016b, p. 833).

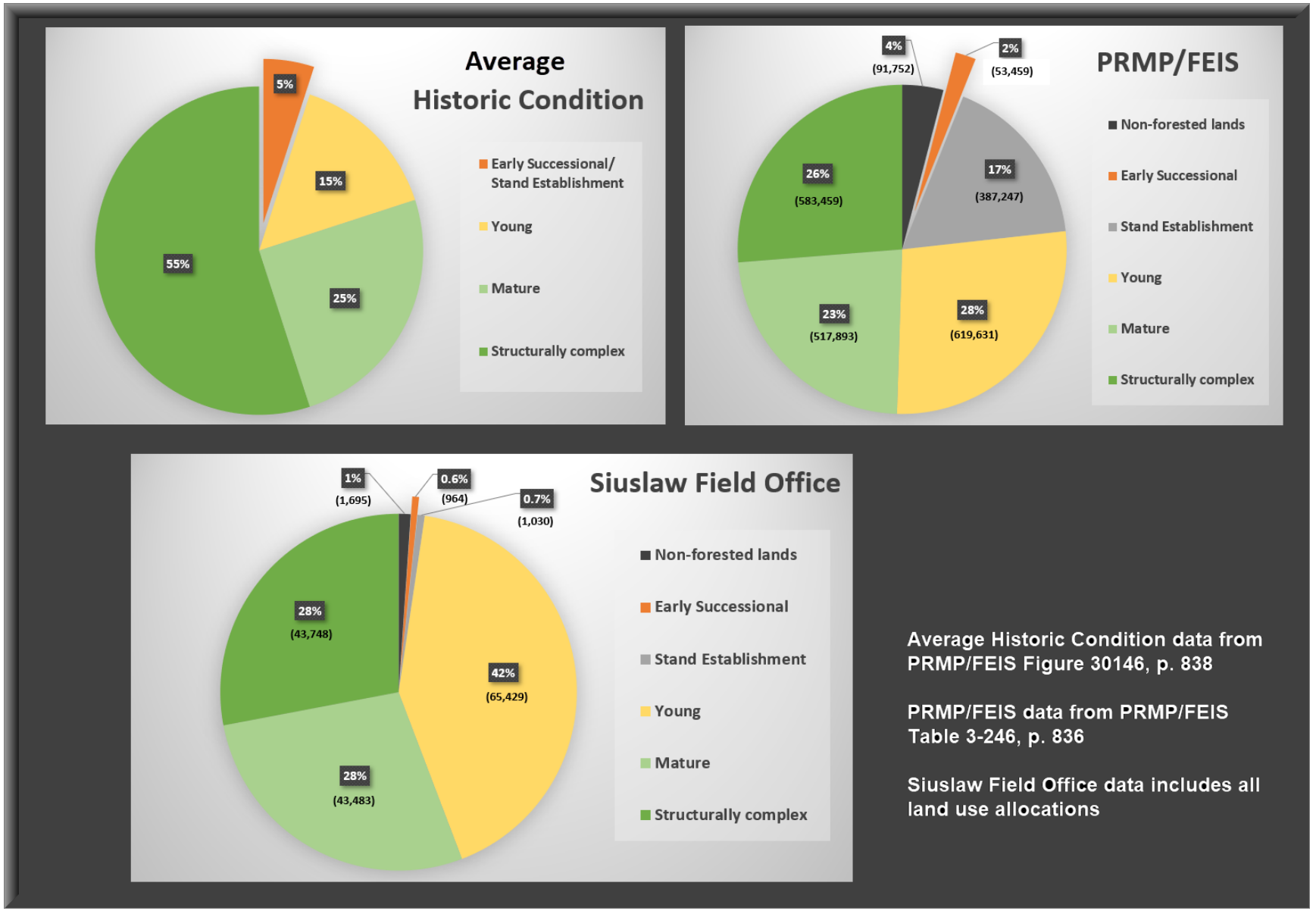
Figure 1 shows a comparison of the amount of BLM managed land in the structural stages from the Proposed RMP/Final EIS (at the Plan level, p. 838) and the average historic condition (also from the Proposed RMP/Final EIS, p. 836) compared to BLM managed lands on the Siuslaw Field Office, considering all land use allocations. The average historic condition in the Proposed RMP/Final EIS combines the structural stages of Early Successional and Stand Establishment, as it is based, in part, on the analysis by Nonaka and Spies (Nonaka & Spies, 2005) and Wimberly (Wimberly, 2002). These papers combined Early Successional and Stand Establishment structural stages, which is reflected in the average historic condition in Figure 1. A discussion of how the BLM derived the average historic condition is found in the 2008 Final EIS and is incorporated here by reference (USDI Bureau of Land Management, 2008b, pp. 211-212). For current (2013) and future conditions, the 2016 Proposed RMP/Final EIS split the Early Successional and Stand Establishment structural stages and we are following that convention in this analysis (Figure 1, Proposed RMP/Final EIS and Siuslaw Field Office).

Less than one percent of BLM managed lands[13] on the Siuslaw Field Office is currently in the Early Successional structural stage[14]. This is less than the five percent Early Successional/Stand Establishment structural stages on the landscape in the average historic condition from the Proposed RMP/Final EIS (Figure 1) (USDI Bureau of Land Management, 2016b, pp. 838, Figure 3-146).

[13] Excluding non-forested areas such as roads, wetlands, seed orchard, and the Walton maintenance facility.

[14] From the BLM Forest Operations Inventory (FOI) GIS layer.

Early Successional Ecosystem Figure 1. Structural stages in Proposed RMP/Final EIS compared to BLM managed lands in Siuslaw Field Office and Average Historic Condition from Proposed RMP/Final EIS. Acres in parentheses.



3.3.2 Analytical Process

The BLM identified specific structural elements important to complex early successional ecosystems that can be varied within the RMP sideboards as listed under the management direction for the HLB. These elements, or impact indicators, were used to evaluate the difference in relative complexity of the early successional ecosystem created under each alternative. The structural elements evaluated under each alternative were (1) Legacy structures – green trees (abundance); (2) Legacy structures – green trees (quality and configuration); (3) Legacy structures – snags; (4) Hardwood nut, drupe, berry production and cavities; (5) Diversity of tree species; and (6) Average number of years a stand remains in the Early Successional stage before transitioning to the Stand Establishment stage. The more acres with a High relative level of complexity in the resultant early successional ecosystem, the greater the diversity of ecological niches.

The literature describing complex early successional ecosystems is largely qualitative, and parameters found were specific to species and not necessarily within the levels allowable under the RMP (e.g., number of snags per acre). Therefore, using the assumptions delineated in 3.3.2.1 Assumptions, the Interdisciplinary Team identified metrics associated with three relative levels of complexity (Early Successional Ecosystem Table 1). The range in metrics for each structural element, or impact indicator, was determined by the parameters in the management direction for the HLB in the RMP (USDI - Bureau of Land Management, 2016a, pp. 59-63) or established silvicultural practices. The relative complexity value was determined based on whether the metric was associated with increased complexity (High relative complexity value), decreased complexity (Low relative complexity value), or in the middle (Medium relative complexity value). A description of the metrics and corresponding relative complexity levels for each impact indicator is shown below in Early Successional Ecosystem Table 1.

Early Successional Ecosystem Table 1. Relative Levels of Complexity based on Impact Indicators

Impact Indicator	Relative Level of Complexity		
	High	**Medium**	**Low**
Legacy structures – green trees (abundance)	20-30%	10-19%	< 10%
Legacy structures – green trees (quality and configuration[15])	Most or all remaining trees have or would develop wildlife characteristics. Legacy trees both in aggregates and dispersed configurations that provide maximum complexity. Aggregates clumped around existing snags and hardwood trees (up to amounts below).	Half of remaining trees have or would develop wildlife characteristics and half have merchantable value in future harvest. Legacy trees both in aggregates and dispersed configurations that provide some complexity. Aggregates clumped around existing snags and hardwood trees (up to amounts below).	Remaining trees have merchantable value in future harvest. Legacy trees configured for ease of logging operations.
Legacy structures – snags	At least 50% of existing snags ≥ 20 inch DBH[16] are clumped with buddy trees & created snags. Snags created using method where tree dies slowly.	At least 25% of existing snags ≥ 20 inch DBH are clumped with buddy trees & created snags. Half of created snags base girdled and half using method where tree dies slowly.	Existing snags would be retained if they do not need to be cut for safety or operational reasons but would not be buffered for protection from logging activities. Snags created by base girdling.
Hardwood nut, berry, and drupe production and cavities	Hardwood trees up to 50% of pre-harvest basal area remain* after harvest. All oaks* remain.	Hardwood trees up to 25% of pre-harvest basal area remain* after harvest. All oaks* remain.	Hardwood trees, except oaks, are available for harvest. All oaks* remain.
Abundance of tree seedlings after reforestation	Min 130 TPA (LITA) Min 150 TPA (MITA)	185-220 TPA (LITA) 220-260 TPA (MITA)	450-500 TPA (both LITA & MITA)
Tree species diversity	At least 3 species (includes hardwood trees)	At least 2 species (may include hardwood trees)	At least 1 species (all conifer)
Average years in early successional ecosystems (i.e., years to reach 30% canopy cover)	24-30	17-23	10-16
* If not a safety concern and operationally feasible.			

3.3.2.1 ***Legacy structures – green tree (abundance)***

This impact indicator measures the abundance of green tree legacy structures remaining in the early successional habitat created by regeneration harvest. More abundant legacy structures such as green tree create more

[15] Exclusive of trees that the BLM determines to have established prior to 1850 and are ≥ 40 inch DBH. These will be left in place under all alternatives unless they need to be cut for safety or operational reasons (USDI - Bureau of Land Management, 2016a, p. 60).

[16] If there are limited snags with ≥ 20 inch DBH, the next largest existing snags would be protected in like manner.

structural complexity in the resulting early successional stand. The relative level of complexity is ranked on a continuum because early successional ecosystems provide complexity on a continuum regardless of designated land use allocation.

3.3.2.2 ***Legacy structures – green trees (quality and configuration)***

This impact indicator evaluates the quality and configuration of the green tree legacy structures. For high relative complexity, green trees that remain after harvest would be selected for their current and potential value to wildlife. For example, trees (generally > 20 inch DBH) with deformities such as candelabras, cavities, or "wolfy" branch structure would be left in the stand. These are more likely to provide soft interior wood (due to heart rot) used by primary cavity excavators (such as woodpeckers) and cavity nesters; therefore, these provide higher quality wildlife habitat. For low relative complexity, straight, large-diameter green trees that could contribute to the next harvest rotation would remain. These are generally healthy trees that are less likely to provide the conditions needed for primary cavity excavators and therefore provide lower quality legacy structures for wildlife.

Under a High relative level of complexity, these green tree legacy structures would be found in both aggregate clumps and dispersed configurations. Aggregate clumps would surround existing snags, hardwood trees, or trees with characteristics important to wildlife to protect them from logging damage. Other places that would have aggregate clumps are areas of botanical or hydrological importance, to protect special features such as rare or uncommon plants or seeps. Created snags would be created in these aggregates to create snag patches.

Dispersed legacy structures would be found in other areas of the early successional ecosystem for species that require a lower density of snags, such as the purple martin. Together this arrangement creates a higher relative level of complexity for the early successional ecosystem created after harvest.

Under a Low relative level of complexity, legacy green trees would be generally dispersed because they would be chosen for the value of their timber in future harvests. Aggregates of remaining trees would occur along the edges of a stand or in areas inaccessible to harvest activities. The goals of legacy green trees to a) sustain or "life-boat" species and processes; b) structurally enrich the post-harvest early successional ecosystem; and c) improve connectivity for biota in the early successional ecosystem (Franklin, Johnson, & Johnson, 2018, p. 93) would not be served (Franklin, Johnson, & Johnson, 2018, p. 104). This would create early successional ecosystems with less structural diversity throughout the stand resulting in a Low relative level of complexity.

Trees that are both ≥ 40 inch DBH and that the BLM determines were established prior to 1850 would remain in place as legacy structures under all alternatives (USDI - Bureau of Land Management, 2016a, p. 60). If such trees need to be cut for safety or operational reasons, they would be retained in the stand and become large dead wood. These trees contribute to early successional ecosystem complexity, but the BLM would not move them from their current location.

3.3.2.3 ***Legacy structures – Standing Trees with Heart Rot***

This impact indicator evaluates the amount and quality of existing snags that are retained as legacies in the early successional ecosystem. Existing snags would be retained under all alternatives (USDI - Bureau of Land Management, 2016a, p. 60). However, in early successional ecosystems with high relative complexity, these snags would be part of aggregate clumps which include "buddy trees" that protect the snag from logging damage and also contain created snags. Buddy trees are those that grow adjacent to the snag and remain in a patch around the snag. This protects the snag from logging damage that may cause the snag to break or fall. Greater residual live tree density around snags may decrease breaking rates and increase bark and wood retention by protecting snags from environmental factors (Barry, Joan, & Rivers, 2017, pp. 145-146). Clumps of snag patches would increase the spatial heterogeneity of the early successional ecosystem by providing groups of current and developing snags for wildlife that depends on them. In one study, more primary cavity nesters were detected in larger patches of aggregated retention within clearcuts than in the nearby forest (Bunnell, Boyland, & Wind, 2002, p. 744). Many species of cavity nesting birds feed on wood-boring insect larvae and require dead wood as a foraging substrate within a territory. Therefore, they require feeding sites as well as nest sites within territories.

The pattern of snag clumping provides both nesting and foraging opportunities within close proximity. Clustered snags may promote greater insect colonization and subsequent colonization by fungi, bacteria, and invertebrates (Barry, Joan, & Rivers, 2017, p. 146). The more snags that occur in an area, the higher the probability that at least some have suitably soft interior wood required by primary cavity excavators (Lorenz, Vierling, Johnson, & Fischer, 2015, p. 1028). Also, larger diameter trees stand longer and have nest cavities more often than smaller diameter trees (Parks, Conklin, Bednar, & Maffei, 1999, p. 8). Created snags would be created by methods which would allow the tree to die slowly (including, but not limited to, high girdling, tree topping, reserving damaged trees, fungal inoculation, etc.). This allows heart rot to soften the interior wood to a level preferred by primary cavity excavators (Lorenz, Vierling, Johnson, & Fischer, 2015, p. 1016). Together, these features provide a High relative level of complexity to the early successional ecosystem for this impact indicator.

Under a Low relative level of complexity, snags would survive in the early successional ecosystem only if they did not present a safety issue or needed to be cut for operational reasons. According to our Timber Sale Administrator, it is likely that most, if not all, of the existing snags would not remain as snags in the early successional ecosystem (Miller, 2021). Under a Low relative level of complexity, snags would be created by base-girdling. Many of these would fall within the first 5-10 years (Parks, Conklin, Bednar, & Maffei, 1999, pp. 2-3).

3.3.2.4 ***Hardwood Nut, Berry, Drupe Production and Cavities***

This impact indicator evaluates the level of nuts, berries and drupes that are produced by hardwood trees and used as food sources for wildlife. Nuts, or hard mast, are produced annually, but production tends to be highly variable. Having a variety of hard mast producing hardwood species in a stand would compensate for the variability in fruit production within any one species (McComb, 2016, p. 43). Berries and drupes, or soft mast, are high in energy and used by many wildlife species. Since trees and shrubs flower and produce fruit at different times of the year, a diversity of hardwood species is important (McComb, 2016, p. 43). Hardwood trees, such as Oregon oak, Pacific madrone, and bigleaf maple, also produce natural cavities and dead limbs that are used by cavity-nesting animals (McComb, 2016, p. 45). For these reasons, the design feature to retain all hardwood trees would result in an early successional ecosystem with a High relative level of complexity. Retaining only oak trees would result in only one species of hardwood with only acorns (hard mast) as a food source. The oaks remaining may have naturally occurring cavities. However, the early successional ecosystem resulting from the design feature of retaining only oaks would result in a Low relative level of complexity because the diversity of food sources and potential cavities from hardwood trees would be restricted to one genus (*Quercus*).

3.3.2.5 ***Diversity of Tree Species***

This impact indicator evaluates the diversity of tree species in the early successional ecosystem after harvest. Richness of tree species is considered a core variable of forest structure that is recognized as important for biodiversity in forests. Species have different physical structures and growing rates. “Species richness of trees with DBH ≥ 7 cm is important for diversity of dependent species, in particular host-specific herbivores, detritivores, symbionts and pathogens” (Storch, Dormann, & Bauhus, 2018, p. 7). Species richness of trees in regeneration stands (DBH < 7 cm) is “important for many taxa like insects, mammals, and birds; high SR Reg[17] leads to more diverse future stand conditions” (Storch, Dormann, & Bauhus, 2018, p. 7). Including hardwood trees in the number of tree species seedlings would also create heterogeneity in the early successional ecosystem. Mixed species stands have several tree and shrub species, often with foliage distributed in several layers (understory, midstory, and overstory). These multilayer stands tend to support more species of vertebrates than a one-layer stand (McComb, 2016, p. 38). Therefore, a higher number of tree species and including hardwoods would result in a High relative complexity rating for the early successional ecosystem. Conversely, homogeneous stands (i.e., one conifer tree species) with evenly spaced trees and uniform canopies offer few niches, so animal diversity is

[17] [Tree] species richness in regeneration

lower in these stands (McComb, 2016, p. 40). This would result in a Low relative level of complexity for the early successional ecosystem.

3.3.2.6 *Average Years in Early Successional Ecosystem*

This impact indicator evaluates the duration of the early successional ecosystem, which results from the number of trees per acre. Average years in early successional ecosystem was measured by the number of years that it would take an early successional stand to reach ≥ 30 percent canopy cover. At this time, it would transition into a Stand Establishment stage.

An early successional ecosystem with trees growing at low stocking levels (i.e., minimum 130 TPA in LITA and minimum 150 TPA in MITA) would allow more growing space for other species, such as broadleaf vegetation. Low-density regeneration will allow sunlight to penetrate through the tree crowns for a longer period of time before the tree crowns overlap one another and shade out many early successional plants (McComb, 2016, pp. 97, 100). Wide reforestation spacing can lead to a longer lasting grass-forb-shrub phase (McComb, 2016, p. 100) and a greater diversity of plant species, including broadleaf vegetation, in the resulting early successional ecosystem. Modified planting densities and other silvicultural practices that control stand density would favor the development of understory herbs, shrubs, and a diversity of tree species (Hagar J. C., Wildlife species associated with non-coniferous vegetation in Pacific Northwest conifer forests: A review, 2007, p. 108). This increases the complexity and duration of the resulting early successional ecosystem and results in a High relative level of complexity.

Conversely, high conifer stocking levels (e.g., 450-500 TPA) would result in more conifer seedling trees. High stocking levels increase the number of conifers by planting desirable tree species, thereby decreasing the available growing space for broadleaf vegetation. Homogeneous stands with evenly spaced trees and uniform canopies offer fewer niches, so animal diversity is often lower in these stands (McComb, 2016, p. 40). High stocking levels result in a shorter duration of years in early successional ecosystem because the density of trees would result in tree canopies touching sooner. The stand would transition out of the early successional ecosystem in about 10-16 years when canopy cover reaches ≥ 30 percent. This results in a Low relative level of complexity for this impact indicator.

3.3.2.7 *Assumptions*

The following assumptions were made in the analysis.

- Greater amounts and diversity of legacy structures increase the complexity and quality of early successional ecosystems created after timber harvest (USDI Bureau of Land Management, 2021, pp. 2-3) .
- The following are elements of stand complexity: higher levels of legacy elements such as green trees and snags, greater amounts of hardwood, natural reforestation with lower conifer stocking levels, diversity of tree species (Storch, Dormann, & Bauhus, 2018, p. 7), and delayed development of closed canopy cover.
- When snags are created with methods that allow a tree to die slowly (including, but not limited to, high girdling, tree topping, reserving damaged trees, fungal inoculation, etc.), heart rot spreads inside the tree creating soft wood inside. Soft interior wood is important for North American primary cavity excavators (Lorenz 2015 p. 1026).
- About 75 percent of snags that are created using methods that allow a tree to die slowly (see previous bullet) would have or develop heart rot.
- An increased number of hardwood trees yields more nuts, drupes, and berries as well as the potential for more naturally occurring cavities in species such as Oregon white oak, Pacific madrone and bigleaf maple (McComb, 2016, p. 45).
- Natural regeneration would delay the progression of coniferous establishment by 10 years or more, depending on the site (USDI Bureau of Land Management, 2016b, p. 1190) in comparison to a stand planted to a fully stocked level. It is assumed that we will meet the desired species diversity and stocking

levels as stated by alternative. If we do not meet the minimum reforestation requirements, we would interplant. We are also assuming that we will maintain the desired density targets by alternative with silvicultural practices such as precommercial thinning. For example, if natural regeneration produces 500 TPA in a unit, under Alternative 4, moderate complexity, we would pre-commercially thin the unit to 220-260 TPA in MITA and 185-220 TPA in LITA. The assumption is that the stands will meet the conditions we are predicting; if they do not, we would employ silviculture tactics to maintain the conditions we analyzed in the alternatives.

- The BLM followed general stocking targets, and reforestation modeling assumptions as outlined in the 2016 Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, p. 1191). Under Alternative 3, it was assumed that the stands would have a stand-level average of at least 130 TPA in LITA and at least 150 TPA in MITA within five years of harvest, and this density would be maintained throughout the early successional stage. Under Alternatives 4-6, it was assumed that stands would have a density of 250 TPA at the age of 15, due either to precommercial thinning (Alternatives 5 and 6) or moderate planting densities (Alternative 4). The 1/3 higher complexity portion of Alternative 4 would be similar to Alternative 3.
- Some trees in the retention areas would die and provide additional snags or downed wood.
- When stands have ≥ 30 percent conifer canopy cover, they transition into the Stand Establishment or Young Stand structural stages (USDI Bureau of Land Management, 2016b, pp. 1080; 1203-1204).
- Group Selection Openings in thinnings would provide small inclusions of early successional ecosystems in young and mature stands and increase stand complexity but are not included in the calculation of acres of early successional ecosystems, consistent with the Proposed RMP / Final EIS (USDI Bureau of Land Management, 2016b, pp. 308, Footnote 54). Group selection openings in thinnings create early successional ecosystems for some species, such as those with a small home range. White-footed mice, for example, were found in 0.25-acre gaps, but not in larger openings. A similar species, deer mice, were not found in small openings but were more abundant in larger openings (McComb, 2016, p. 79). However, for many processes and organisms, small gaps or group selection openings do not substitute for complex early successional ecosystems created by larger disturbances. Small openings are generally “still under the microclimatic control of the adjacent forest and experience an array of biotic and abiotic edge effects” (Swanson, Studevant, Campbell, & Donato, 2014, p. 15). These group selection openings change the vegetative characteristics of the existing stand, but do not count as a stand-alone unit in the Early Successional structural stage. Therefore, they are not included in the calculation of the Early Successional structural stage at the stand-level.
- Natural disturbances may create early successional ecosystems, but it is not addressed in this issue because the BLM cannot predict the location or severity of these events.

3.3.2.8 ***Summary of Analytical Methods***

The geographic scale is the project footprint; that is, all of the HLB (13,225 acres) within the Siuslaw Field Office as described in Chapter 1. The direct and indirect effects of the proposed action are limited to the areas in which the project would be implemented. The spatial scale for the direct and indirect effects is at the stand scale because that is where the effect on complex early-successional ecosystems would occur.

The temporal scale is 30 years after each harvest because this is the maximum amount of time that any stand would provide an early successional ecosystem under the Proposed RMP / Final EIS before transitioning to the Stand Establishment (canopy cover reaches or exceeds 30 percent) or Young (forests over 30 years old) structural stages (USDI Bureau of Land Management, 2016b, pp. 1080; 1203-1204).

The impact indicators used in the analysis are (1) Legacy structures – green trees (abundance); (2) Legacy structures – green trees (quality and configuration); (3) Legacy structures – snags; (4) Hardwood nut, drupe, berry production and cavities; (5) Diversity of tree species; and (6) Average number of years a stand remains in the Early Successional stage before transitioning to the Stand Establishment stage.

Data for the impact indicators were ranked to determine one of three relative levels of complexity (Low, Medium, and High) in Early Successional Ecosystem Table 1. If an alternative had different levels of relative complexity for various impact indicators, the overall relative complexity for that alternative was assigned based on the majority of the relative complexity ratings. In the case of a tie, the overall relative complexity combined both levels (e.g., an equal number of Low and Medium levels of complexity for impact indicators resulted in an overall relative complexity of Low-Medium.

3.3.3 Affected Environment

Currently, the Siuslaw Field Office has about 143 acres in an early successional ecosystem (Early Successional Ecosystems Table 2. Acres Currently in Early Successional Ecosystem on the Siuslaw Field Office).

Early Successional Ecosystems Table 2. Acres Currently in Early Successional Ecosystem on the Siuslaw Field Office

Source of Early Successional Ecosystem	Relative Level of Complexity	Acres
Stands harvested under the 1995 RMP	Low	25
High Pass Fire Salvage	Low	20
Nails Creek ACEC	Low	53
Nails Creek outside ACEC	Low	45
Total Acres currently in Early Successional Ecosystem on the Siuslaw Field Office		143

Stands harvested under the 1995 RMP were consistent with the Northwest Forest Plan. Retention on these acres was about 12 TPA, which would be similar to about 10-15 percent retention under the 2016 RMP. The area was planted at high stocking levels of 400 TPA, primarily with Douglas-fir and minor components of cedar, hemlock, and pine (in areas of natural ponderosa pine occurrence). Precommercial thinning is expected to thin conifers to approximately 250 TPA when the stand is about 10 years old. These design criteria resulted in a Low relative level of complexity for these early successional ecosystems.

The High Pass Fire Salvage was implemented under the 2016 RMP. It occurred in HLB- MITA. These acres retained at least 5 percent of the pre-harvest stand in live trees or snags (USDI - Bureau of Land Management, 2016a, p. 63). The area was planted with Douglas-fir and western red cedar at high stocking levels of 400 TPA. Precommercial thinning is expected to thin stands to approximately 250 TPA when the stand is about 10 years old. These design criteria resulted in a Low relative level of complexity for this early successional ecosystem.

Nails Creek Timber Sale harvested 98 acres in HLB-MITA under the 2016 RMP. About 53 acres were also in the Nails Creek Area Critical Environmental Concern (ACEC). These acres had an average of 15 percent retention which was dispersed; trees with larger diameters and oaks were part of the retention. Other hardwoods were not retained. The area is reforesting naturally at 150-200 TPA. Existing snags were not part of aggregate retention and new snags were created through base-girdling. These design elements resulted in an early successional ecosystem with a Low relative level of complexity.

The remaining 45 acres in the Nails Creek Timber Sale outside the ACEC had an average of 6 percent dispersed retention; trees with larger diameters and oaks were part of the retention. Other hardwoods were not retained. The area is going to be replanted at 400-450 TPA. Existing snags were not part of aggregate retention and new snags were created through base-girdling. One has already fallen within one year of harvest (Timoshevskiy, 2021). These design elements resulted in an early successional ecosystem with a Low relative level of complexity.

In September and October of 2020, the Holiday Farm Fire burned approximately 5,164 acres of HLB within the Eugene SYU. However, none of these acres are within the project area for this issue.

3.3.4 Direct and Indirect Effects

3.3.4.1 ***Alternative 1 – No Action***

In this alternative, timber harvest would not occur under this EA. There are currently about 143 acres in early successional ecosystems on the Siuslaw Field Office (Early Successional Ecosystems Table 2. Acres Currently in Early Successional Ecosystem on the Siuslaw Field Office). All have a Low relative level of complexity in the early successional ecosystem. These stands would reach 30 percent canopy cover in about 10-20 years.

Two additional sales from the Nails Creek EA are scheduled to be regeneration harvested in the HLB-MITA land use allocation in the next few years. Nails Knob would regeneration harvest 96 acres and High Three would regeneration harvest 82 acres. These additional 178 acres would have the same design elements as Nails Creek outside of the ACEC resulting in early successional ecosystems with a Low relative complexity rating. These stands would reach 30 percent canopy cover and transition out of early successional in about 10-16 years. After this time, the Field Office would have zero acres in the Early Successional structural stage.

Natural disturbances may create gaps that provide small-scale patches of early successional ecosystems in any structural stage. These gaps would add structural complexity to the stand as legacy features remain, but a larger scale development of complex early successional ecosystems would not occur without stand-scale disturbances, such as wildfire or storm damage. Some species associated with early successional ecosystems would not benefit from small patches, as they need larger areas to persist.

3.3.4.2 ***Alternative 2***

Under this alternative, thinning would be the only treatment within the HLB. This would consist of approximately 3,889 acres per decade (Early Successional Ecosystem Table 4). The effects from this alternative on early successional ecosystems is the same as under Alternative 1 – No Action. Currently there are 143 acres in early successional ecosystems with a Low relative complexity rating. An additional 178 acres will be regeneration harvested under the Nails Creek EA with a Low relative complexity rating for complex early successional ecosystems.

This alternative provides the greatest number of trees from which future snags and downed wood would be recruited. At least five percent of the planned harvest units would be left in untreated areas (skips) (USDI - Bureau of Land Management, 2016a, p. 60). Natural mortality processes would continue in the untreated areas.

3.3.4.3 ***Alternative 3***

Under this alternative the design feature of retaining an average of 30 percent of pre-harvest stand basal area in live trees in LITA and 15 percent in MITA would result in a relatively high amount of legacy green trees remaining after harvest. A larger number of legacy green trees provides increased structural complexity to the resulting early successional ecosystem. High levels of retention also provide a larger pool of green trees from which future snags and downed wood would be recruited. Higher retention under this alternative equates to a **High** relative level of complexity in LITA and a **Medium** relative level of complexity in MITA for the Legacy Structures – Green Tree Abundance impact indicator (Early Successional Ecosystem Table 3).

The design feature to arrange retention in dispersed and aggregate configurations results in spatial heterogeneity inside the harvest unit (Palik, D'Amato, Franklin, & Johnson, 2021, p. 107). Dispersed retention would include large diameter trees, including trees with defects. Large size generally equates to older aged trees that provide greater ecological value (Palik, D'Amato, Franklin, & Johnson, 2021, p. 100). These structures often take decades to centuries to develop (Palik, D'Amato, Franklin, & Johnson, 2021, p. 99). An average of 80 percent or more of the green trees would have or could develop characteristics of wildlife trees (such as large diameter trees, trees with cavities or defects, trees with candelabra branches or large limbs, etc.) and would be located inside the harvest unit. Aggregates would be clumped around existing snags, created snags, large trees with cavities, large branches or broken tops, hardwood trees, seeps, springs, and unique biological or cultural features inside the unit

(Franklin, Johnson, & Johnson, 2018, p. 104). The impact would be that features of ecological value would remain in the unit after harvest and the pattern of legacy structures would be distributed in various parts of the harvest unit. Spatial heterogeneity inside the harvest unit equates to a **High** relative level of complexity for the Legacy Structures – Green Tree Quality and Pattern impact indicator.

The design feature to clump at least 50 percent of existing snags that are greater than or equal to 20 inch DBH with buddy trees and created snags would result in a greater amount of snags that survive in the early successional ecosystem. The ecological function of snags is described in the Coast Creek Timber Management Project EA, which is incorporated here by reference (USDI Bureau of Land Management, 2020, pp. 61-63). Nearly all snags are used to some extent for foraging. However, cavities only form while the tree is still alive. Once a tree dies, sapwood rotting fungi begin decaying the tree from the outside toward the center (USDI Bureau of Land Management, 2020, p. 62). This provides lower quality, less stable cavities for smaller secondary cavity excavators. Hollow cavities are formed by heart-rot fungi that invade the living tree through wounds, such as where limbs have broken off or trees that are scarred by mechanical damage (USDI Bureau of Land Management, 2020, p. 62). Primary cavity excavators, such as woodpeckers, show a definite preference for trees infected by heart rots (Conner, Hooper, Crawford, & Mosby, 1975, p. 149) (Conner & Adkisson, Discriminant Function Analysis: A Possible Aid in Determining the Impact of Forest Management on Woodpecker Nesting Habitat, 1976, p. 125).

The design feature to create snags such that heart rot can spread and trees die slowly would result in an average of 75 percent or more of created snags developing heart rot and dying slowly. This results in trees that primary cavity excavators more readily use (Lorenz, Vierling, Johnson, & Fischer, 2015, p. 1016). Primary cavity excavators, such as woodpeckers, provide cavities that are used by secondary cavity nesters (species that use cavities excavated by primary cavity nesters or natural cavities created by decay). Most excavate cavities in either dead wood or through live wood into decaying heart wood (McComb, 2016, p. 162). Lorenz et al found that all six species[18] of primary cavity excavators they studied selected trees with significantly softer interior wood than random trees. They concluded that “interior wood hardness was the most influential factor in our models of nest site selection at both spatial scales we examined: in the selection of trees within territories and in the selection of nest locations on trees” (Lorenz, Vierling, Johnson, & Fischer, 2015, p. 1016). Another result of this design feature is that trees which die slowly remain to provide structural complexity and utilization as snags longer than trees that are base girdled. Parks et al (Parks, Conklin, Bednar, & Maffei, 1999, p. 2) found that of 48 base girdled snags, almost half (n=20) had fallen within 9 years. Of these 80 percent (n=16) broke at the girdle.

These two design features result in an early successional ecosystem that would have clumps of trees that include existing snags with heart rot as well as damaged trees that develop heart rot and die slowly. Such trees are likely to persist in the early successional ecosystem. Together this results in a **High** relative level of complexity for the Legacy Structures – Standing Trees with Heart Rot impact indicator.

The design feature to retain all hardwood trees[19] would result in an early successional ecosystem that has a diversity of hardwood trees to provide nuts, drupes, and berries as food sources for wildlife. Additionally, hardwood trees such as Oregon oak, Pacific madrone, and bigleaf maple produce natural cavities and dead limbs that are used by cavity-nesting animals (McComb, 2016, p. 45). The diversity of hardwood tree species remaining under this alternative provides a diversity of food sources and current or potential natural cavities for wildlife. Thus, retaining all hardwood trees results in a **High** relative level of complexity for the Hardwood Nut, Drupe, Berry Production and Cavities impact indicator.

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[18] American Three-toed Woodpecker (*Picoides dorsalis)*, Black-backed Woodpecker *(P. arcticus),* and Hairy Woodpecker, classified as “strong” excavators compared to the other three species included in the study: Northern Flicker *(Colaptes auratus)*, White-headed Woodpecker *(P. albolarvatus)*, and Williamson’s Sapsucker *(Sphyrapicus thyroideus)* (Lorenz, Vierling, Johnson, & Fischer, 2015, p. 1018).

[19] Unless falling is necessary for safety or operational reasons. If such trees need to be cut, they would be retained in the stand as downed wood.

The design feature to include at least 3 species of trees (including hardwoods) in the reforested stand would result in an early successional ecosystem with a greater diversity of tree species. Inclusion of hardwoods provides additional diversity because hardwoods are valuable to wildlife species for nuts, berries, and drupes, as well as potential for cavities, as explained above. Both the structural and niche complexity of the resulting early successional ecosystem is increased by hardwoods. These attributes result in a **High** relative complexity rating for the Tree Species Diversity impact indicator.

The design feature to reforest at or near minimum RMP standards (i.e., a minimum of 130 TPA in LITA and 150 TPA in MITA) results in a longer duration of the stand in an early successional ecosystem. The design element to reforest at low densities and maintain a low density of conifer seedlings through silvicultural practices (such as pre-commercial thinning, manual maintenance, seedling release, etc.) would ensure that the resulting stand would remain an early successional ecosystem for about 24-30 years. In MITA, this alternative would provide an early successional ecosystem for the longest amount of time. This results in a **High** relative level of complexity for the Average Years in Early Successional Ecosystem impact indicator for stands in MITA. Stands in LITA retain more trees after harvest; therefore, the tree canopies would close to ≥ 30 percent canopy cover in about 15-20 years. This results in a **Low-Medium** relative level of complexity for the Average Years in Early Successional Ecosystem impact indicator in LITA.

Legacy elements retained in the early successional stage would provide complexity through the life of the stand (Donato, Campbell, & Franklin, 2012, pp. 576, 580). The structural complexity in the early successional ecosystem under this alternative is likely to persist through the stages of forest development, especially in older stands where larger diameter trees remain. Therefore, this alternative is also most likely to develop diverse late successional ecosystems for a portion of the rotation, as stated in the Management Objectives under LITA (USDI - Bureau of Land Management, 2016a, p. 62) and MITA (USDI - Bureau of Land Management, 2016a, p. 63).

This alternative includes 1,444-1,944 acres of thinning per decade in addition to regeneration harvest (Early Successional Ecosystem Table 4). Hardwoods would be maintained unless they pose a safety concern, or it is not operationally feasible to retain them. Thinning would not create early successional ecosystems except for small patches in gaps. Acres in gaps are not counted in the Early Successional structural stage in this analysis.

The rotation[20] for regeneration harvest under this alternative is approximately140 years in LITA and 110 years in MITA. Approximately 846-1,050 acres would be regeneration harvested and 1,444-1,1944 acres would be thinned per decade under this alternative (Early Successional Ecosystem Table 4). Total treated acres by decade would be approximately 2,290-2,994.

This alternative would provide a smaller number of total acres in the Early Successional structural stage after harvest than the other alternatives that include regeneration harvest (Early Successional Ecosystem Table 4), but the relative level of complexity of the early successional ecosystems on these acres would be High (Early Successional Ecosystem Table 3) because more legacy features would remain dispersed through the unit and in aggregate patches surrounding trees with high value for wildlife or existing snags, hardwoods would remain, tree species diversity would be ≥ 3 species and would include hardwood trees on the most acres. Additionally, regeneration harvested stands in Alternative 3 would provide the most complex early successional ecosystems for the greatest amount of time than any other action alternative (i.e., up to 20 years in LITA and up to 30 years in MITA).

Considering all impact indicators, the overall relative level of complexity for early successional ecosystems under Alternative 3 is High (Early Successional Ecosystem Table 3).

3.3.4.3.1 Sub-Alternative for Alternatives 3 and 4 – Additional Snag Creation

To increase complexity in early successional ecosystems the BLM analyzed the option to create additional snags from the retention in the HLB. The RMP requires creating one snag per acre in the HLB in the Oregon Coast

[20] Number of years between harvests in regeneration harvest.

Range Province (USDI - Bureau of Land Management, 2016a, p. 61). Under this sub-alternative, the BLM would create additional snags in retention areas.

This sub-alternative would increase the complexity of the early successional ecosystem by increasing the number of dying trees in snag patches. More dying trees would be available for primary and secondary cavity excavators to choose from to create cavities and for foraging. Trees that develop cavities are valuable to a host of wildlife, from primary and secondary cavity excavators and other birds to large and small mammals.

3.3.4.4 ***Alternative 4***

Under this alternative, one third would create complexity as described under Alternative 3, with one difference. The design feature for the impact indicator of Legacy Structures – Green Tree Abundance would retain an average of 25 percent of pre-harvest stand basal area in live trees in LITA and an average of 10 percent in MITA for all acres under this alternative. There would be an average of 5 percent less pre-harvest basal area in live trees in both MITA and LITA than under Alternative 3. Less retention also provides a smaller pool of green trees from which future snags and downed wood would be recruited. However, the result is still a high number of legacy green trees in the resulting early successional ecosystem relative to Alternatives 5 and 6. This equates to a High relative level of complexity in LITA and a Medium relative level of complexity in MITA for the Legacy Structures – Green Tree Abundance impact indicator. The overall relative complexity rating for this third is High in both LITA and MITA. About 345-454 acres would be created per decade under this alternative with the overall relative complexity rating of High.

The remaining two thirds under this alternative would have the same design features and impacts to the early successional ecosystem as Alternative 3 for the impact indicators of Legacy Structures – Green Trees Quality and Pattern, Legacy Structures – Standing Trees with Heart Rot, and Hardwood Nut, Drupe, Berry Production and Cavities.

The design feature to reforest with 2 species (including hardwoods) would result in an early successional ecosystem with less diversity of tree species than Alternative 3, but more than Alternatives 5 and 6. Inclusion of hardwoods provides additional diversity in the resulting early successional ecosystem as described above under Alternative 3. Because the number of tree species in the early successional ecosystem falls between those under Alternative 3 and those under Alternatives 5 and 6, the relative complexity level for two thirds of Alternative 4 is a Medium for the Tree Species Diversity impact indicator.

The design feature to reforest at a moderate intensity (an average of 185-220 TPA in LITA and 220-260 in MITA) would result in a shorter duration early successional ecosystem. Tree crowns would touch, and a canopy cover of 30 percent would be reached in about 10-15 years in LITA and about 15-20 years in MITA. At that time, the stand would transition into an ecosystem where less light reaches the soil and shade intolerant plants would die out. The transition would occur earlier in LITA because it would have a higher level of legacy green trees than MITA. This results in a Low relative complexity level for LITA and a Low-Medium relative complexity level for MITA for the Average Years in Early Successional Ecosystem impact indicator.

This alternative would provide a larger number of total acres in the Early Successional structural stage after harvest than Alternative 3, but only one third would have an overall relative complexity level of High equivalent to the relative complexity of Alternative 3 (Early Successional Ecosystem Table 4). The remaining two thirds would have somewhat less complexity in structure, with an overall relative complexity level of High in LITA and Medium in MITA (Early Successional Ecosystem Table 3).

This alternative includes 278-944 acres of thinning per decade in addition to regeneration harvest (Early Successional Ecosystem Table 4). Thinning would not create early successional habitat except for small patches in gaps, if these are incorporated into the thinning prescriptions. Acres in gaps are not counted in the Early Successional structural stage in this analysis. Thinning would be similar in all areas that would be thinned under Alternative 4.

About 1,126-1,361 acres of regeneration harvest and 278-944 acres of thinning would be implemented by decade under this alternative (Early Successional Ecosystem Table 4).

Considering all impact indicators, the overall relative level of complexity for early successional ecosystems in the 1/3 area with higher complexity is High. ***Considering all impact indicators, the overall relative level of complexity for early successional ecosystems in the 2/3 area of moderate complexity is High in LITA and Medium in MITA*** (Early Successional Ecosystem Table 3).

3.3.4.5 ***Alternative 5***

Under this alternative, the design feature of retaining green tree legacy structures at the low end of the scale in the RMP (i.e., 15 percent in LITA and 5 percent in MITA) would result in a relatively low amount of legacy green trees remaining after harvest. There would be some green trees remaining to provide a minimal level of complexity to the resulting early successional ecosystem. Lower retention equates to a **Medium** relative level of complexity in LITA and a **Low** relative level of complexity in MITA for the Legacy Structures – Green Tree Abundance impact indicator.

The design feature to arrange retention in aggregate configurations around at least 25 percent of existing snags (with ≥ 20 inch DBH) and hardwood trees would result in some legacy snags and hardwood trees in the resulting early successional ecosystem. However, the remaining 75 percent of snags existing prior to harvest would not remain in the early successional ecosystem after harvest. The amount of legacy structures in the early successional ecosystem would be less than under Alternatives 3 and 4, but more than under Alternative 6. Some aggregates may be located along the edges of the harvest unit. The result would be that some features of ecological value would remain in the unit after harvest, but spatial heterogeneity would be less than under Alternatives 3 and 4 and more than under Alternative 6. This results in a **Medium** relative level of complexity in both LITA and MITA for the Legacy Structures – Green Trees Quality and Pattern impact indicator.

The design feature to clump at least 25 percent of the existing snags ≥ 20 inch DBH with buddy trees and existing snags would result in about one quarter of the existing snags remaining as legacy structures in the resulting early successional ecosystem. This would provide more complexity to the early successional ecosystem than Alternative 6, but less than Alternatives 3 & 4. The design feature where half of the created snags would be created such that the tree dies slowly, and half would be created by base girdling, would result in about half of the created snags providing potential cavities for wildlife over time. Snags created by base girdling can be used by wildlife for foraging beetles within and beneath the bark (Parks, Conklin, Bednar, & Maffei, 1999, p. 8). However, they begin falling as early as one or two years after harvest (Timoshevskiy, 2021) (Parks, Conklin, Bednar, & Maffei, 1999, p. 2). About half fell within nine years in this study. Of these, 80 percent broke at the girdle (Parks, Conklin, Bednar, & Maffei, 1999, p. 2). These features result in a **Medium** relative level of complexity in both LITA and MITA for the Legacy Structures – Standing Trees with Heart Rot impact indicator.

The design feature to retain all oaks and 50 percent of the other hardwoods would result in these remaining hardwood trees producing nuts, berries, drupes as forage and providing cavities as nest sites for wildlife. Reductions in broadleaf-dominated early successional ecosystems have led to population declines of species most associated with this forest type (Betts, et al., 2010, p. 2116). This alternative would provide more forage and potential trees with cavities than Alternative 6, but about half as many hardwoods (excepting oaks) than Alternatives 3 and 4. This results in a **Medium** relative level of complexity in both LITA and MITA for the Hardwood Nut, Drupe, Berry Production and Cavities impact indicator.

The design feature to plant one tree species results in an early successional ecosystem that has minimal relative complexity in terms of tree seedlings. Since only the desired tree species would be counted under this alternative and planting would result in a high number of trees per acre (450-500 TPA), the growing space in the resulting early successional ecosystem would be dominated by the desired tree species. This results in the less complexity and more structural homogeneity than either Alternatives 3 or 4 and is like Alternative 6, which is low in tree species diversity. Therefore, the relative complexity for this alternative is **Low** for the Tree Species Diversity impact indicator.

The design feature to reforest at a high intensity (an average of 450-500 TP in both LITA and MITA) would result in the shortest duration in early successional ecosystem. A canopy cover of 30 percent would be reached in about

10 years in LITA and 15 years in MITA. This results in a **Low** relative level of complexity for both LITA and MITA for the Average Years in Early Successional Ecosystem impact indicator.

The early successional ecosystem created under this alternative would have more legacy structures than Alternative 6 and, therefore, more complexity, but it would be lower in complexity than either Alternatives 3 or 4.

Under this alternative 1,126-1,361 acres of early successional ecosystem with Low or Low-Medium relative complexity would be created by regeneration harvest per decade.

In addition to regeneration harvest, this alternative includes thinning of 0-556 acres per decade (Early Successional Ecosystem Table 4). Thinning would not create early successional ecosystems except for small patches in gaps, if these are incorporated into the thinning prescriptions. Acres in gaps are not counted in the Early Successional structural stage in this analysis.

Considering all impact indicators, the overall relative level of complexity for early successional ecosystem under Alternative 5 is Low in LITA and Low-Medium in MITA (Early Successional Ecosystem Table 3).

3.3.4.6 ***Alternative 6***

Under this alternative, the relative level of complexity for the Legacy Structures – Green Tree Abundance impact indicator is the same as under Alternative 5 (**Medium** in LITA and **Low** in MITA; it has the same design features and same results to the early successional ecosystem.

The design feature to locate retention along the edges of the units to facilitate logging would result in an early successional ecosystem that has little complexity within the stand. “Retention has relatively little ecological benefit if it is all on the edges or boundaries of the harvest unit” (Franklin, Johnson, & Johnson, 2018, p. 104). If retention is located just around the edges or in a patch in a corner of the harvest unit, it will make little or no contribution toward the goals of retention: life boating organisms, providing inoculum for recolonization, and structurally enriching the early successional ecosystem (Franklin, Johnson, & Johnson, 2018, p. 104). Therefore, the resulting early successional ecosystem under this alternative would have a **Low** relative level of complexity in both LITA and MITA for Legacy Structures – Green Trees Quality and Pattern impact indicator.

The design feature that does not provide “buddy trees” to protect snags from harvest activities, would result in very few, if any, existing snags remaining in the resulting early successional ecosystem (Miller, 2021). The design feature that would create all snags by base girdling would result in very few snags remaining standing in 10-15 years (Parks et al p. 2, 8). These created snags would not be available to cavity excavating birds, such as woodpeckers, because they would not develop heart rot to soften the interior wood, as they require. Lorenz et al. (2015 p. 1027) observed that woodpeckers showed a consistent preference for trees with soft interiors despite their rarity on the landscape. They noticed that while some nests had soft exteriors and interiors, none of the observed nests had soft exteriors and hard interiors (Lorenz p. 1027). At most, snags created by base-girdling would provide foraging opportunities for wildlife that consumes beetles and larvae found in the bark of dead trees. About half of the created snags would fall within 1-9 years (Parks, Conklin, Bednar, & Maffei, 1999, pp. 2-3). Thus, the resulting early successional ecosystem would have a **Low** relative level of complexity in both LITA and MITA for the Legacy Structures – Standing Trees with Heart Rot impact indicator.

The design feature that all hardwoods, except oaks, would be available for harvest would result in a relatively homogeneous early successional ecosystem for trees. Oaks would persist, primarily in the valley fringe, drier sites. The remaining sites would have no legacy hardwoods. Douglas-fir seedlings would dominate the early successional ecosystem as a result of the design feature to plant at high intensities (450-500 TPA). With hardwoods limited to oaks, the production of nuts, drupes and berries would be limited to acorns and berries produced by shrubs. There is a potential for natural cavities in oaks but other hardwood trees that could also provide cavities would be absent. Thus, the resulting early successional ecosystem would have a **Low** relative level of complexity in both LITA and MITA for the Hardwood Nut, Drupe, Berry Production and Cavities impact indicator.

The design feature to replant with one conifer species results in a relatively homogenous early ecosystem. Structural diversity provided by different tree species (resulting from different growing rates and morphology) would be lacking. Much of the growing space in the early successional ecosystem would be occupied by planted Douglas-fir. Thus, the resulting early successional ecosystem would have a **Low** relative level of complexity in both LITA and MITA for the Diversity of Tree Species impact indicator.

The design feature and impacts to the resulting early successional ecosystem for the Average Years in Early Successional Ecosystem impact indicator under Alternative 6 are the same as under Alternative 5. The result is a **Low** relative level of complexity for both LITA and MITA.

The early successional ecosystems created under Alternative 6 would have the lowest overall relative level of complexity for the early successional ecosystem compared to the other action alternatives. Under this alternative, 1,470 acres of early successional ecosystems with Low complexity would be created per decade (Early Successional Ecosystem Table 4). This alternative does not include thinning.

Considering all impact indicators, the overall relative level of complexity for early successional ecosystems under Alternative 6 is Low (Early Successional Ecosystem Table 3).

3.3.4.6.1 Summary of Relative Levels of Complexity for Early Successional Ecosystems in the Action Alternatives

Alternative 2 (thinning only) would not create measurable early successional ecosystems. Therefore, the overall relative level of complexity of early successional ecosystems is not applicable to this alternative.

Alternative 3 would create the most early successional ecosystem in acres with a **High** relative level of complexity. Alternative 3 would, on average, have the highest amounts of legacy features in green trees and existing snags. Legacy green trees would be selected with wildlife characteristics in mind. They would be in aggregate patches around resources of value (such as existing snags, hardwoods, springs, seeps, etc.) as well as dispersed throughout the unit. Existing snags would be in snag patches that includes created snags that allow the tree to die slowly and heart rot to spread. Hardwoods would remain in the early successional ecosystem to provide nuts, drupes, berries, and natural cavities for wildlife. There would be 3 or more tree species in the resulting ecosystem to provide structural diversity. Reforestation would be at a low intensity results in the longest duration of the early successional ecosystem under the action alternatives. The overall relative level complexity of Alternative 3 is High in both LITA and MITA.

Alternative 4 would provide one third High relative level of complexity in both LITA and MITA and two thirds early successional ecosystem with High relative level of complexity in LITA and Medium relative level of complexity in MITA. One third of this alternative has the same design features and results on the early successional ecosystem as Alternative 3 for all impact indicators except Legacy Structures – Green Tree Abundance. Two thirds of this alternative share the same design features and results on the early successional ecosystem as Alternative 3 for the following three impact indicators: Legacy Structures – Green Trees Quality and Pattern; Legacy Structures – Standing Trees with Heart Rot; and Hardwood Nut, Drupe, Berry Production and Cavities. There are 5 percent less legacy green trees remaining in the early successional ecosystem in this alternative than under Alternative 3. In the two thirds medium relative level of complexity, two tree species (including hardwoods) occur in the early successional ecosystem and reforestation at moderate intensities results in a shorter amount of time in the early successional ecosystem. The overall relative level of complexity of Alternative 4 one third higher complexity is High in both LITA and MITA. In the two thirds moderate complexity it is High in LITA and Medium in MITA.

Alternatives 5 would provide lesser amounts, lower quality, and less diversity in arrangement of legacy structures than Alternatives 3 and 4. Only about 50 percent of the hardwoods (excepting oaks) existing prior to harvest would be present in the early successional ecosystem, reducing the amount of hard and soft mast for wildlife foraging. Only one species of trees would be present in the early successional ecosystem resulting in a low relative level of complexity. Trees would be planted at high intensity (450-500 TPA) resulting in a short duration of early successional ecosystem. The overall relative level of complexity of Alternative 5 is Medium in LITA and Low-Medium in MITA.

Alternative 6 would provide some, but minimal levels of relative complexity with a low abundance of green tree legacy structures, legacy structures concentrated at the edges of the units, no legacy snags remaining, snags created with base girdling, only oaks present and only in some areas, homogeneous one tree species, and high intensity reforestation resulting in a shorter time in early successional ecosystem. The overall relative level of complexity of Alternative 6 is Low in both LITA and MITA.

The alternative that would provide the most acres of High relative complexity early successional ecosystems (846-1,050 acres) for the longest amount of time (25-30 years) is Alternative 3. Alternative 4 has two parts. In the 1/3 higher relative complexity areas, there would be about 471-596 acres per decade less early successional ecosystems with a relative complexity rating of High than under Alternative 3. Early successional ecosystems under Alternative 3 and the 1/3 higher relative complexity areas under Alternative 4 would last about the same amount of time (25-30 years). In the 2/3 area of moderate relative complexity under Alternative 4, 741-907 acres per decade of early successional ecosystems would be created with a High overall relative complexity rating in LITA and a Medium overall complexity rating in MITA, primarily due to reforestation at moderate intensity. This early successional ecosystems would remain on the landscape a shorter amount of time (15-20 years). Alternatives 5 and 6 both provide a higher number of acres in early successional ecosystems, but those ecosystems would have an overall rating of Low or Low-Medium with less retention (i.e., legacy structures) and traditional replanting. Early successional ecosystems under these two alternatives would remain on the landscape for about 10 years in LITA and 15 years in MITA.

Early Successional Ecosystem Table 3. Comparison of Relative Levels of Complexity for Early Successional (ES) Ecosystems under all Action Alternatives

Impact Indicator	Relative Level of Complexity of Early Successional Ecosystem			Alternative 3		Alternative 4 1/3 High Complexity		Alternative 4 2/3 Moderate Complexity		Alternative 5		Alternative 6	
	High	**Medium**	**Low**	**LITA**	**MITA**	**LITA**	**MITA**	**LITA**	**MITA**	**LITA**	**MITA**	**LITA**	**MITA**
Legacy Structures Green Trees Abundance	20-30%	10-19%	< 10%	(30%) High	(15%) Medium	(25%) High	(10%) Medium	(25%) High	(10%) Medium	(15%) Medium	(5%) Low	(15%) Medium	(5%) Low
Legacy Structures Green Trees Quality and Pattern	Average ≥ 80% of green trees have or develop wildlife characteristics. Spatial heterogeneity inside the harvest unit with a mix of aggregate patches around existing and created snags, hardwoods, etc. Some dispersed legacy green trees	Average 50% of green trees have or develop wildlife characteristics. Spatial heterogeneity inside unit, but fewer aggregate patches. Some patches may be located along edges of harvest unit. Some dispersed legacy green trees.	Legacy structures arranged homogeneously on edges of harvest units.	High	High	High	High	Medium	Medium	Low	Low	Low	Low
Legacy Structures Standing Trees with Heart Rot	Average 75% or more of created snags have or develop heart rot. Existing snags with heart rot would remain standing in patches with created snags where trees die slowly.	Average 50% or more of created snags have or develop heart rot. Average 50% existing snags with heart rot would remain standing in patches. Average half created snags where trees die slowly; half base-girdled	Less than 25% of existing snags would remain standing. Created snags would not develop heart rot before dying.	High	High	High	High	High	High	Medium	Medium	Low	Low
Hardwood nut, drupe, berry production & cavities	All legacy hardwoods remain in stand producing an abundance of hard and soft mast; May have or develop natural cavities.	Oaks and 50% of legacy hardwoods remain in stand. Production of hard and soft mast is reduced. Reduced number of trees that may have or develop natural cavities	Only oaks remain after harvest. Only acorns available as hard mast. Oaks may have or develop natural cavities.	High	High	High	High	High	High	Medium	Medium	Low	Low
Diversity of Tree Species	≥ 3 species (including hardwoods)	2 species (including hardwoods)	1 species (conifer)	High	High	High	High	Medium	Medium	Low	Low	Low	Low
Average years in Early Successional Ecosystem (Duration in years)	24-30	17-23	10-16	(15-20) Low-Medium	(25-30) High	(15-20) Low-Medium	(25-30) High	(10-15) Low	(15-20) Low-Medium	(10) Low	(15) Low	(10) Low	(15) Low
Overall Relative Level of Complexity for Each Action Alternative				High	High	High	High	High	Medium	Medium	Low-Medium	Low	Low

Early Successional Ecosystem Table 4. Acres treated per Decade under each Action Alternative.

Action Alternative	Relative Level of Complexity of Early Successional Ecosystem		Rotation (Years between harvests for Regeneration Harvest		Decadal Regeneration Acres		Decadal Thinning Acres	Decadal Total Harvest
	LITA	MITA	LITA	MITA	LITA	MITA		
Alternative 2	NA	NA	NA	NA	NA	NA	3,889	3,889
Alternative 3	High	High	140	110	176-212	670-838	1,444-1,944	2,290-2,994
Alternative 4 (1/3 higher complexity)	High	High	120	80	71-81	305-372	278-944	1,404-2,305
Alternative 4 (2/3 moderate complexity)	High	Medium	120	80	141-163	609-745		
Alternative 5	Medium	Low-Medium	120	80	212-244	914-1,117	0-556	1,126-1,917
Alternative 6	Low	Low	80	80	353	1,117	0	1,470

3.3.5 Reasonably Foreseeable/Cumulative Effects

Excepting a large wildfire or other disturbance event, the majority of early successional habitat created on the Siuslaw Field Office within the next decade is likely through regeneration harvest analyzed in this EA.

Other than the actions discussed above, there are no other past, present, or reasonably foreseeable actions outside the analysis in the Siuslaw HLB Landscape EA that would affect creation of early successional habitat on the Siuslaw Field Office HLB.

3.4 How would timber harvest and reforestation affect stand level fire hazard[21] and resistance[22]?

The BLM decision maker identified this issue as important to the final decision that selects a management strategy for the project area. Based on the unprecedent fire events of September 2020 and the corresponding high level of fire-related concerns from BLM neighbors, the decision maker requested to see the impact of timber harvest type and amount on wildfire hazard and resistance. As such, the BLM is analyzing this issue in detail to inform the decision maker and the public on the alternatives' level of impacts to stand level fire hazard and resistance.

3.4.1 Background

"Fire hazard is a fuel complex defined by volume, type condition, arrangement, and location that determines the degree of ease of ignition and of resistance to control" (USDI Bureau of Land Management, 2016b, p. 1070). In the 2016 Final EIS, the BLM analyzed the effects of fire hazard close to developed areas for the Northwestern and Coastal Oregon RMP planning area (USDI Bureau of Land Management, 2016b, pp. 253-264). In that analysis, the BLM assigned forest structural stages [(USDI Bureau of Land Management, 2016b, pp. 1203-1206) Appendix C] to a relative ranking of stand-level fire hazard Fuels Table 1 [(USDI Bureau of Land Management, 2016b, p. 254)Table 3-34].

Fuels Table 1: Stand-level fire hazard ratings by structural stage (Table 3-34, p. 254, FEIS)

Structural Stages	Subdivisions	Fire Hazard
Early Successional	with Structural Legacies	Moderate
	without Structural Legacies	Moderate
Stand Establishment	with Structural Legacies	High
	without Structural Legacies	High
Young Stands – High Density	with Structural Legacies	High
	without Structural Legacies	High
Young Stands – Low Density	with Structural Legacies	Moderate
	without Structural Legacies	Moderate
Mature	Single-Layered Canopy	Low
	Multi-Layered Canopy	Mixed
Structurally-complex	Developed Structurally-complex	Mixed
	Existing Old Forest	Mixed
	Existing Very Old Forest	Mixed

"Resistance refers to the capacity for an ecosystem to resist the impacts of disturbances without undergoing significant [substantial] change. For example, wildfire can burn through a resistant forest without substantially altering its structure, composition, or function (Franklin et al. 2013)" (USDI Bureau of Land Management, 2016b, p. 242). "The BLM assigned forest structural stages (Appendix C) to a relative ranking of resistance to stand-

[21] **Fire Hazard -** the ease of ignition, potential fire behavior, and resistance to control of the fuel complex, defined by the volume and arrangement of several strata, including surface, ladder, and canopy fuels (Calkin et al. 2010).

[22] **Fire Resistance** – The capacity for an ecosystem to resist the impacts of disturbances without undergoing significant change (Franklin et al. 2013). The BLM assigned forest structural stages to a relative ranking of resistance to stand-replacement fire (PRMP/FEIS, p. 242-243).

replacement fire (Table 3-32). These categories range from Low/Moderate fire resistance (i.e., greater tendency of a stand-replacement fire) to High fire resistance (i.e., less probability of a stand-replacement fire). Mixed fire resistance indicates the potential to exhibit the full range of resistance categories (High to Low) (Appendix H)" (USDI Bureau of Land Management, 2016b, pp. 242-243). In general, stands with higher fire resistance have reduced surface fuel loading, lower tree density, large diameter trees of fire-resistant species (such as oaks and pines), increased height to live crown (Brown et al. 2004, Peterson et al. 2005, USDI BLM 2008), and discontinuous horizontal and vertical fuels (USDI Bureau of Land Management, 2016b, pp. 242-243).

Fuels Table 2: Resistance to stand-replacement fire by structural stage (Table 3-32, p. 243, PRMP/FEIS)

Structural Stages	Subdivisions	Resistance to Stand Replacement Fire
Early Successional	with Structural Legacies	Moderate
	without Structural Legacies	Moderate
Stand Establishment	with Structural Legacies	Moderate
	without Structural Legacies	Low
Young Stands – High Density	with Structural Legacies	Low
	without Structural Legacies	Low
Young Stands – Low Density	with Structural Legacies	Moderate
	without Structural Legacies	Moderate
Mature	Single-Layered Canopy	High
	Multi-Layered Canopy	Mixed
Structurally-complex	Developed Structurally-complex	Mixed
	Existing Old Forest	Mixed
	Existing Very Old Forest	Mixed

While the Final EIS analysis did not specifically account for surface fuel loading, the BLM assumed that descriptions of forest vegetation structural conditions and fuel continuity reflect relative stand-level fire hazard and resistance. The BLM assumed in the 2016 Final EIS that a one-mile buffer around the West Wide Wildfire Risk Assessment Wildland Development Areas (WDAs) data layer (WWRA 2013) represents the geographic scope of possible immediate risks to the public and firefighter safety close to communities located within the Wildland Urban Interface (WUI) (USDI Bureau of Land Management, 2016b, p. 266). This one-mile buffer is referred to as the WDA. The BLM quantified the acreage of forested BLM-administered lands into fire hazard categories within the WDA over a 50-year period. The Proposed RMP/Final EIS analysis identified that young Stand Establishment following a regeneration harvest of a Mature stand would increase wildfire hazard and reduce resistance to stand replacement fire for approximately 50 years on dry forest sites, and 30 to 50 years on moist forest sites (USDI Bureau of Land Management, 2016b, pp. 255, 1203-1204).

The Final EIS (USDI Bureau of Land Management, 2016b, p. 262), to which this EA is tiered, concluded that in 50 years, implementation of the timber harvest program under the Proposed RMP/Final EIS would result in a seven percent acreage net increase in the High or Moderate hazard category for the HLB in the coastal and north Final EIS analysis area within the WDA. The Siuslaw Field Office contains 13,225 acres of HLB, seventy-seven percent located within the WDA. The projected Final EIS, seven percent net acreage increase in the High or Moderate fire hazard category within the HLB over 50 years, equates to approximately 926 acres of increased fire hazard within the Siuslaw Field Office by 2063.

For the Siuslaw HLB Landscape Plan, the BLM estimated the Siuslaw Field Office would, on average, regeneration harvest 0-1,470 acres and commercially thin 0-3,889 acres each decade (See ASQ Issue, Section

3.2). This estimate is within the range of the Final EIS analysis which assumed approximately 1,500 acres of regeneration harvest, and 6,730 acres of thinning each decade within the Siuslaw Field Office. Because actual timber harvest implementation within the Siuslaw Field Office is within the range of the modeling assumptions in the (USDI Bureau of Land Management, 2016b, p. 262) and timber harvests have been designed in conformance with the 2016 ROD/ RMP, this project would not have effects on fire hazard beyond those disclosed in the Final EIS to which this analysis is tiered.

3.4.2 Analytical Process and Methods

Change in fire hazard and resistance (to a stand level replacement fire) is measured by change in acres of forest structural stage. For the comparison of effects on harvested acres, BLM predicted the decadal average range of harvest from each structural stage (acres to be regeneration harvested and thinned) (see Age Class Issue, section 3.1). The estimates below were used to determine the potential change to stand level fire hazard and resistance caused by shifts in forest structure from an average decade of harvest (see Fuels Table 7 under summary of effects). These effects to fire hazard and resistance would be similar for each decade that the BLM implements harvest actions under the Siuslaw HLB Landscape Plan EA.

Fuels Table 3: Estimated Regeneration Harvest Acres by Structural Stage per Decade

RMP Structural Stage	Alt 2	Alt 3	Alt 4/5	Alt 6
Young	0	245-305	327-395	426
Mature	0	533-662	709-857	926
Structurally Complex	0	68-84	90-109	118

Fuels Table 4: Estimated Commercial Thin Harvest Acres by Structural Stage per Decade

RMP Structural Stage	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Young	3,889	1,444-1,944	278-944	0-556	0

For the comparison of change in acres to fire hazard and resistance over 5 decades (see Table 8 under summary of effects), the proposed range of harvested acres was averaged for each alternative. The averaged acres of regeneration were combined with averaged thinned acres to calculate the combined average change in acres of hazard and resistance over 5 decades.

Forest structural stages [(USDI Bureau of Land Management, 2016b, pp. 1203-1206) Appendix C], represent stand-level categories of fire hazard [(USDI Bureau of Land Management, 2016b, p. 254) Table 3-34]. As such, forest structural stage is used in this analysis as a surrogate for a range of indicators related to fire hazard, including fire hazard category, fuel model, predicted flame length, rate of spread, and fire type. Stand-level fire hazard was analyzed in the Final EIS (USDI Bureau of Land Management, 2016b, pp. 253-271), to which this EA is tiered. The assumptions, methodology, and findings are incorporated into this EA by reference. Fire Hazard categories range from High to Moderate fire hazard (i.e., relatively difficult to control) to Low fire hazard (i.e., relatively easy to control). The Mixed fire hazard category indicates the potential to exhibit the full range of hazard categories (High to Low). Resistance to stand replacing categories range from Low/Moderate fire resistance (i.e., greater tendency of a stand-replacement fire) to High fire resistance (i.e., less probability of a stand-replacement fire). Mixed fire resistance indicates the potential to exhibit the full range of resistance categories (High to Low). For the Siuslaw HLB Landscape Plan, the BLM gathered site-specific information from a combination of site visits, stand exams, GIS datasets, and fire modeling tools (LANDFIRE and IFTDSS[23]). The BLM used historic

[23] IFTDSS - Interagency Fuel Treatment Decision Support System (IFTDSS)

conditions, biophysical settings, and vegetation condition class data from LANDFIRE[24]. The BLM conducted site visits in the spring of 2020. During these site visits, the BLM assessed existing and predicted fuel loading and fuel models. Ocular calculation of existing fuel loading was determined by BLM using photo series (Ward, 1980). Fuel models and expected fire behavior were determined by the BLM from Standard Fire Behavior Fuels Models: A Comprehensive Set, for use with Rothermel's Surface Fire Spread Model (Scott and Burgan, 2005).

Spatial scale

This analysis evaluates fire hazard and resistance to stand level replacement fire at the project scale, which is all HLB (13,225 acres) within the Siuslaw Field Office, excluding those with overlapping Areas of Environmental Critical Concern. The direct and indirect effects of the proposed action on hazard and resistance are limited to the areas in which timber harvest would change the structural stage. Evaluating the project area allows for estimating the current and expected fuel loading, fuel models, and potential fire behavior.

The BLM also considered fire hazard and resistance to stand level replacement fire at the sub-watershed scale. The sub-watershed is the sixth-field watershed (also referred to as HUC12) level. The HLB project area encompasses 23 HUC12s. The 23 sub-watersheds total 511,102 acres. At this scale BLM manages 308,558 acres, which is 60 percent of the total acres. The 13,225 HLB designated acres represent approximately 4 percent of BLM-administered lands in these sub-watersheds. Across all ownerships in the sub-watershed, the HLB acres represent approximately 3 percent of the landscape. There would be no discernable differences in effects to fire hazard and resistance to stand level replacement fire between the alternatives at this scale of analysis.

Temporal scale

This analysis evaluates fire hazard at three temporal scales:

- Short-term effects are 0 to 10 years post-harvest, which is based on the time it would take for activity-generated fine fuels (less than three inches diameter) to degrade (McIver and Ottmar 2007). Note that this analysis of short-term effects on fire hazard and resistance to stand level replacement fire is also summarized as the hazard component in the Fire Risk analysis.
- Intermediate effects are 10 to 30 years, based on the changes in structural stage and their effects on fire hazard and resistance to stand level replacement fire.
- Long-term effects are 30 to 50 years, which is the time it would take for conditions post-regeneration harvest to approximate current fire hazard and resistance to stand level replacement fire conditions.

3.4.2.1 ***Assumptions***

- Forest structural stages reflect the stand-level fire hazard categories (USDI Bureau of Land Management, 2016b, pp. 254-255).
- Forest structural stages reflect the resistance to stand level replacement fire categories (USDI Bureau of Land Management, 2016b, p. 243).
- According to RMP classifications, there are currently no young low density stands on Siuslaw Field office therefore, it is assumed that all current young stands are high density and represent a high fire hazard and a low fire resistance.
- All thinning would occur in the young high density stands.
- Post-harvest, all thinned young high density stands would transition to young low density with a moderate rating for decades 1, 2, and 3. Thinned young high density stands would transition to mature multi-story stands with a mixed rating in Decades 4 and 5.
- Regeneration harvest would occur in young, mature, and structurally complex stands.

[24] LANDFIRE (Fire and Resource Management Planning Tools Project) is an interagency program producing consistent and comprehensive data describing landscape change, disturbance, vegetation, fuel, and fire regimes across the United States.

- Post-harvest, all regenerated stands would transition to early successional structural stage with a moderate fire hazard for decade 1. Stands would transition to young stands with a high hazard rating in decades 2 and 3. Stands would transition to low/mixed hazard in decades 4 and 5.
- In general, stands with higher fire resistance have reduced surface fuel loading, lower tree density, large diameter trees of fire-resistant species, increased height to live crown (Brown et al. 2004, Peterson et al. 2005, USDI BLM 2008), and discontinuous horizontal and vertical fuels (USDI Bureau of Land Management, 2016b, pp. 242-243).
- Timber harvest would affect fire hazard at the project scale because timber harvest would create fuels. By generating residual activity fuels, timber harvest has the potential to increase fire risk associated with the hazard component if not adequately treated (Agee 1993, Weatherspoon and Skinner 1995, Raymond, and Peterson 2005) (see the Fire Risk analysis). Post-harvest fuels treatments reduce activity fuels and potential fire behavior. Following slash disposal treatments, a reduction in potential fire behavior would occur due to the reduction in surface fuel loading and change in horizontal and vertical fuel arrangement.
- The BLM would treat portions of residual activity fuels following timber management activities for both site preparation and hazardous fuels reduction purposes.
- In whole tree harvesting, the entire cut tree is yarded to the landing, with disposal of limbs and tops at the landing. Whole tree harvesting is the most effective method for limiting the increase in surface fuels within the harvested stand because limbs and tops are taken to the landing rather than cut and left on the forest floor (Agee 2005). At the landings, limbs and tops would be piled and then chipped, removed for biomass, sold for firewood, or burned.
- When feasible, all harvest acres would include whole tree yarding or cut to length and yard tops and limbs attached. As a result, not every harvest acre would need additional slash disposal treatments.
- See age class assumptions (Issue 3.1 How does regeneration harvest adjust the age class distribution within the Harvest Land Base-Medium Intensity Timber Area and Low Intensity Timber Area land use allocation in Siuslaw Field Office?)

Impact Indicators

The impact indicator for this analysis is the change in acres of relative stand level fire hazard/resistance categories caused by shifts in forest structure (from one decade of averaged timber harvest activities and the combined change over 5 decades). Additionally, the BLM considered evaluating the annual change in acres of fire hazard/resistance categories from timber activities. It was determined that under all alternatives, 0-2.9 percent of the HLB acres would be harvested annually. However, the change in fire hazard/resistance is correlated to the decision on harvest type (thinning vs regeneration). Because this is a landscape level EA, the final harvest type will be decided during the implementation of a specific project., at that time BLM will confirm that the annual change to stand level hazard/resistance would be within the range of following effects analysis.

3.4.3 Affected Environment

Currently, stands in the project area are in a variety of structural stand stages. Of the project area, less than one percent is Early Successional with a Moderate fire hazard and resistance rating. Two percent of the project area is Stand Establishment with a High fire hazard and Low to Moderate resistance rating. Sixty-five percent of the project area is Young with a fire hazard rating of Moderate to High and resistance rating of Moderate to Low. Twenty-nine percent of the project area is Mature with a Low to Mixed fire hazard and a High to Mixed resistance rating. Three percent of the project area is Structurally Complex with a Mixed fire hazard and resistance rating. The stands are dominated by Douglas-fir, with smaller components of western hemlock, western red cedar, incense cedar, ponderosa pine, and grand fir. Scattered hardwoods such as oak, bigleaf maple, golden chinkapin, madrone and red alder exist. The dominant understory vegetation consists of salal, hazel, vine maple, Oregon grape, and swordfern. Currently, the stands consist of timber-litter and timber-understory fuel types. The predominant fuel models are TL5 and TU5 (Standard Fire Behavior Fuel Models RMRS GTR-153). As fuel loadings increase for these fuel types, resultant fire behavior also increases. Interagency Fuel Treatment Decision Support System (IFTDSS) was utilized to evaluate current stand conditions and potential fire behavior. Fire weather conditions for IFTDSS modeling was at the 97th percentile as determined by the Remote Automatic Weather Station closest to the center of the project. The 97th percentile is often termed “the worst-case scenario”.

[redacted][25][redacted]. If a wildfire were to occur in the project area, predicted flame lengths would be one to four foot with a rate of spread of zero to five chains per hour. Crown fire activity would be ninety-six percent surface fire and four percent passive crown fire. The fuels specialist report (Corliss 2020), which is incorporated here by reference, provides more detail on different components and measures of fire hazard and resistance.

Fuels Table 5: RMP Structural Stage and Fire Hazard and Resistance.

RMP Structural Stage	Fire Hazard	Fire Resistance	Total Acres in Structural Stage	Percentage Total Acres
Early Successional	Moderate	Moderate	45	0%
Stand Establishment	High	Moderate-Low	329	2%
Young	High	Low	8,630	65%
Mature	Low-Mixed	High-Mixed	3,783	29%
Structurally Complex	Mixed	Mixed	438	3%
			13,225	100%

3.4.4 Direct and Indirect Effects

3.4.4.1 *Alternative 1 (No Action)*

Under the No Action Alternative, the BLM would not harvest timber within the HLB, produce ASQ volume, or treat the adjacent riparian reserve within the Siuslaw Field Office. In the short-term, stand level fire hazard and resistance ratings would remain unchanged because there would not be harvest activities. Over time, hazard and resistance would slowly change into the Mixed category as the stands transition into Mature and Structurally Complex structural stages. Approximately 225 acres of HLB in the Siuslaw Field Office were analyzed under the Nails Creek EA and are scheduled for regeneration harvest from 2020 to 2025. Harvest from the Nails Creek EA would result in 45-75 annual acres of regeneration and implementation would be staggered slightly ahead of HLB; We estimated that logging all of Nails Creek EA would take somewhere between 3 to 5 years and divided the total 225 acres by the those to come up with range of annual harvest acres.

Effects Common to all Action Alternatives

Forest management activities would change the structural stage, fuel model, and fuel loadings within harvested areas. The BLM gathered information from a combination of site visits, stand exams, GIS datasets, and fire modeling tools to determine site-specific effects of thinning versus regeneration harvests for the acres of the HLB land use allocation covered by this EA. Interagency Fuel Treatment Decision Support System (IFTDSS) was utilized to evaluate and compare current versus postharvest stand conditions and potential fire behavior. Fire weather conditions for IFTDSS modeling was at the 97th percentile as determined by the Remote Automatic Weather Station closest to the center of the project. The 97th percentile is often termed “the worst-case scenario”. These reports are summarized in this analysis, incorporated herein by reference and are available upon request from the BLM’s District Office in Springfield, OR.

Fuels Table 6: Comparison of Fire Behavior in Regeneration vs Thinning Treatments: 10 years Post Harvest

[25] One chain equals 66 feet.

	Current Condition	Regeneration	Thinning
Primary Fuel Model[1]	**Timber Litter 5 (TL5)**	**Timber**	**Timber Litter 3**
Predicted Flame Lengths (feet)	1-4	0-1 (10%) 1-4 (89%) 4-8 (1%)	0-1 (87%) 1-4 (9%) 4-8 (3%)
Rate of Spread (chains per hour*)	0-5	0-2 (12%) 2-5 (49%) 5-20 (39%)	0-2 (94%) 2-5 (5%) 5-20 (1%)
Crown Fire Activity	Surface Fire (96%) Passive Torching (4%)	Surface Fire (97%) Passive Torching (3%)	Surface Fire (99%) Passive Torching (1%)
Burn Probability	.0002	.0002	.0002

[1] Standard Fire Behavior Fuel Models RMRS GTR-153.

*One chain equals 66 feet

Forest management activities increase the surface fuel loads within stands. Post-harvest, the stands would transition from a timber fuel models (TL3, TL5) to slash fuel models (SB1, SB2), resulting in higher predicted flame lengths, fire duration, and intensity. Fuel loading would be greatest during the first three years following harvest, when needles have dried but remain attached to tree limbs. Post-harvest slash disposal treatments would be implemented to reduce activity fuels and potential fire behavior. Following slash disposal treatments, a reduction in potential fire behavior would occur due to the reduction in surface fuel loading and change in horizontal and vertical fuel arrangement.

To the extent feasible, all alternatives would include whole tree yarding or yarding of tops and limbs on harvested areas. As a result, not every harvest acre would need additional slash disposal treatments. However, because of the values at risk (structures, transmission lines, etc.), the BLM would implement additional post-harvest activity fuels treatments as needed. The BLM would conduct a fuels assessment within each unit following harvest activity to identify slash disposal activities. This assessment would determine the fire hazard based on surface fuel loading, aspect, slope, access, and location of each unit. Harvest areas where concentrations of increased fuel loadings remain after whole tree yarding would be piled and burned (Corliss 2020). Slash disposal treatments would begin within 90 days after completion of harvest activities. Additionally, burning landing piles would occur one to two years post-harvest. Following slash disposal treatments, a reduction in potential fire behavior would occur due to the reduction in surface fuel loading and change in horizontal and vertical fuel arrangement. The goal of post-harvest slash disposal would be to allow planting sites for the establishment of seedlings, and/or to reduce residual harvest slash levels for fire hazard reduction. Slash disposal activities would include, but are not limited to, piling (machine or hand), slashing, chipping, biomass removal, burning or any combination of techniques that would sufficiently reduce the residual slash and vegetation. Burning techniques may include, but are not limited to, pile burning, broadcast, and underburning. Controlled burning (e.g., pile, broadcast, underburning) would be completed one to five years post-harvest due to weather and air quality restrictions prescribed.

3.4.4.2 ***Alternative 2***

Under Alternative 2, the BLM would implement commercial thinning on approximately 3,889 acres per decade and create group selection openings around oaks up to approximately ten percent of the harvest unit. Small

pockets of regeneration would occur in group selection openings but stands would not be regeneration harvested at the stand level. Where feasible, commercial thinning areas would function as shaded fuel breaks, with some areas receiving additional understory fuel treatments.

In each decade, there would be approximately 3,889 commercially thinned harvest acres. Thinning would occur in Young High-Density stands. These stands would transition to Young-Low Density stands, decreasing the fire hazard category from High to Moderate. Fire resistance would increase from Low to Moderate. Over the next 50 years, the thinned stands would develop into Mature-Multistory or Structurally Complex stands and the associated fire hazard and resistance categories would transition from Moderate to Mixed.

3.4.4.3 ***Alternative 3***

Under Alternative 3, the BLM would regeneration harvest 846-1,050 acres and commercially thin 1,444-1,944 acres per decade. Following regeneration harvest, the BLM would allow natural reforestation with some intermixed planting to ensure RMP reforestation standards are met. Replanting would consist of a mix of site-appropriate, merchantable species, with a focus on increasing diversity and selecting species resilient to drought, insect pressure, and disease in susceptible areas. Timber harvest treatments would vary based on forest conditions and vegetation type. This alternative would address fuels concerns through the use of underburning or broadcast burning. These actions would maintain or restore natural processes and assist in developing complexity. Where feasible, the BLM would use commercial thinning to create shaded fuel breaks. Regeneration harvest and subsequent reforestation would change the structural stage, fuel model, and fuel loadings within harvested areas.

In each decade, the harvest units would experience an initial and immediate change in the associated fire hazard and resistance because timber harvest would create fuels and change the forest structural stage. The 846-1,050 acres that were regeneration harvested would change from their current stand structural stages to Early Successional with a fire hazard and resistance category of Moderate. Towards the end of the short-term these stands would transition into Stand Establishment which has a High hazard rating and Moderate/Low resistance rating. This transition between Early Successional and Stand Establishment structural stages broadly represents the transition from a slash fuel type to a brush fuel type, which would occur approximately three to five years after reforestation. If a wildfire were to occur, stands with High fire hazard rating would exhibit high flame lengths, rates of spread and intensity, and would be difficult to contain during weather conditions conducive to fire growth. This increase in fire hazard would be consistent with the analyses of the effect of timber harvest on fire hazard in the (USDI Bureau of Land Management, 2016b, pp. 253-270), which concluded and disclosed that regeneration harvest in the HLB would increase fire hazard in the short term. Those analyses are incorporated here by reference. Over the next 10 to 30 years, these stands would transition from Early Successional to Stand Establishment and Young High Density, which would increase their fire hazard rating from Moderate to High and decrease their resistance rating from Moderate to Low. In the long term these stands would transition from Young-High Density into Mature, which would change the fire hazard from High to Low/Mixed and the resistance from Low to High/Mixed.

The 1,444-1,944 commercially thinned harvest acres would occur in Young High-Density stands. These stands would transition to Young-Low Density stands, decreasing their fire hazard category from High to Moderate and increasing their resistance from Low to Moderate. Over the next 50 years, the stands would develop into Mature-Multistory or Structurally Complex stands with a Mixed fire hazard and resistance category.

3.4.4.4 ***Alternative 4***

Under this alternative, the BLM would regeneration harvest 1,126-1,361 acres and commercially thin 278-944 acres per decade. Following regeneration harvest, the BLM would allow natural reforestation with some intermixed planting to ensure minimum RMP reforestation standards are met. Replanting would consist primarily of Douglas-fir with a mix of site-appropriate, merchantable species that focus on species resilient to drought, insect pressure, and disease in susceptible areas. This alternative would address fuels concerns through the use of underburning or broadcast burning. These actions would maintain or restore natural processes and assist in developing complexity. Where feasible, BLM would use commercial thinning to create shaded fuel breaks.

In each decade, the regeneration harvest units would experience an initial and immediate change in the associated fire hazard and resistance because timber harvest would create fuels and change the forest structural stage. Regeneration harvest and subsequent reforestation would change the structural stage, fuel model, and fuel loadings within harvested areas. The 1,126-1,361 acres that were regeneration harvested would change from their current stand structural stages to Early Successional, with a fire hazard and resistance category of Moderate. Over the next 10 to 30 years, these stands would transition from Early Successional to Stand Establishment and Young High Density, which would increase their fire hazard rating from Moderate to High and decrease their resistance rating from Moderate to Moderate/Low. In the long term, these stands would transition from Young-High Density into Mature, which would change the fire hazard from High to Low/Mixed and the resistance from Low to High/Mixed.

The 278-944 commercially thinned harvest acres would occur in Young High-Density stands. These stands would transition to Young-Low Density stands, decreasing their fire hazard category from High to Moderate and increasing their resistance from Low to Moderate. Over the next 50, years the stands would develop into Mature-Multistory or Structurally Complex stands with a Mixed fire hazard and resistance category.

3.4.4.5 ***Alternative 5***

Under this alternative, the BLM would regeneration harvest 1,126-1,361 acres and commercially thin 0-556 acres per decade. When treated with regeneration harvest, the BLM would reforest harvested areas. Replanting would consist of predominantly Douglas-fir, with some minor species at 450 TPA. Commercial thinning would not be used to create shaded fuel breaks.

In each decade, the regeneration harvest units would experience an initial and immediate change in the associated fire hazard and resistance because timber harvest would create fuels and change the forest structural stage. Regeneration harvest and subsequent reforestation would change the structural stage, fuel model, and fuel loadings within harvested areas. The 1,126-1,361 acres that were regeneration harvested would change from their current stand structural stages to Early Successional with a fire hazard and resistance category of Moderate. Over the next 10 to 30 years, these stands would transition from Early Successional to Stand Establishment and Young High Density, which would increase their fire hazard rating from Moderate to High and decrease their resistance rating from Moderate to Moderate/Low. In the long term these stands would transition from Young-High Density into Mature, which would change the fire hazard from High to Low/Mixed and the resistance from Low to High/Mixed.

The 0-556 commercially thinned harvest acres would occur in Young High-Density stands. These stands would transition to Young-Low Density stands decreasing their fire hazard category from High to Moderate and increasing their resistance from Low to Moderate. Over the next 50 years, the stands would develop into mature-multistory or Structurally Complex stands with a Mixed fire hazard and resistance category.

3.4.4.6 ***Alternative 6***

Under this alternative, the BLM would regeneration harvest 1,470 acres per decade. Following regeneration harvest the BLM would reforest harvested areas. Replanting would consist of predominantly Douglas-fir, with some minor species, at 450 TPA. Commercial thinning would not be used to create shaded fuel breaks.

In each decade, the regeneration harvest units would experience an initial and immediate change in the associated fire hazard and resistance because timber harvest would create fuels and change the forest structural stage. Regeneration harvest and subsequent reforestation would change the structural stage, fuel model, and fuel loadings within harvested areas. The 1470 acres that were regeneration harvested would change from their current stand structural stages to Early Successional with a fire hazard and resistance category of Moderate. Over the next 10 to 30 years, these stands would transition from Early Successional to Stand Establishment and Young High Density, which would increase their fire hazard rating from Moderate to High and decrease their resistance rating from Moderate to Moderate/Low. In the long term, these stands would transition from Young-High Density into Mature, which would change the fire hazard from High to Low/Mixed and the resistance from Low to High/Mixed.

3.4.4.7 ***Summary of Alternatives***

Fuels Table 7: Alternative Comparison of Effects to Stand Level Fire Hazard and Resistance on Harvested Acres. Effects to the harvested stand hazard and resistance over time. These percentages are based on an average decade of harvest. These effects to the harvested stand hazard and resistance, would be similar for each decade that the BLM implements harvest actions under the Siuslaw HLB Landscape Plan EA.

Fire Hazard	Resistance	Alt 1 - no Action	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Short Term (0-10 yrs.)							
High	Low	66%	38%	58-61%	66-71%	70-73%	78%
Moderate	Moderate	1%	30%	12-15%	3-9%	1-5%	1%
Low	High	20%	19%	15-16%	14-15%	14-15%	13%
Mixed	Mixed	13%	13%	11%	10-11%	10-11%	9%
Intermediate Term (10-30 yrs.)							
High	Low	3%	3%	9-11%	11-13%	11-13%	17%
Moderate	Moderate	65%	35%	45-52%	53-60%	57-62%	61%
Low	High	0%	0%	0%	0%	0%	0%
Mixed	Mixed	33%	62%	39-42%	29-34%	27-30%	22%
Long Term (30-50 yrs.)							
High	Low	0%	0%	0%	0%	0%	0%
Moderate	Moderate	0%	0%	0%	0%	0%	0%
Low	High	3%	3%	9-11%	11-13%	11-13%	17%
Mixed	Mixed	97%	97%	89-91%	87-89%	87-89%	83%

Fuels Table 8: Alternative Comparison of Change in Acres to Stand Level Fire Hazard and Resistance over 5 Decades. This is the combined (Regeneration and Thinning) acres of hazard rating per decade across the project area.

Decade	Hazard	Resistance	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
1	mixed	mixed	0	0	0	0	0
	low	high	0	0	0	0	0
	moderate	moderate	3889	2667	1946	1522	1470
	high	low	0	0	0	0	0
2	mixed	mixed	0	0	0	0	0
	low	high	0	0	0	0	0
	moderate	moderate	7778	4386	2648	1800	1470
	high	low	0	948	1244	1244	1470
3	mixed	mixed	0	0	0	0	0
	low	high	0	0	0	0	0
	moderate	moderate	11667	6105	3350	2078	1470
	high	low	0	1896	2487	2487	2940
4	mixed	mixed	3889	1719	702	278	0
	low	high	0	948	1244	1244	1470
	moderate	moderate	11667	6105	3350	2078	1470
	high	low	0	1896	2487	2487	2940

5	mixed	mixed	7778	3438	1404	556	0
	low	high	0	1896	2487	2487	2940
	moderate	moderate	11667	6105	3350	2078	1470
	high	low	0	1896	2487	2487	2940

Under Alternatives 2, 3, 4, 5, and 6, timber harvest would increase fire hazard in the short-term at the project scale because of the creation of residual activity fuels. The use of whole tree yarding, and slash treatments would reduce but not eliminate this increase in fire hazard. Subsequent reforestation would create stands that would have a Moderate fire hazard and resistance initially, followed by a High fire hazard and Low resistance by the end of the first decade and during the intermediate timeframe due to change in structural stage. In the long term these stands would transition to a Low/Mixed fire hazard with High/Mixed resistance to stand replacement fire.

Alternative 2 would see the smallest increase in fire hazard and largest increase in resistance because it proposes more commercial thinning than the other alternatives and no regeneration harvest.

Alternative 3 would have a smaller increase in fire hazard and larger increase in resistance than Alternative 4 because it has less regeneration harvest acres and more commercial thinning acres. Alternative 4 would have a larger increase in fire hazard and a larger decrease in resistance compared to Alternative 3 because it would have more regeneration harvested acres and less commercially thinned acres. Alternatives 4 and 5 propose the same amount of regeneration harvest acres and varying amounts of commercial thinning so the changes in hazard and resistance would vary primarily based on the number of acres commercially thinned.

Among the action alternatives, Alternative 6 would see the largest increase in fire hazard and smallest increase in resistance because it proposes the most regeneration harvest.

3.4.5 Reasonably Foreseeable/Cumulative Effects

Past, present, and reasonably foreseeable future actions on BLM administered lands within the HLB include timber harvest and fire suppression operations. For the Siuslaw HLB Landscape Plan, the BLM estimated the Siuslaw Field Office would regeneration harvest 0-1,470 acres and commercially thin 0-3,889 acres each decade (See ASQ Issue, section 3.2). The staggered implementation of harvest under these two EAs would ensure that the BLM would not exceed the Final EIS estimate of 1,500 acres of regeneration harvest and 6,370 acres of commercial thinning each decade. Because timber harvest implementation within the Siuslaw Field Office is within the range of the modeling assumptions in the Proposed RMP / Final EIS (USDI Bureau of Land Management, 2016b, p. 262) and timber harvests have been designed in conformance with the RMP, this project would not have effects on fire hazard beyond those disclosed in the Proposed RMP / Final EIS to which this analysis is tiered.

3.5 How would timber harvest and reforestation affect fire risk?

The BLM decision maker identified this issue as important to the final decision that selects a management strategy for the project area. Based on the unprecedent fire events of September 2020 and the corresponding high level of fire-related concerns from BLM neighbors, the decision maker requested to see the impact of timber harvest type and amount on wildfire risk. As such, the BLM is analyzing this issue in detail to inform the decision maker and the public on the alternatives' level of impacts to stand level fire risk.

3.5.1 Background

Fire risk is the potential for realization of adverse or beneficial consequences to valued resources and assets (USDI Bureau of Land Management, 2016b, p. 264). In terms of wildfire, an assessment of risk evaluates the interaction of wildfire hazard (likelihood and intensity), exposure (susceptibility) and effects on those values (e.g., where people live, timber resources, habitat, etc.). The BLM-administered lands in the vicinity of the project area are typically located in the foothills and mountains surrounding inhabited valley bottomlands and are closely intermixed with small towns, rural residential areas, and private and industrial forests. This is an area commonly referred to as the Wildland Urban Interface (WUI). The Healthy Forest Restoration Act (2003) provides latitude to Community Wildfire Protection Plans (CWPP) for refining their WUI boundary. The Lane County CWPP has identified the Siuslaw HLB Landscape Plan project area as WUI.

The Lane County CWPP and the 2016 Proposed RMP/Final EIS analyzed fire risk for the Siuslaw HLB Landscape Plan project area using different methodologies.

Overall fire risk for the Siuslaw HLB Landscape Plan project area as identified by the Lane County CWPP is Low to Moderate. The Lane County CWPP evaluated wildland-urban interface Fire "Overall" Risk by analyzing four key "layers" of wildfire information. These layers are:

- "Ignition" Risk: Assesses the potential and frequency that wildfire ignitions may occur by analyzing historical ignitions over the past 10 years.
- Hazard: The natural conditions including vegetative fuels, weather, topographic features that may contribute to and affect the behavior of wildfire.
- Values: The people, property, and essential infrastructure that may suffer losses in a wildfire event.
- Protection Capability: The ability to plan and prepare for, as well as respond to and suppress, structural and wildland fires.

Through comparison and analysis of these layers this assessment indicates areas that are at a High, Moderate and Low potential to be impacted by a WUI fire. The Lane County CWPP divided the WUI into five assessment areas; the Siuslaw HLB Landscape Plan project area is in Assessment Areas 1 and 2. Assessment area 1 shows overall WUI risks as Moderate to Low with less than one percent in the High risk category. Assessment area 1 has identified Deadwood Creek Area, Triangle Lake, Mapleton, South of Horton (area between High Pass Rd and Hwy 36), and Blachly as areas of concern. Assessment Area 2 shows overall WUI risks as Low on the valley floor and Moderate with interspersed areas of High risk. Higher ignition rates and housing densities are the primary reason for this. Assessment area 2 identified Cheshire, South Hills of Eugene, Southwest Eugene/Spencer Creek area, Northwest of Fern Ridge Reservoir, and the communities of Crow, Vaughn, Elmira, and Noti as areas of concern. (Lane County CWPP, pp 2.7-2.8).

Overall fire risk for the Siuslaw HLB Landscape Plan project area is categorized in the 2016 Proposed RMP/Final EIS as Low to Moderate. The 2016 Proposed RMP/Final EIS determined fire risk based on wildfire hazard potential (WHP) and proximity to the wildland developed areas (USDI Bureau of Land Management, 2016b, p. 266). Because there is not a standardized methodology for determining WUI boundaries, the 2016 Proposed RMP/Final EIS assumed that a one-mile buffer around the West Wide Wildfire Risk Assessment Wildland Development Areas (WDA) data layer (WWRA 2013) represents the geographic scope of possible immediate risks to the public and firefighter safety within close proximity to communities located within the WUI. This one-mile buffer is referred to as the WDA. Using this method, fire risk inside the WDA is higher than outside the WDA. Wildland hazard potential (WHP) is a model used to depict the relative probability of experiencing extreme fire

behavior with torching and crowning, and the potential for wildfire that would be difficult for suppression resources to contain during weather conditions favorable for fire growth. The WDA GIS layer shows seventy-seven percent of the proposed units are within the one-mile buffer of developed areas (WDA), while twenty-three percent are outside the WDA. Based on WHP and proximity to the WDA, fire risk in the area is Low to Moderate.

3.5.2 Analytical Process and Methods

This analysis used the methodology of the 2005 Lane County Community Wildfire Protection Plan (CWPP) in conjunction with methodology from the 2016 Final EIS to analyze overall fire risk because of the size of the project, and the following site-specific information related to the area:

- Most of the area (77 percent) is within the WDA
- The entire area is covered by the Lane County CWPP

The decision of unit level harvest (regeneration or commercially thinning) would occur at the project specific level. The localized impacts to risk from unit level harvest would be calculated during project planning to ensure that those impacts fall within the range analyzed below.

The fire risk methodology of the 2005 Lane County CWPP includes four key components: risk, hazard, values, and protection capability.

- The risk component is analyzed by evaluating changes in public use in the project area, which has the potential to affect the probability of human-caused fires.
- The hazard component is analyzed by evaluating the short-term changes in forest structural stage, which represents changes in fuel conditions in the project area. That analysis is summarized from the Fire Hazard analysis (section 3.4).
- The values component would not be affected by the proposed action. The values involved are primarily residences and infrastructure. The location and abundance of residences and infrastructure would not be affected by the proposed action. The potential for ignition of a residence is determined primarily by the conditions within the home ignition zone: the area encompassing a home and its immediate surroundings (Cohen 2008). A home's ignition potential during wildfires is determined by the characteristics of its exterior materials and design, and their response to burning objects within one hundred feet and firebrands. The proposed action would have no effect on these conditions. Therefore, this component of risk would be the same under all alternatives, including the No Action alternative.
- The protection capability component is analyzed by evaluating changes in access in the project area, which would affect the effectiveness of wildfire suppression efforts.

This Siuslaw HLB Landscape Plan analysis was conducted prior to the completion and approval of the Lane County CWPP update July 2020 which utilized Oregon Wildfire Risk Explorer data. BLM fuels specialist reviewed both the 2005 and 2020 CWPPs and concluded the overall risk for the project area is moderate.

The Siuslaw HLB Landscape Plan project evaluated fire risk from the decadal average change in acres of forest structural change (Section 3.4) along with fire risk from the acres of residual activity fuels.

- The WDA is a one-mile buffer around the West Wide Wildfire Risk Assessment WDA data layer (WWRA 2013).
- The acres of forest structural change and stand level fire hazard changes were analyzed in the issue, "How would timber harvest and reforestation affect stand level fire hazard and resistance?" (Section 3.4)
- The relative fire risk from residual activity fuels associated with timber management was determined using Table 3-38 (USDI Bureau of Land Management, 2016b, p. 267). Relative fire risk from acres of residual activity fuels was analyzed in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 253-271). The assumptions, methodology, and findings are incorporated into this EA by reference.

The BLM gathered site specific information from a combination of site visits, stand exams, GIS datasets, and fire modeling tools. Historic conditions, biophysical settings, and vegetation condition class data was taken from LANDFIRE. OR Wildfire Risk Explorer was utilized to generate advanced risk reports for the Siuslaw HLB Landscape Plan proposed units and surrounding areas displaying metrics on housing density, potential impacts

from wildfire, burn probabilities, etc. Interagency Fuel Treatment Decision Support System (IFTDSS) was utilized to evaluate and compare current versus postharvest stand conditions and potential fire behavior. These reports are incorporated here by reference and are available upon request from the BLM at the Springfield Interagency Office.

Spatial scale

- This analysis evaluates fire risk at the local scale which is the HLB (13,225 acres) within the Siuslaw Field Office, as well as structures and infrastructure that could be affected if a wildfire were to occur on the HLB units. The local scale extends to structures and infrastructure within one-quarter mile of the project area, because the potential impacts of short-range spotting from embers during a wildfire is one-quarter mile. Oregon Wildfire Risk Explorer's Advanced Report identifies that at this scale the housing density is predominantly concentrated within the Valley Fringe and along the Hwy 126 and Hwy 36 corridors. This scale highlights the number of off-site values at risk compared to the larger WDA.
- The BLM considered analyzing fire risk at the project scale (13,225 acres of HLB), which is smaller than the local scale. However, the project area alone does not encompass the values component of fire risk, which is primarily the nearby residences and infrastructure. Therefore, this analysis does not analyze fire risk at the project scale. (Note that the Fire Hazard analysis does address the hazard component of fire risk at the project scale – see Section 3.4).
- The BLM also considered analyzing fire risk at the sub-watershed scale, which is broader than the local scale. The sub-watershed is the sixth-field watershed (also referred to as HUC12) level. The project is encompassed by 23 HUC12s. The 23 sub-watersheds total 511,102 acres; of these acres BLM manages 304,636 acres or approximately sixty percent of the area. The 13,225 acres of proposed harvest and activity fuels treatments represents approximately four percent of BLM-administered lands in these sub-watersheds. Across all ownerships in the sub-watersheds, the proposed harvest represents less than three percent of the landscape. Because the project affects less than three percent of the combined sub-watersheds, there would be no discernable differences in effects to fire hazard between the alternatives at this scale of analysis. Therefore, this analysis does not analyze fire risk at the sub-watershed scale.

Temporal scale

- This analysis evaluates fire risk at the temporal scale of 0-50 years. (Note that the Fire Hazard analysis addresses the hazard component of fire risk at short-term, intermediate, and long-term timeframes – see the Fire Hazard analysis in Section 3.4).

3.5.2.1 ***Assumptions***

- For the purpose of this analysis, the BLM assumes that timber harvest prescriptions removing greater basal area from stands increase surface fuels (i.e., less retention has more residual fuel loading). This increase in surface fuels has the potential to result in higher rates of spread and greater flame lengths in the event of a wildfire, increasing the fire risk to firefighters and public safety.
- Strategically located shaded fuel breaks in combination with activity fuels treatment would have the potential to reduce risk to firefighters and public, improve wildfire suppression efforts, reduce risk to adjacent values.
- Treatment of activity fuels in strategic locations (such as along main access routes, ridgelines, or property lines) would slow the spread and decrease the flame length of potential fires, increasing the likelihood that wildfires would be suppressed during initial attack.
- Human caused ignition risk cannot be directly influenced; however, treating activity fuels in strategic areas would slow the spread and decrease the flame length of potential fires, increasing the likelihood that wildfires would be suppressed during initial attack.
- BLM would treat portions of residual activity fuels following timber management activities for both site preparation and hazardous fuels reduction purposes. The future level of treatments would resemble the historical level of treatments.
- Depending on the residual stand structure, allocating resources to mitigate the activity fuel loading, particularly through prescribed burning, could result in some level of post-treatment mortality to the residual stand. However, the areas that are prescribed burned would have the effects of reducing risk and developing stand structural diversity (USDI Bureau of Land Management, 2016b, p. 269).

- The BLM's PDFs would reduce the potential impacts from wildfire; however, they would not stop or eliminate all fires.
- The impacts from short-range spotting caused by burning embers carried by wind is a quarter mile.
- The home ignition zone[26] is maintained by the homeowner as a defensible space against embers and small flames. A home's ignition potential during wildfires is determined by the characteristics of its exterior materials and design. Their response to burning objects within one hundred feet (thirty meters) and firebrands principally determine a home's ignition potential (Cohen 2008).
- Development of roads and access points to BLM-administered lands would increase access for wildfire suppression which would increase effectiveness of suppression efforts.
- In whole tree harvesting, the entire cut tree is yarded to the landing, with disposal of limbs and tops at the landing. Whole tree harvesting is the most effective method for limiting the increase in surface fuels within the harvested stand because limbs and tops are taken to the landing rather than cut and left on the forest floor (Agee 2005). At the landings, limbs and tops would be piled and then chipped, removed for biomass, sold for firewood, or burned.
- When feasible all harvest acres would include whole tree yarding or cut to length and yard tops and limbs attached, and, as a result, not every harvest acre would need additional slash disposal treatments.
- Timber management on adjacent private lands would continue at the current pace and scale. For this analysis it is assumed that industry forested lands would be managed on an average rotation age of 40-60 years, which would equate to these land ownerships remaining in an even mix of acres in moderate to high fire hazard categories. Small woodlots owners would be managed on an average rotation age of 80-100 years, which would equate to these land ownerships remaining in an even mix of acres across all fire hazard categories. The BLM assumes, for the purpose of this analysis, that changes in fire risk associated with the hazard component at the local scale are represented by changes in hazard within the project area (see the Fire Hazard analysis Section 3.4).

Impact Indicators

The impact indicators are changes in risk components (risk from human caused fires, hazard, values, protection capability along with change in acres caused by shifts in forest structure and activity fuels due to timber harvest activities.

3.5.3 Affected Environment

There are approximately 10,225 acres of HLB inside the WDA and 3,000 acres outside the WDA. Current overall fire risk inside the WDA is categorized as Low to Moderate. Current overall fire risk outside the WDA is categorized as Very Low to Low. The project area is 13,225 acres of HLB within the Siuslaw Field Office. These 13,225 acres are primarily distributed within a checkerboard pattern of ownership, with square mile sections alternating between private and BLM-administered lands. The BLM-administered lands are typically located in the foothills and mountains surrounding inhabited valley bottomlands and are closely intermixed with small towns, rural residential areas, and private and industrial forests. This is an area commonly referred to as the WUI. Lane County CWPP has identified all the Siuslaw HLB Landscape Plan project area as WUI.

Oregon Wildfire Risk Explorer's Advanced Report identifies that at the local scale the housing density is predominantly concentrated along the Valley Fringe and road corridors of Hwy 126, and Hwy 36. There are multiple small communities and concentrations of residents scattered across the local area.

The Proposed RMP/Final EIS analysis determined current fire risk based on WHP and proximity to the WDA. Using this method, fire risk inside the WDA is higher than outside the WDA (USDI Bureau of Land Management, 2016b, p. 266). WHP at the local scale is generally Very Low/Low to Moderate. The WDA GIS layer shows seventy-seven percent of the proposed units are within the one-mile WDA, while twenty-three percent are outside

[26] The area encompassing a home and its immediate surroundings (100-200 ft from a home) is called the home ignition zone.

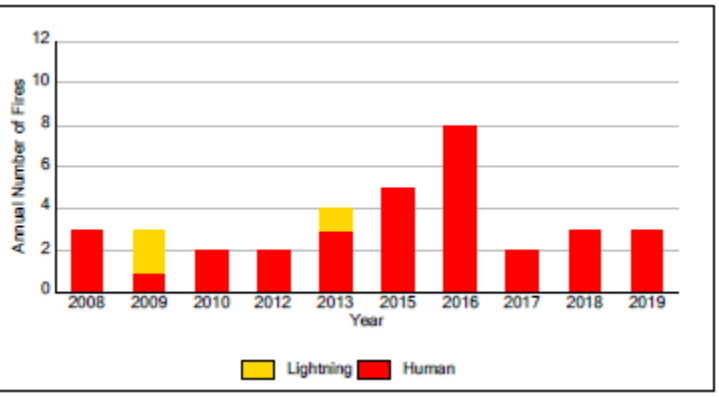
the WDA. The WHP is fifty-seven percent Low, forty-one percent moderate, and only two percent high. In general, Fire Risk ranges from Low to Moderate.

A report for the local project scale was generated using Advanced Oregon Wildfire Risk Explorer. The report calculates an output for Overall Wildfire Risk which combines both the likelihood of a wildfire and the expected impacts of a wildfire on highly valued resources and assets. The data values in the overall wildfire risk map and chart reflect a range of impacts from a very high negative value, where wildfire is detrimental to one or more resources or assets, to positive, where wildfire has an overall benefit (e.g., forest health or wildlife habitat). At the time of analysis, the data from 2020 was not available through the Oregon Wildfire Risk Explorer. All acres within this proposed project area were not within any of the 2020 large fire perimeters.

Oregon Wildfire Risk Explorer – Overall Wildfire Risk	
Low Benefit - Wildfire slightly beneficial (14.5 to 29th percentile)	28%
Low -Wildfire slightly negative (29th to 50th percentile)	51%
Moderate -Wildfire Moderately Negative (50th to 80th percentile)	18%

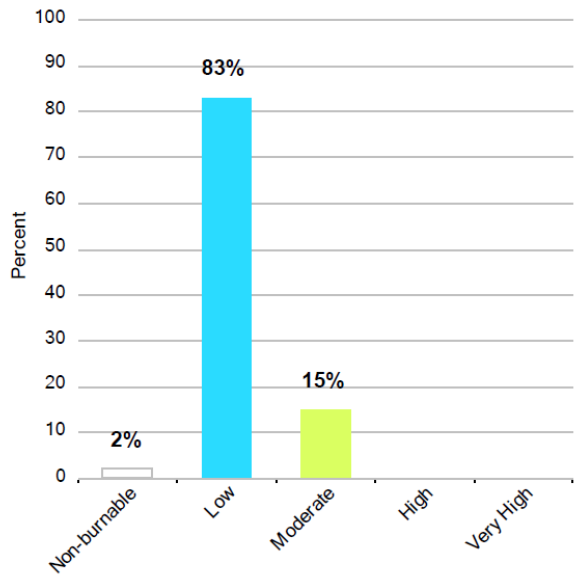
According to Oregon Wildfire Risk Explorer there were thirty-five fires between 2008 to 2019.

Total Acres Burned	395
Total Number of Fires	35
Average Acres Burned Per Year	39
Average Fires Per Year	4
Percent Lightning Caused	8.6%
Percent Human Caused	91.4%



Additionally, the Advanced Oregon Wildfire Risk Explorer calculated the Burn Probability for the local project scale. Burn probability shows the annual likelihood of a wildfire greater than 250 acres in size occurring, considering weather, topography, fire history, and fuels (vegetation). This estimate includes fire history from 1992 through recently disturbed fuels from large Oregon wildfires in notable years 2013, 2014, 2015, and 2017. Annual burn probability in the local project area was calculated to be 83% low and 15% moderate.

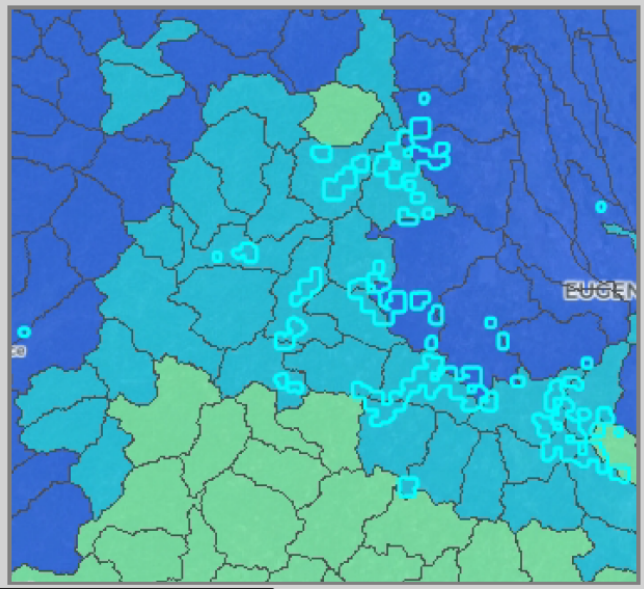
Burn probability in HLB Units .25 Mile Buffer *



Source: 2018 Pacific Northwest Quantitative Wildfire Risk Assessment, US Forest Service

** Values may add up to over 100% due to rounding precision*

Burn probability in HLB Units .25 Mile Buffer: sub-watershed summary map. Burn probability is summarized at the subwatershed (6th field Hydrologic Unit Code, HUC12) level. Watershed summaries enable you to view the landscape context and identify and compare sub-watersheds for prioritization.



3.5.4 Direct and Indirect Effects

3.5.4.1 ***Alternative 1 (No Action)***

Under the No Action Alternative, the proposed project would not be implemented. Overall, the fire risk inside the WDA would remain Low to Moderate and fire risk outside the WDA would remain Very Low to Low. There would be:

- no change in fire risk associated with the risk component because there would be no change in public use.
- no change in fire risk associated with the hazard component because there would be no change in the forest structural stages, as detailed in in the Fire Hazard analysis.
- a slight increase in fire risk associated with the values component (which would occur under any alternative) because of the likely increased presence of structures and infrastructure along the road corridors and in nearby towns.
- no change in fire risk associated with the protection capability component because there would be no change in access.

Overall, the fire risk would remain the same under the No Action alternative. Although there would be a slight increase in fire risk associated with the values component (which would occur under any alternative), there would be no change in any of the other components of fire risk. As a result, neighboring homeowners would continue to experience the same overall fire risk that they currently experience. There would be no meaningful or measurable change in the likelihood of an ignition. And if a wildfire were to occur on the BLM-administered lands of the project area, there would be no change in the fire hazard caused by the fuels in the project area and no change in the ability to suppress the wildfire.

Effects Common to all Action Alternatives (Alternatives 2, 3, 4, 5, and 6)

Effects of Residual Activity Fuels

Forest management activities would increase the surface fuel loads within stands. In each decade proposed timber harvest would create short term (0-10 years) localized changes in fire risk in the project area. Post-harvest, the stands would transition from timber fuel models (TL5, TU5) to slash fuel models (SB1, SB2), resulting in higher predicted flame lengths, fire duration, and intensity. This is consistent with the Proposed RMP / Final EIS which found an increase in surface fuels has the potential to result in higher rates of spread and greater flame lengths in the event of a wildfire, increasing the risk to firefighters and public safety. Many different treatments can accomplish surface fuels reduction, including prescribed fire, biomass removal, and mechanical mastication or manipulation (USDI Bureau of Land Management, 2016b, p. 265). Fuel loading and the increased risk of a fire start would be greatest during the first three years following harvest, when needles cure but remain attached to tree limbs. Whole tree yarding and slash disposal treatments would be implemented to reduce residual activity fuels and further reduce the effects to fire risk. Post-harvest slash disposal treatments would be implemented to reduce activity fuels and potential fire behavior. Following slash disposal treatments, a reduction in potential fire behavior would occur due to the reduction in surface fuel loading and change in horizontal and vertical fuel arrangement. The residual activity fuels associated with the proposed regeneration harvest would result in a Moderate fire risk (USDI Bureau of Land Management, 2016b, p. 267) Volume 3, table 3-38. However, whole tree yarding, and slash disposal treatments would reduce residual activity fuels and would result in a further reduction of fire risk.

Effects from all action Alternatives to the risk components are as follows:

- A slight increase in fire risk associated with the values component (which would occur under any alternative, including the No Action alternative) because of the likely increased presence of structures and infrastructure along the road corridors and in nearby towns.
- A slight increase in fire risk associated with the ignition risk component because there would be an increase in public access from road construction and renovation. Increased access would increase the potential for human caused fires.
- A slight decrease in fire risk associated with the protection capability component because of increased access. Road construction and renovation under Alternative 2, 3, 4, 5, and 6 would provide additional access to wildland areas and improve opportunities for firefighters to quickly respond and suppress fires.

3.5.4.2 *Alternative 2*

Under Alternative 2, the BLM would implement commercial thinning on approximately 3,889 acres per decade and create group selection openings around oaks up to approximately 10 percent of the harvest unit. Small pockets of regeneration would occur in group selection openings but stands would not be regeneration harvested at the stand level. Where feasible, commercial thinning areas would function as shaded fuel breaks, with some areas receiving additional understory fuels treatments.

Effects from actions in Alt 2 to the risk components are as follows:

- A decrease in fire risk associated with the hazard component because fire hazard would drop from 66 percent High to 38 percent High in the forest structural stages for the first decade, as detailed in in the Fire Hazard analysis. Each subsequent decade of harvest would experience a similar effect on changes in forest structure (see Fire Hazard Fuels Table(s) 7 and 8).
- Creation of activity fuels from the 3,889 acres of commercial thinning would fall into the Low risk category both inside and outside the WDA.
- Creation of shaded fuel breaks would increase protection capability and result in a slight decrease in fire risk.

Overall, for Alt 2, the fire risk would remain Low to Moderate inside the WDA and Very Low to Low outside the WDA. The countervailing changes in the components of fire risk are insufficient to alter the overall fire risk category at the local scale. As a result, neighboring homeowners would continue to experience the same overall fire risk that they currently experience, similar to the No Action alternative.

3.5.4.3 ***Alternative 3***

Under Alternative 3, the BLM would regeneration harvest 846-1,050 acres and commercially thin 1,444-1,944 acres per decade. Following regeneration harvest, the BLM would allow natural reforestation with some intermixed planting to ensure RMP reforestation standards are met. Replanting would consist of a mix of site-appropriate, merchantable species, with a focus on increasing diversity and selecting species resilient to drought, insect pressure, and disease in susceptible areas. Timber harvest treatments would vary based on forest conditions and vegetation type. This alternative would address fuels concerns through the use of prescribed fire. Where feasible, BLM would use commercial thinning to create shaded fuel breaks.

Regeneration harvest and subsequent reforestation would change the structural stage, fuel model, and fuel loadings within harvested areas. The 846-1,050 acres of regeneration harvest would have a Low to Moderate risk from activity fuels. The 1,444-1,944 acres of commercial thinning would have a Low risk from activity fuels. Off-site and on-site values at risk would see a slight increase in risk from as populations increase over time.

Effects from actions in Alt 3 to the risk components are as follows:

- A decrease in fire risk associated with the hazard component because fire hazard would drop from 66 percent High to 58-61 percent High in the forest structural stages for the first decade, as detailed in in the Fire Hazard analysis. Each subsequent decade of harvest would experience a similar effect on changes in forest structure (see Fire Hazard Fuels Table(s) 7 and 8).
- Creation of activity fuels from the 846-1,050 acres of regeneration harvest would fall into the Low to Moderate risk category both inside and outside the WDA.
- Creation of activity fuels from the 1,444-1,944 acres of commercial thinning would fall into the Low risk category both inside and outside the WDA.
- Creation of shaded fuel breaks would increase protection capability and result in a slight decrease in fire risk.
- Acres where underburn or broadcast burns are applied would experience a slight decrease in fire risk. Burning would remove surface fuels which would decrease ignition potential and increase protection capability.

In each decade proposed timber harvest would create short term localized changes in fire risk at the project level; however, overall fire risk would not increase beyond current levels from the residual activity fuels. The local scale would remain at Low to Moderate fire risk because of the presence of structures and infrastructure along the Valley Fringe and main road corridors of Hwy 126, and Hwy 36.

Overall, the fire risk would remain Low to Moderate inside the WDA and Very Low to Low outside the WDA. These countervailing changes in the components of fire risk are insufficient to alter the overall fire risk category at the local scale. As a result, neighboring homeowners would continue to experience the same overall fire risk that they currently experience, similar to the No Action alternative. There would be no meaningful or measurable change in the likelihood of an ignition. If a wildfire were to occur on the BLM-administered lands of the project area, there would be an increase in the fire hazard caused by the fuels in the project area but an improvement in the ability to suppress the wildfire.

3.5.4.4 ***Alternative 4***

Under this alternative, the BLM would regeneration harvest 1,126-1,361 acres and commercially thin 278-944 acres per decade. Following regeneration harvest, the BLM would allow up to 30 percent natural reforestation and also meet the adequately stocked levels of the RMP reforestation standards. Replanting would consist primarily of Douglas-fir with a mix of site-appropriate, merchantable species that focus on species resilient to drought, insect pressure, and disease in susceptible areas. This alternative would address fuels concerns through the use of prescribed fire. Where feasible, BLM would use commercial thinning to create shaded fuel breaks. Regeneration harvest and subsequent reforestation would change the structural stage, fuel model, and fuel loadings within harvested areas. The 1,123-1,361 acres of regeneration harvest would have a Low to Moderate risk from activity fuels. The 278-944 acres of commercial thinning would have a Low risk from activity fuels. Off-site and on-site values at risk would see a slight increase in risk from as populations increase over time.

Effects from actions in Alt 4 to the risk components are as follows:

- An increase in fire risk associated with the hazard component because fire hazard would increase from 66 percent High to 66-71 percent High in the forest structural stages in each decade as detailed in in the Fire Hazard analysis. Each subsequent decade of harvest would experience a similar effect on changes in forest structure (see Fire Hazard Fuels Table(s) 7 and 8).
- Creation of activity fuels from the 1,123-1,361 acres of regeneration harvest would fall into the Low to Moderate risk category both inside and outside the WDA.
- Creation of activity fuels from the 278-944 acres of commercial thinning would fall into the Low risk category both inside and outside the WDA.
- Creation of shaded fuel breaks would increase protection capability and result in a slight decrease in fire risk.
- Acres where underburn or broadcast burns are applied would experience a slight decrease in fire risk. Burning would remove surface fuels which would decrease ignition potential and increase protection capability.

In each decade proposed timber harvest would create short term localized changes in fire risk at the project level; however, overall fire risk would not increase beyond current levels from the residual activity fuels. The local scale would remain at Low to Moderate fire risk because of the presence of structures and infrastructure along the Valley Fringe and main road corridors of Hwy 126, and Hwy 36.

3.5.4.5 ***Alternative 5***

Under this alternative, the BLM would regeneration harvest 1,126-1,361 acres and commercially thin 0-556 acres per decade. When treated with regeneration harvest, the BLM would reforest harvested areas. Replanting would consist of predominantly Douglas-fir, with some minor species at 450 TPA. Commercial thinning would not be used to create shaded fuel breaks. Regeneration harvest and subsequent reforestation would change the structural stage, fuel model, and fuel loadings within harvested areas. The 1,123-1,361 acres of regeneration harvest would have a Low to Moderate risk from activity fuels. The 0-556 acres of commercial thinning would have a Low risk from activity fuels. Off-site and on-site values at risk would see a slight increase in risk from as populations increase over time.

Effects from actions in Alt 5 to the risk components are as follows:

- An increase in fire risk associated with the hazard component because fire hazard would increase from 66 percent High to 70-73 percent High in the forest structural stages in each decade, as detailed in in the Fire Hazard analysis. Each subsequent decade of harvest would experience a similar effect on changes in forest structure (see Fire Hazard Fuels Table(s) 7 and 8).
- Creation of activity fuels from the 1,126-1,361 acres of regeneration harvest would fall into the Low to Moderate risk category both inside and outside the WDA.
- Creation of activity fuels from the 0-556 acres of commercial thinning would fall into the Low risk category both inside and outside the WDA.

In each decade proposed timber harvest would create short term localized changes in fire risk at the project level; however, overall fire risk would not increase beyond current levels from the residual activity fuels. The local scale would remain at Low to Moderate fire risk because of the presence of structures and infrastructure along the Valley Fringe and main road corridors of Hwy 126, and Hwy 36.

3.5.4.6 ***Alternative 6***

Under this alternative, the BLM would regeneration harvest 1,470 acres per decade. Following regeneration harvest the BLM would reforest harvested areas. Replanting would consist of predominantly Douglas-fir, with some minor species, at 450 TPA. Commercial thinning would not be used to create shaded fuel breaks. Regeneration harvest and subsequent reforestation would change the structural stage, fuel model, and fuel loadings within harvested areas. The 1,470 acres of regeneration harvest would have a Low to Moderate risk from

activity fuels. Off-site and on-site values at risk would see a slight increase in risk from as populations increase over time.

Effects from actions in Alt 6 to the risk components are as follows:

- An increase in fire risk associated with the hazard component because fire hazard would increase from 66 percent High to 78 percent High in the forest structural stages in each decade, as detailed in in the Fire Hazard analysis. Each subsequent decade of harvest would experience a similar effect on changes in forest structure (see Fire Hazard Fuels Table(s) 7 and 8).
- Creation of activity fuels from the 1,470 acres of regeneration harvest would fall into the Low to Moderate risk category both inside and outside the WDA.

In each decade proposed timber harvest would create short term changes in fire risk at the local scale; however, overall fire risk would not increase beyond current levels from the residual activity fuels. The local scale would remain at Low to Moderate fire risk because of the presence of structures and infrastructure within the Valley Fringe and along the main road corridors of Hwy 126, and Hwy 36.

3.5.4.7 ***Summary of Alternatives***

Overall, the fire risk would remain Low to Moderate inside the WDA and Very Low to Low outside the WDA. There would be a slight increase in fire risk associated with the values component because of the likely increased presence of structures and infrastructure along the road corridors and in nearby towns, and a slight decrease because of the protection capability component due to increased access. These countervailing changes in the components of fire risk are insufficient to alter the overall fire risk category at the local scale. As a result, neighboring homeowners would continue to experience the same overall fire risk that they currently experience, similar to the No Action alternative. There would be no meaningful or measurable change in the likelihood of an ignition. If a wildfire were to occur on the BLM-administered lands of the project area, there would be an increase in the fire hazard caused by the fuels in the project area but an improvement in the ability to suppress the wildfire.

Under all alternatives, including the No Action alternative, overall fire risk would remain Low to Moderate at the local scale. Over this time frame, there would be some changes among the alternatives in the individual components of fire risk, and these changes differ among the alternatives. Alternatives 2 and 3 would cause slight decreases in fire risk associated with the hazard component because of changes to the structural stage. Alternatives 4, 5, and 6 would cause slight increases in fire risk associated with the hazard component because of changes to the structural stage. The magnitude of these changes in the individual components of fire risk are not sufficient to alter the overall fire risk category at the local scale for any alternative.

3.5.5 Reasonably Foreseeable/Cumulative Effects

The local scale (one quarter mile from the project area) would remain at Low to Moderate fire risk under all alternatives because of the presence of structures and infrastructure along the Valley Fringe and road corridors of Hwy 126 and Hwy 36. While the proposed actions would have changes in vegetative fuels (forest structure see Fire Hazard Issue in Detail, and residual activity fuels), the other factors that contribute to the overall fire risk (such as wildfire ignitions, topography, weather, values at risk, and protection capability) in the area remain unchanged and the overall fire risk would remain at Low to Moderate.

Past and present practices like private logging operations and fire suppression would continue into the foreseeable future both inside and outside the WDA.

4 Consultation

4.1 ESA-listed Terrestrial Species Consultation

Consultation with the US Fish and Wildlife Service on the effects of this project on Threatened and Endangered wildlife species is under the Biological Assessment for Timber Harvest and Routine Activities that are Likely to Adversely Affect Listed Species and Critical Habitat (USDI Bureau of Land Management and USDA Forest Service, 2019) and its associated Biological Opinion (TAILS:01EOFW00-2020-F-0170) (USDI Fish and Wildlife Service, 2020c). Northern spotted owl and marbled murrelet are the threatened wildlife species occurring within the project area that are covered by this consultation. Site-specific information for each project under this consultation would be reported to the US Fish and Wildlife Service prior to project implementation. Monitoring of projects under this consultation would be submitted to the US Fish and Wildlife Service annually.

The Level 1 Team is in the process of updating the spotted owl habitat baseline in the 2019 Routine Actions LAA Biological Assessment due to the 2020 large fires in the West Cascade Province. The Oregon Coast Province has only minor adjustments to the baseline because it did not have a corresponding, unexpected event. In the interim, timber sale projects that may affect and are likely to adversely affect northern spotted owls are provided to the Level 1 Team and the Service prior to implementation regardless which consultation they were consulted under. These reports have site-specific information on proposed actions and their effects to listed species. When the Level 1 Team and the Service concur that the effects analysis is still accurate in light of the 2020 large fires, the project can go forward. If there are concerns about impacts to listed species, the project would be adjusted prior to implementation to address those concerns.

On 10 November 2021, the Final Rule withdrawing and revising spotted owl critical habitat was published in the Federal Register. It withdrew critical habitat designation on lands managed by the BLM that are in the Harvest Land Base Land Use Allocation (USDI Fish and Wildlife Service, 2021, p. 62641). On the Siuslaw Field Office, this was land allocated to the Low Intensity Timber Area (LITA) in the HLB. The US Fish and Wildlife Service used the 2016 RMP GIS[27] layer to delineate the polygons in HLB-LITA that were withdrawn from the critical habitat designation. As the 2016 RMP layer is updated with changes in land use allocations and polygon boundaries change, some small amount of HLB may remain in spotted owl critical habitat. This would be a tiny fraction of the 3,161 acres of critical habitat that were analyzed in the project area under the 2012 Critical Habitat Rule (USDI Fish and Wildlife Service, 2012). All was in HLB-LITA. This revised designation of spotted owl critical habitat would not change BLM implementation actions as described in this EA. The effects of timber harvest on spotted owl critical habitat in HLB-LITA would be insignificant and discountable.

4.2 ESA-listed Fish Species Consultation

4.2.1 Oregon Coast Coho Salmon

On February 04, 2008, NOAA Fisheries Service announced that it was listing the Oregon coast coho salmon evolutionarily significant unit (ESU) as *threatened* under the Endangered Species Act (73FR7816). This action included designation of critical habitat and adoption of ESA protective regulations (4(d) rule). On May 12, 2008, the *threatened* listing became official.

On December 16, 2008, the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) amended regulations governing interagency consultation under the Endangered Species Act (ESA, 50 CFR 402). The amended regulations became effective January 15, 2009. The rule changes three definitions, better identifies situations where consultation with the FWS and/or NMFS is required, and establishes time frames for the informal consultation process.

Effects from the project would vary from no effect, not likely to adversely affect, or likely to adversely affect Oregon Coast coho salmon or critical habitat. The likelihood of incidental take of Oregon Coast coho salmon associated with this project has been minimized by following Management Direction, BMP's and Aquatic

[27] ESRI Geographic Information Services polygon layer

Conservation Measures described, herein, which was analyzed in the "*Forest Management Program for Western Oregon"* programmatic consultation with NMFS Biological Opinion WCR-2017-7574, March 2018 (USDC - NMFS, 2018) and included in the project design features for this project (see section 5.5 Appendix E Project Design Features). Prior to a final project implementation decision, BLM would either make a no effect determination or receive verification from NMFS that the project is consistent with consultation as outlined in the NMFS Biological Opinion described above (USDC - NMFS, 2018).

4.2.2 Upper Willamette River Chinook Salmon

On June 28, 2005, NOAA Fisheries Service announced that it was listing the Upper Willamette River Chinook salmon evolutionarily significant unit (ESU) as *threatened* under the Endangered Species Act (73FR7816). This action included designation of critical habitat and adoption of ESA protective regulations (4(d) rule). On June 28, 2005, the *threatened* listing became official.

On April 14, 2014, the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) amended regulations governing interagency consultation under the Endangered Species Act (ESA, 50 CFR 402) to fix inadvertent errors in the listing.

Effects from the project would vary from no effect, not likely to adversely affect, or likely to adversely affect Upper Willamette River Chinook salmon. The likelihood of incidental take of Upper Willamette River Chinook salmon associated with this project has been minimized by following Management Direction, BMP's and Aquatic Conservation Measures described, herein, which was analyzed in the "*Forest Management Program for Western Oregon"* programmatic consultation with NMFS Biological Opinion WCR-2017-7574, March 2018 (USDC - NMFS, 2018) and included in the project design features for this project (see section 5.5 Appendix E Project Design Features). Prior to a final project implementation decision, BLM would either make a no effect determination or receive verification from NMFS that the project is consistent with consultation as outlined in the NMFS Biological Opinion described above (USDC - NMFS, 2018).

4.2.3 Magnuson Stevens Act-listed Fish Species Consultation

The Magnuson Stevens Fishery Conservation and Management Act (MSA) was created in 1976 to, in part, establish regional fishery management councils and sustainably conserve marine fisheries. The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. The MSA requires Federal agencies to consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (MSA Manguson Stevens Act Section 305). The MSA (section 3) defined Essential Fish Habitat (EFH) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The species managed by the Pacific Fishery Management Council in the project area are Fall and Spring Chinook and coho salmon. Steelhead trout are not a primary management species under the Magnuson Stevens Act because they are rarely caught in ocean fisheries. The Oregon Coast Fall Chinook is the only ESU in the project area that is managed by the MSA and not also currently ESA listed or candidate for listing.

Oregon Coast Fall Chinook are found in the Siuslaw Watershed portion of the project area and, therefore, an effect determination for Fall Chinook EFH be included in the NMFS consultation described above. Effects on Fall Chinook EFH from the project would vary from no effect, not likely to adversely affect, or likely to adversely affect. The likelihood of incidental take of Oregon Coast Fall Chinook salmon associated with this project has been minimized by following Management Direction, BMP's and Aquatic Conservation Measures described, herein, which was analyzed in the "*Forest Management Program for Western Oregon"* programmatic consultation with NMFS Biological Opinion WCR-2017-7574, March 2018 (USDC - NMFS, 2018) and included in the project design features for this project (see section 5.5 Appendix E Project Design Features). Prior to a final project implementation decision, BLM would either make a no effect determination or receive verification from NMFS that the project is consistent with consultation as outlined in the NMFS Biological Opinion described above (USDC - NMFS, 2018).

4.3 National Historic Preservation Act Compliance

BLM sent Tribal scoping letters on November 4, 2019, to the tribal chairs and natural and cultural resources directors of the following tribes: Confederated Tribes of Siletz Indians; Confederated Tribes of Grand Ronde; and the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians.

BLM conducted consultation with the Oregon State Historic Preservation Officer (SHPO) and federally recognized Tribes (Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians; Confederated Tribes of the Siletz Indians; Confederated Tribes of the Grand Ronde); this is in accordance with Section 106 of the National Historic Preservation Act (NHPA) and 36 CFR 800.The scale of this landscape plan and the phased manner of the activities necessitated the “phased” identification and evaluation for historic properties within the project area as allowed under 36 CFR 800.4 (b) (2). Consequently, the Programmatic Agreement between United States Department of Interior, Bureau of Land Management, Northwest Oregon District, Siuslaw Field Office, and the Oregon State Historic Preservation Office, Regarding the Siuslaw HLB Landscape Plan was developed and formalized on May 17, 2021. This is also in accordance with the Council on Environmental Quality’s “Final Guidance for Effective Use of Programmatic NEPA Reviews; … “where a Federal agency’s broad decision will narrow the opportunities for adverse effects in future specific proposals, then the agency may initiate the Section 106 process as part of the programmatic review." (EOP - Council on Evironmental Quality, 2014, p. 27)

The programmatic agreement requires that initiation of work in any phase of this project be contingent upon completion of the identification and protection of historic properties and compliance with applicable provisions of NHPA in accordance with this agreement. Project specific survey and reporting will occur prior to implementation during specific project planning. Each implementation project must first have a historic properties survey, and a Finding of Effect on historic properties for that implementation project documented in a report to be reviewed by SHPO and federally recognized Tribes. Protection measures in Appendix B of the programmatic agreement are to be applied to ensure that effects to historic properties are avoided or minimized. Further, this agreement is consistent with the Proposed RMP / Final EIS, which concludes that “The BLM anticipates avoiding or mitigating impacts to the vast majority of cultural resources through: (1) identification of cultural resources and potential impacts through inventory; and (2) applying appropriate mitigation measures” (USDI Bureau of Land Management, 2016b, p. 218).

Cultural resource inventories of Siuslaw HLB Landscape Plan EA units would be conducted in accordance with Stipulation VI.B, and guided by Appendices A and D, of the 2015 State Protocol between the Oregon-Washington Bureau of Land Management (BLM) and the Oregon State Historic Preservation Officer (SHPO). These cultural surveys would be accomplished in two ways:

- Planning units occurring within the Willamette Valley eco-region shall be subject to pre-harvest inventory (USDI, Bureau of Land Management, 2015, Appendix A). These surveys would be conducted at the Determination of NEPA Adequacy level, which are to be completed for each individual timber sale contained within the Siuslaw HLB Landscape Plan EA planning area. These pre-project assessments shall be conducted for all ground-disturbing activities associated with the undertaking and incorporate project design features (PDFs) as needed (see below). In so doing, BLM would meet its Section 106 responsibilities under the 2015 State Protocol as well as the 2012 National Programmatic Agreement.
- For those units located within the Coast Range eco-region, post-harvest inventories would be required (USDI, Bureau of Land Management , 2015, Appendix D). These would be accomplished via the district-wide annual post-harvest survey program.

All inventories would be designed in accordance with the 2015 State Protocol, and utilize a GIS probability model to identify all areas within the project that have high, medium, and low probabilities for containing cultural resource sites based on degree of slope and proximity to water. One hundred percent of high probability acres would be surveyed unless on the ground conditions (e.g., impenetrable brush) prevent access to a specific, targeted area. In addition, a 20 percent random sample of medium probability acres would also be surveyed. No low probability acres would be inventoried, though some may be covered inadvertently. Pedestrian survey shall generally consist of parallel linear transects spaced no more than 30 meters apart and clearing 1 x 1-meter surface scrapes down to mineral soil every 30 meters.

List of Preparers

Name	Specialty
Emily Timoshevskiy	Silviculture
Sarah Wernecke	Planning Forester/Project Proponent
Sonja Weber	Wildlife Biologist
Jessica Gallimore and Maija Corliss	Fuels specialist
Doug Goldenberg	Botanist
Nick Scheidt	Fish Biologist
Julie Turner	Hydrologist/Road Decommissioning
Megan McGinnis	Soils Scientist/Road Decommissioning
Bernadette Hoffman	GIS
Heather Ulrich and Terry Godin	Archaeologists
David G. Sanders	Recreation
Greg Hedrick and Jonathan Eastman	Engineer/Road Decommissioning
Pierino Castelli	Logging Systems
Joshua M. Carnahan	NEPA Planner
Morgan Schneider	Team Lead/NEPA Planner/EA writer

5 Appendices

5.1 Appendix A – Glossary and Acronyms

5.1.1 Glossary

Age class – A system that categorizes forest stands by interval of years. For this analysis, the interval is 10-year increments. For example, a stand of 10-year age class of 60 includes ages 55 to 64. (USDI - Bureau of Land Management, 2016a, p. 289)

Allowable Sale Quantity (ASQ) – The timber volume that a forest can produce continuously under the intensity of management described in the RMP for those lands allocated for permanent timber production. (USDI - Bureau of Land Management, 2016a, p. 289)

Buddy Tree: Buddy trees are those that grow adjacent to the snag and remain in a patch around the snag. This protects the snag from logging damage that may cause the snag to break or fall.

Burning:

- **Underburning:** a fire that consumes surface fuels but not the overstory canopy.
- **Broadcast Burning:** A prescribed burning activity where fire is applied generally to most or all of an area within well-defined boundaries for reduction of fuel hazard, as a resource management treatment, or both. Canopy is generally either non-existent or not an objective to retain.
- **Pile Burning:** Activity fuels, once piled by machine or by hand, are burned in place.

Canopy Cover – A measure of the percentage of ground covered by a vertical projection of the tree crowns.

Commercial Timber Harvest – Timber volume is sold to the commercial timber market. Unit of measure is board feet (Bf).

DecAID – "…a summary of the current knowledge and best available data on deadwood in Pacific Northwest ecosystems. The primary emphasis is on wildlife relationships to deadwood and summaries of deadwood levels from inventory data; however, the data are presented in an ecosystem context. Snag dbh, down wood diameter, snag density, and down wood percent cover are statistically summarized using tolerance levels. (Mellen-McLean, et al., 2017)"

Disruption (ESA-listed wildlife species) – a type of disturbance that creates the likelihood of injury to ESA-listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering (see 50 CFR 17.3) and create the likelihood of injury or loss of reproduction if the species is present (USDI Fish and Wildlife Service, 2020, p. 40). An action that would disrupt the normal behavior of an ESA-listed species may affect, and is likely to adversely affect, the species and would cause the incidental taking of affected individual(s).

Disturbance (ESA-listed wildlife species) – Disturbance is a human action that may affect an ESA-listed animal species by the addition of noise or human intrusion above ambient conditions, or the mechanical movement of habitat (e.g., the shaking of the forest canopy from helicopter rotor wash) but does not necessarily disrupt the species resulting in incidental take. Disturbance is temporary/short term (minutes to days) and does not modify habitat structure. (Disturbance should not be confused with "surface disturbance," which refers to an action that modifies soil, water, or vegetation). Disruption is the subset of disturbance (USDI - Bureau of Land Management, 2016a, p. 293) that can cause incidental take.

Disturbance (natural) – A force that causes significant change in structure or composition through natural events such as fire, flood, wind, or earthquake, mortality caused by insect or disease outbreaks, or by human-caused events such as the harvest of forest products (USDI - Bureau of Land Management, 2016a, p. 293).

Down (or Downed) Wood – Woody material found on the forest floor from dead trees, branches or woody shrubs.

Early Successional Ecosystem – Successional stage between a stand-replacing disturbance (such as wildfire, wind event, or logging) and subsequent tree canopy closure. In this document, early successional ecosystem refers to the forest structural stage as well as the corresponding habitat for the diverse group of species that relies on or uses this stage in forest development.

Eligible river – A river or river segment found to meet criteria found in Sections 1(b) and 2(b) of the Wild and Scenic Rivers Act of being free flowing and possessing one or more outstandingly remarkable value. (USDI - Bureau of Land Management, 2016a, p. 294)

Fire Hazard - A fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree of ease of ignition and of resistance to control (USDI - Bureau of Land Management, 2016a, p. 294).

Fire Resistance Category– The BLM assigned forest structural stages to a relative ranking of resistance to stand-replacement fire (USDI Bureau of Land Management, 2016b, pp. 242-243). *See (related to) resistance.* Resistance - is the capacity for an ecosystem to resist the impacts of disturbances without undergoing significant change. For example, wildfire can burn through a resistant forest without substantially altering its structure, composition, or function (Franklin et al. 2013).

Foraging habitat (northern spotted owls) – "Foraging activity is positively associated with tree height diversity (North et al. 1999, p. 524), canopy cover (Irwin et al. 2000, p. 180; Courtney et al. 2004, p. 5–15), snag volume, density of snags greater than 20 in (50 cm) dbh (North et al. 1999, p. 524; Irwin et al. 2000, pp. 179–180; Courtney et al. 2004, p. 5–15), density of trees greater than or equal to 31 in (80 cm) dbh (North et al. 1999, p. 524) density of trees 20 to 31 in (51 to 80 cm) dbh (Irwin et al. 2000, pp. 179–180), and volume of woody debris (Irwin et al. 2000, pp. 179–180). While the majority of studies reported strong associations with old-forest characteristics, younger forests with some structural characteristics (legacy features) of old forests (Carey et al. 1992, pp. 245 to 247; Irwin et al. 2000, pp. 178 to 179), hardwood forest patches, and edges between old forest and hardwoods (Glenn et al. 2004, pp. 47–48) are also used by foraging northern spotted owls." (USDI Fish and Wildlife Service, 2012a, p. 71905)

Group Selection Openings – Areas with ≤ 2 live trees ≥ 7 inches DBH per acre. Roads, landings, yarding corridors, and skid trails do not count as group selection openings. (USDI - Bureau of Land Management, 2016a, p. 66).

Management direction – "…identifies where future actions may or may not be allowed and what restrictions or requirements may be placed on those future actions to achieve the management objectives set for the BLM-administered lands and resources." (USDI - Bureau of Land Management, 2016a, p. 47)

Management objectives – "…descriptions of desired outcomes for BLM-administered lands and resources in an RMPAs such, management objectives are not rules, restrictions, or requirements by which the BLM determines which implementation action to conduct or how to design specific implementation actions." (USDI - Bureau of Land Management, 2016a, p. 47)

Nesting-roosting habitat (northern spotted owls) – "In the West Cascades/Coast Ranges of Oregon and Washington, high-quality foraging habitat is also nesting/roosting habitat. Nesting stands typically include a moderate to high canopy cover (60 to over 80 percent); a multilayered, multispecies canopy with large (greater than 30 in (76 cm) dbh) overstory trees; a high incidence of large trees with various deformities (e.g., large cavities, broken tops, mistletoe infections, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for northern spotted owls to fly." (USDI Fish and Wildlife Service, 2012a, p. 71905) (USDI Fish and Wildlife Service, 2012a, p. 71905)

Nesting structure (marbled murrelets) – a conifer tree with all of the following characteristics (which are not always visible from the ground):

- A DBH of at least 19.1" and a height greater than 107 feet

- A nest platform at least 32.5 feet above the ground (a nest platform is a relatively flat surface at least 4" wide, with nesting substrate (e.g., moss, epiphytes, duff), and an access route through the canopy that a murrelet could use to approach and land on that platform)
- A tree branch or foliage, either on the tree with potential structure or on an adjacent tree, which provides protective cover over the platform

Note: Nesting structure does not have to be occupied by nesting marbled murrelets. (USDI - Bureau of Land Management, 2016a, p. 98)

Openings – Canopy cover removal of portions (0-4 acres) of a timber stand that maintains ≥3 live trees per acre, and the overall canopy cover of the stand above 40 percent. Not synonymous with group selection openings.

Recent Detections (northern spotted owls) – One or more detections of a northern spotted owl within the five years prior to the Decision Record authorizing treatment actions (USDI Fish and Wildlife Service, 2020, pp. Appendix H-3). For analysis in the EA Wildlife Report, sites with spotted owl detections in 2015-2019 were determined to have recent activity.

Relative density (RD) – A means of describing the level of competition among trees or site occupancy in a stand, relative to some theoretical maximum based on tree density, size, and species composition. Relative density percent is calculated by expressing Stand Density Index (SDI) (Reineke 1933) as a percentage of the theoretical maximum SDI, which varies by tree species and range. Curtis's relative density (Curtis 1982) is determined mathematically by dividing the stand basal area by the square root of the quadratic mean diameter. See also Stand Density Index. (USDI - Bureau of Land Management, 2016a, p. 301)

- When relative density is equal, stands with larger diameter trees will have fewer trees per acre when compared to a stand with smaller diameter trees. In simple terms, relative density measures how much surface area the stems of a tree occupy within a given area. For example, many toothpicks can fit into a 1 square foot area, but only a few baseball bats can fit into that same area. This analogy is the concept of relative density only using tree stems and acres instead of toothpicks, baseball bats and a square foot (Field Office Silviculturist analogy).

Rotation (age) **–** The planned number of years between the establishment of an even-aged or two-aged forest stand and its regeneration harvest. (USDI - Bureau of Land Management, 2016a, p. 301)

Shaded Fuel Break - A shaded fuel break is a strategic location along a ridge, access road, or other defensible location where fuels have been modified to increase the probability of success for fire suppression activities. This is a carefully planned thinning of dense vegetation, so fire does not easily move from the ground into the overhead tree canopy. A shaded fuel break is not the removal of all vegetation in a given area. The intent of the fuel break is to create a fuel model or vegetative arrangement where wildfire reduces intensity as it burns into the fuel break.

Snag – Any standing dead, partially dead, or defective (cull) tree at least 6 feet tall (USDI - Bureau of Land Management, 2016a, p. 302). All snags are standing trees that are either dead or live trees with dead wood, such as cavities or evidence of heart rots that promote hollow tree cavities.

Stand – An aggregation of trees occupying a specific area managed as a discrete operational or management unit. A stand may be composed of trees and groups of trees of a variety of ages, species, and conditions, or it may be relatively uniform. A stand may also contain multiple land use allocations. (USDI - Bureau of Land Management, 2016a, p. 304). An operational stand is 5 acres or more in the BLM inventory tracking database MicroStorms.

Stand Density Index (SDI) – Reineke's (1933) stand density index is a function of quadratic mean diameter and number of trees per unit area. SDI can be interpreted as the number of 10 inch trees that would experience approximately the same level of inter-tree competition as the observed number of trees with the observed mean diameter. See also relative density. (USDI - Bureau of Land Management, 2016a, p. 304)

Sustained yield – The board foot volume of timber that a forest can produce in perpetuity at a given intensity of management; the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources. (USDI - Bureau of Land Management, 2016a, p. 304)

Sustained yield unit (SYU) – An administrative unit for which an allowable sale quantity is calculated; in western Oregon, the six sustained yield units correspond to the Coos Bay, Eugene, Medford, Roseburg, and Salem Districts, and the western portion of the Klamath Falls Field Office. (USDI - Bureau of Land Management, 2016a, p. 305)

Timber volume – Amount of timber contained in a log, a stand, or a forest, typically measured in board feet or cubic feet. (USDI - Bureau of Land Management, 2016a, p. 305)

Timber harvest (also: harvest / harvesting) – The process of cutting and removing of merchantable trees from a forested area. (USDI - Bureau of Land Management, 2016a, p. 295)

5.1.2 Acronyms

ASQ – Allowable Sale Quantity

BLM – Bureau of Land Management

BMP – Best Management Practice

DBH – Diameter at Breast Height

EA – Environmental Assessment

EIS – Environmental Impact Statement

ESA – Endangered Species Act

FOI – Forest Operations Inventory

HLB – Harvest Land Base

LITA – Low Intensity Timber Areas

LUA – Land Use Allocation

Mbf – Thousand Board Feet

MMbf – Million Board Feet

MITA – Moderate Intensity Timber Areas

NEPA – National Environmental Policy Act

ORV – Outstandingly Remarkable Value

PDF – Project Design Feature

PDC – Project Design Criteria

PRMP/FEIS – Proposed RMP / Final EIS

RD – Relative Density

RMP – Resource Management Plan

ROD – Record of Decision

SYU – Sustained Yield Unit

TPA – Trees Per Acre

USDI – United States Department of Interior

WDA – Wildland Development Areas

WHP – Wildfire Hazard Potential

WSR – Wild and Scenic River

WUI – Wildland Urban Interface

5.2 Appendix B – Issues Considered but not Presented in Detailed Analysis

5.2.1 Botany:

5.2.1.1 *What are the effects of timber harvest and road construction on Noxious and Invasive Weeds?*

During public scoping, the BLM received comments concerning the increased risk of noxious and invasive weeds spread due to management activities related to timber harvest and road construction. The BLM determined that all action alternatives would remain within the range of effects described in the Final EIS and did not present this issue in detail because there would not be reasonably foreseeable significant effects of the proposed project beyond those disclosed in the Proposed RMP/Final EIS. Discussion of identifying issues for analysis occurs in the BLM NEPA Handbook (USDI - Bureau of Land Management, 2008a)

Executive Order 13751 and the 2016 ROD/RMP (p. 296) refers to invasive species as non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human health, and specifies that invasive species are to be prevented from being introduced, and are to be monitored and controlled. The Oregon Department of Agriculture lists invasive non-native species of particular interest as Noxious Weeds.

During previous botanical surveys, parts of the HLB Landscape Plan Project Area were surveyed for noxious and invasive weeds. Weeds are very common on roadsides. The most harmful weed species were mapped (Table 1); these species are ODA Noxious Weeds, except cut-leaf blackberry, and are those most likely to produce nearly monospecific stands, displacing native vegetation. Himalayan blackberry includes *Rubus armeniacus* and the very similar but more shade tolerant *R. vestitus.* Despite the infestations, moist, shaded forest understories in the project area often are without non-native species. However, some areas off road in more open conditions have become highly infested with blackberries, false brome, and Scotch broom.

Botany Table 1. Acres of invasive species mapped in the HLB Project Area during botany surveys 2010-2019.

Species Name	Total Acres
Scotch broom	1364
Himalayan blackberry	818
Herb Robert	256
False brome	216
Cut-leaf blackberry	197
Meadow knapweed	100
Shining geranium	37
English ivy	3

The Final EIS (USDI Bureau of Land Management, 2016b, p. 422) considered there was a higher weed risk where there were more existing weeds and more ground disturbance by expected projects. Increased weed infestation is likely under the action alternatives in this EA, and likely to persist indefinitely. Of greatest concern are large, dominant infestations of Scotch broom, blackberries, and false brome off roadsides, which would impact the native plant community. Several studies have documented increased weed infestation after timber sales [e.g. (Thysell & Carey, 2001), (Gray, 2005), and (Muir, et al., 2002)], and timber sales in and near the project area have shown this effect as well. For example, the understory within the Burnt Bottle Timber Sale has become largely covered in Himalayan blackberry after two thinning entries. Comparison of the planned Spike Schaffer Thinning and the nearby completed Russell Creek Thinning revealed increases that could be expected in that particular locale after a timber sale. The planned sale had an existing 5-25 percent weed cover on roadsides, and 0-0.1 percent cover off road. In contrast, the completed Russell Creek Sale had 50 percent cover on

roadsides and 1 percent off road; increasing to 50 percent cover on new temporary roads and 20 percent cover on skid trails (from reviews for the Spike Schaffer Timber Sale).

Project Design Features and BLM Manual 9015 Risk Assessment. Control measures for weeds are included in this effects analysis, that is, observed weed concentrations were the result of current and standard actions, including ongoing weed control work, washing of logging equipment, and native grass seeding on closed, tilled roads. Additional project design features (referred to as mitigation in the BLM Manual 9015) is prescribed by the risk assessment in BLM Manual 9015 – Integrated Weed Management. The assessment considers the likelihood of spread and the consequence of spread (level of effects) to come up with a risk rating. The BLM Manual 9015 Risk Assessment will be applied to individual timber sales as localized data becomes available. For areas with a high risk rating, seeding with desirable species to occupy disturbed sites, control of existing infestations prior to and after project activity, and monitoring of weeds for five years after project activity is prescribed by BLM Manual 9015. In all project areas, weed free gravel would be used for road work, and some harvest skip areas would be placed over some weed infestations to provide additional weed mitigation. Weed free gravel or aggregate used for road construction, improvement and renovation would be recently crushed rock from active quarry sites, or from sites inspected by BLM personnel and found to be weed free, or from gravel sources certified as weed free by Oregon Department of Agriculture (ODA) Weed Free Forage & Gravel Program.

An indirect effect of the project is that it adds to the overall inability to successfully control weeds on the Siuslaw Field Office. Weeds are generally widespread over Siuslaw Field Office lands, as evidenced through weed mapping efforts. More acreage of infestations has been documented than can be controlled with current resources and methods. Recent financial resources have allowed weed control of high priority species and Scotch broom in the Siuslaw Field Office. High priority species such as false brome, shining geranium, and meadow knapweed are species that are not yet abundant, but have a potential for severe impacts. Control measures have been concentrating on these high priority species and Scotch broom along roadsides. Roadside infestations are prioritized as they have a high likelihood of being spread along the road. A lack of financial and personnel resources has often led to off-road infestations not being controlled. Blackberry has generally not been controlled as it sprouts from underground after cutting, and herbicides have not been available, although they have become available in 2020 with the Integrated Invasive Plant Management for the Northwest Oregon District Environmental Analysis. It is likely that much of the weed infestations expected to result from the action alternatives will not be adequately controlled given current resources.

The risk of invasive plant introduction and spread was analyzed in detail within the Final EIS (pp. 419-438) to which this EA tiers. The action alternatives would have potentially significant effects concerning invasive species. However, the 2016 Proposed RMP/Final EIS acknowledged the risk of potentially significant increases in invasive plant infestation due to ground disturbing actions including timber harvest and road construction. In the Final EIS (USDI Bureau of Land Management, 2016b, p. 428), 155 of 267 watersheds were considered at risk of introduction and spread of invasive plant species due to timber harvest and 155 of 275 watersheds due to new road construction, under the proposed RMP. Risk levels varied from none and low, to highest, and were calculated and described as relative among alternatives. Risk was higher where there were more existing weeds, and more expected disturbance. The project area falls in watersheds considered at high to highest risk due to timber harvest, and road construction. The 2016 Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, p. 437), and the 2016 ROD/RMP (USDI - Bureau of Land Management, 2016a, p. 80) prescribe control measures for invasive species but do not detail their extent or expected level of success. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.1.2 *What are the effects of timber harvest on Special Status Plants, Lichens, and Fungi?*

During public scoping, the BLM received comments concerned about the effects associated with the proposed timber harvest and connected actions on Bureau Special Status plants, lichens, and fungi. This issue was considered, but not analyzed in detail because significant effects to Special Status (Threatened, Endangered or

Sensitive) Species are not anticipated beyond those disclosed in the Proposed RMP/Final EIS, and there are no differences in effects being used to inform the decision. Discussion of identifying issues for analysis occurs in the BLM NEPA Handbook (USDI - Bureau of Land Management, 2008a, p. 41).

Public scoping comments suggested concerns about surveys for rare and uncommon species and concerns about sensitive and listed species in general. The BLM 6840 Special Status Species policy directs the BLM to conserve and/or recover ESA-listed species, and to initiate proactive conservation measures that reduce or eliminate threats to Bureau Sensitive species to minimize the likelihood of and need for listing of these species under the ESA. Effects to Bureau Sensitive plants, including lichens and bryophytes, was described in the 2016 Proposed RMP / Final EIS, to which this analysis is tiered, and that discussion is hereby incorporated by reference (USDI Bureau of Land Management, 2016b, pp. 517-548). That analysis concluded that, “timber harvest would not directly affect sites of Bureau Sensitive plants, including lichens and bryophytes, and their occupied habitat within the Harvest Land Base, because the BLM would conduct pre-disturbance surveys and apply conservation measures. These conservation measures would be sufficient to protect sites based on past implementation of these measures.” (USDI Bureau of Land Management, 2016b, p. 534). The 2016 ROD/RMP provides management direction for the conservation of Bureau Special Status plant and fungi species (USDI - Bureau of Land Management, 2016a, p. 86).

Botanical surveys would be conducted in the individual project areas for the BLM Special Status (federally listed Threatened or Endangered, and BLM Sensitive) vascular plants, lichens and bryophytes that are documented or suspected on the Siuslaw Field Office. These surveys would cover the individual projects, using established survey methods for rare plants (“intuitive-controlled” surveys). Bureau Special Status botanical species that are found through these surveys in a project area would be managed accordingly to protect sites and preclude loss of site viability. Some Sensitive vascular plant, lichen or bryophyte sites may have been overlooked during surveys, and overlooked sites may be extirpated by timber harvest activities. The majority of sites should be found during surveys and management of these known sites is considered adequate to preclude contributing to a trend toward listing of the species under the Endangered Species Act.

Eucephalus vialis (wayside aster), a vascular plant species, was reported during previous surveys in the vicinity of the project area. *Eucephalus vialis* is a Bureau Sensitive plant, and would be managed according to BLM Policy 6840 to avoid a trend toward listing under the Endangered Species Act. Sites occur on or near roadsides and in relatively open forest. *Eucephalus vialis* is a species of relatively open habitats, and is often excluded from areas of dense forest except for roadsides or other openings. Sites will be protected from direct disturbance by small buffers, with thinning nearby. Thinning should provide a beneficial effect by increasing sunlight and the size and flowering of the plants, while retaining some canopy to preclude excessive growth of shrubs and invasive species. However, it is unlikely that *Eucephalus vialis* sites will expand in the near future. *Eucephalus vialis* is a slow growing species of fire-maintained habitats, rather than an early successional plant that expands greatly during episodic disturbance events. Other Bureau Sensitive Species possible in the project area include vascular plants *Horkelia congesta* ssp. *congesta, Lathyrus holochlorus,* and *Sisyrinchium hitchcockii;* lichens *Bryoria bicolor*, *Hypotrachyna riparia,* and *Ramalina labiosorediata;* bryophytes *Entosthodon fascicularis, Orthotrichum hallii, Blepharostoma arachnoideum, Phymatoceros phymatodes* and *Porella bolanderi.*

Special Status fungi may occur in the project area; surveys in specific projects areas are not conducted for fungi. On the Siuslaw and Upper Willamette Field Offices there are 10 Documented and 17 Suspected Bureau Sensitive fungi species. According to BLM Information Bulletin No. OR-2004-145, and the April 2016 Proposed RMP / Final EIS (USDI Bureau of Land Management, 2016b, p. 525), pre-disturbance surveys in proposed project areas for these fungi are not practical to conduct due to their intermittent appearance. Instead, incidental, or strategic surveys (surveys not tied to project clearance) and management of known sites is conducted. Ten years of strategic fungi surveys have been completed over the “south zone,” the Siuslaw and Upper Willamette Field Offices, spanning 2008 through 2019, over 6633 acres, with 254 rare fungi sites found, and an average of 5 species new to the area found per year. Bureau Sensitive fungi documented on the Siuslaw Field Office include *Phaeoclavulina abietina, Phaeocollybia oregonensis,* and *Sarcodon fuscoindicus.* One site of *Sarcodon fuscoindicus* was found in the HLB.

Special Status fungi may occur in the project area, and if so, would be impacted by the timber sales. However, according to BLM Information Bulletin Number OR-2004-145 and the April 2016 Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, p. 525), incidental findings or strategic surveys, along with protection of known sites, is thought to be adequate in assuring that projects will not contribute to the need to list these species under the ESA. Retention trees and retention areas (skips) in harvest units, and the retention of older, structurally complex stands in late-successional reserves, are also expected to benefit fungi by conserving unknown sites. Any known sites of Bureau Special Status fungi would be managed on a project and species basis with features designed to conserve populations of the species.

In all action alternatives analyzed in detail the BLM would conduct pre-disturbance surveys for Bureau Special Status plant species and apply conservation measures to protect these sites. The BLM determined that under all action alternatives effects to Special Status botanical species are not associated with significant direct, indirect, or cumulative impact. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.1.3 ***What are the effects of timber harvest on common and uncommon botanical species?***

During public scoping, the BLM received comments concerned about the effects associated with the proposed timber harvest and connected actions on common and uncommon botanical species; these species include lichens, mushrooms, damage to the shrub layer, and tree and understory species composition.

The BLM determined that all action alternatives analyzed in detail would remain within the range of effects described in the Final EIS and did not present this issue in detail because it does not inform the decision and is not associated with significant effects. Discussion of identifying issues for analysis occurs in the BLM NEPA Handbook (USDI - Bureau of Land Management, 2008a, p. 41).

The BLM interpreted this comment as common and uncommon botanical species that could trend toward extinction. The BLM botanist reviewed all action alternatives analyzed in detail and they would not cause a trend toward listing for common and uncommon botanical species. The historic wildfires of 2020 burned outside the project area and thus did not affect botanical species within the project area.

Lichens are expected to decline with timber harvest, especially with regeneration. Many lichens are epiphytic, so removal of trees would harm the species. However, in some cases thinning can eventually increase lichen diversity due to increased sunlight and structural diversity (Root, McCune, & Neitlich, 2010). Likewise, mushrooms would be expected to decline with timber harvest. Harvestable culinary mushrooms in our area, such as chanterelles, hedgehogs, boletes, and truffles are ectomycorrhizal and depend on connections with live trees to survive. Ectomycorrhizal fungi decrease more with greater harvest intensity (Aubry, Halpern, & Peterson, 2009). The shrub layer would be damaged in timber operations, however, within about 5 years after timber harvest, the shrub layer would become very dense due to increased sunlight. Many previous thinning units in the Siuslaw Field Office have nearly impenetrable understories due to shrub growth. Likewise, shrub growth can be so great after regeneration harvest that manual cutting can be required to allow reforestation success.

Understory species composition is expected to dramatically shift due to timber harvest. Common vascular plants in the project area include community dominants such as Douglas-fir, big-leaf maple, California hazel, oceanspray, vine maple, salal, sword fern and dwarf Oregon-grape. Many of the community dominant shrub species increase with canopy thinning or removal. Heavy brush growth in some areas limits forest floor bryophyte growth that could otherwise be present. Forest floor bryophytes are known to decline greatly with harvest, even at relatively low intensities (Aubry, Halpern, & Peterson, 2009). Aubry et al. 2009 (Aubry, Halpern, & Peterson, 2009) found that for "more sensitive forest organisms" (including forest-floor bryophytes), "reductions in abundance or diversity were comparably large at both low and moderate levels of retention. For these taxa, physical conditions…may exceed thresholds for persistence even at moderate levels of retention."

Early seral species occur in the project area particularly along roadsides, in recently logged areas, and in natural treefall areas. Characteristic early seral species include bracken fern, legumes such as *Lotus aboriginus*, *Vicia*

gigantea and *Lupinus latifolius*, and *Rubus leucodermis*, a common shrub that invades disturbed areas. Small trees such as *Rhamnus purshiana* and *Prunus emarginata* can invade logged areas.

Late seral herbs decline in recently thinned areas. Late seral species found in the project area include orchids (*Corallorhiza maculata, Goodyera oblongifolia, Listera cordata, Calypso bulbosa*) and herbaceous Ericaceae (*Chimaphila spp., Pyrola spp. , Monotropa uniflora*); these taxa are often mycotrophic or partially mycotrophic species (Terdersoo, Pellet, Kõljalg , & Selosse, 2007), possibly explaining their seral status and tendency to decline because of thinning (Thysell & Carey, 2001). Mycotrophic species are those plants that obtain their energy from fungi instead of through photosynthesis.

Vegetation effects of timber harvest and succession have been extensively studied. Halpern (Halpern C. , 1989) found that a majority (71-82 percent) of forest understory plants persisted after clearcuts and burning (persistent, or residual species), while a number of species colonized the sites (invading, or early seral species). Within the 20 years after disturbance, some of the invading species peaked and then declined, while others continued to increase. Residual species were reduced in abundance greatly by the initial disturbance. Some residual species increased quickly after the disturbance, with some becoming much more abundant than in the original stand, while others did not recover (late-seral species). Species losses occurred, including Orchidaceae and herbaceous Ericaceae (Halpern & Spies, 1995). Similarly, Aubry (Aubry, Halpern, & Peterson, 2009) found a loss of diversity among both forest generalist and late-seral vascular plants under variable retention cutting. However, overall diversity in vascular plants tends to be highest after disturbance (Halpern C. , 1989), particularly due to the relatively high number of early-seral species. Even before canopy closure, community dominant shrubs can drive a loss in diversity (Halpern & Spies, 1995). Competitive taxa can form dense monospecific stands that can exclude less robust shade-tolerant understory taxa. Species diversity again increases after canopy closure, peaking in old growth (Halpern & Spies, 1995).

Patterns under forest thinning are similar to those under regeneration harvest. Thinning of mid seral stands leads to increases in vascular plant diversity, particularly due to increases in invading early seral species (Burton, Ares, Olson, & Puettmann, 2013). Thinning, however, can also reduce the abundance of late seral species through competitive effects from early seral species (Burton, Ares, Olson, & Puettmann, 2013), and probably other mechanisms.

Vegetation responses in the regeneration harvest areas could be expected to be similar to those observed in the Rusty Nel and Badger One Timber Sales in the Siuslaw Field Office, 5-10 years after the sales were completed. A large number of characteristics early-seral species were found that evidently dispersed into the site, including *Sambucus mexicana, Ribes sanguineum, Anaphalis margaritacea, Rubus leucodermis,* and *Salix scouleriana*. Some early-seral species, such as *Ceanothus sanguineum, Lupinus latifolius* and *Lotus aboriginus* probably had long-lived seed banks that responded to disturbance. Often, though, much of the biomass on these sites was from persistent, “mid-seral” or community dominant species, such as *Rubus ursinus, Acer macrophylum, Holodiscus discolor, Polystichum munitum, Gaultheria shallon* and *Corylus cornuta.* Many persistent forest-floor herbs were found, but some (such as *Viola orbiculata, Trillium ovatum,* and *Linnaea borealis*) appeared to have declined from their usual abundance, while others were undetected. Species that had declined or had become absent would be considered late-seral species. Lichens and bryophytes were also relatively sparse, although bryophytes of open, mineral soil sites could be found.

Special Status Species, oaks, and pines (valley fringe species adapted to frequent understory fire) have specific management actions to be implemented where they are found. Species other than Bureau Special Status Species, oaks and pine do not have specific management goals, and there are no specific standards to measure effects against. Additionally, “coarse filter” (Hunter, Jacobson, & Webb, 1988) management actions should provide for the range of common and uncommon species. Coarse filter actions provide for ecosystem function and biodiversity, in contrast to fine filter actions targeting particular species. For example, Late Successional and Riparian Reserves, harvest skips, and longer rotations should provide for many botanical species adapted to late successional forest. Likewise, management of oak and pine will help provide for other botanical species adapted to frequent understory fires. Harvest skips are often placed in botanically valuable locations. Effects to common

and uncommon species are not expected to be significant because the above “coarse filter” actions should preclude a trend towards extinction, listing as Bureau Sensitive, or listing under the Endangered Species Act.

The BLM determined that under all action alternatives effects to common and uncommon botanical species is not associated with significant direct, indirect, or cumulative impacts. BLM actions would not cause a trend toward listing for common and uncommon botanical species. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn’t necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects.

5.2.2 Carbon storage and greenhouse gas emissions:

5.2.2.1 ***How would the timber harvest affect carbon storage, greenhouse gas emissions and carbon sequestration in the planning area?***

During public scoping, the BLM received comments to consider the effects of the Siuslaw HLB Landscape Project on carbon storage and greenhouse gas emissions. This issue is not presented for detailed analysis because, regardless of project-specific or site-specific information, there would be no reasonably foreseeable significant effects of the proposed action beyond those disclosed in the Final EIS and such an analysis would not show a reasoned choice between alternatives. That is, it does not relate to how the alternatives respond to the purpose and need. The Final EIS analyzed the effects of timber harvesting, prescribed burning, and livestock grazing on greenhouse gas emissions and carbon storage, and the potential impacts of climate change on major plan objectives.

The effects of the proposed action, within the Siuslaw HLB Landscape Project, on carbon storage and greenhouse gas emissions tiers to the analysis in the Proposed RMP/Final EIS. As described below, the proposed action is consistent with the Northwestern and Coastal Oregon ROD, and the proposed action is not expected to have significant effects beyond those already analyzed in the Proposed RMP/Final EIS. While analysis of the project-specific and site-specific conditions could give greater specificity to the analysis in the Proposed RMP/Final EIS, there is no potential for reasonably foreseeable significant effects of the proposed action beyond those disclosed in the Proposed RMP/Final EIS. The analysis in the Proposed RMP/Final EIS addressed the effects on carbon storage and greenhouse gas emissions of implementing the entire program of work in the timber sale program based on high quality and detailed information (USDI Bureau of Land Management, 2016b, pp. 165-180; 1295-1304). The information available on project-specific and site-specific conditions, while more specific, is not fundamentally different from the information used in the Proposed RMP/Final EIS analysis of effects on carbon storage and greenhouse gas emissions, and thus cannot reveal any fundamentally different effects than that broader analysis.

The Proposed RMP/Final EIS upon which the 2016 ROD/RMP was based examined the most recent science regarding climate change, carbon storage, and greenhouse gas emissions. The analysis in V. 1 on Pages 165-211 (USDI Bureau of Land Management, 2016b, pp. 165-211) are relevant to this project and are incorporated by reference.

The key points from 2016 Proposed RMP/Final EIS analyses include (USDI Bureau of Land Management, 2016b, p. 165):

- Net carbon storage would increase.
- Annual greenhouse gas emissions would increase although annual emissions would remain less than 1 percent of the 2010 Statewide greenhouse gas emissions.
- Climate change increases the uncertainty that reserves will function as intended and that planned timber harvest levels can be attained, with the uncertainty increasing over time.
- Active management provides opportunities to implement climate change adaptive strategies and potentially reduce social and ecological disruptions arising from warming and drying conditions.

The Proposed RMP/Final EIS concluded that the approved RMPs support the state of Oregon’s interim strategy for reducing greenhouse gas emissions (USDI Bureau of Land Management, 2016b, p. 173). Both the

state of Oregon's strategy and Federal climate change strategies have goals to increase carbon storage on forest lands to partially mitigate greenhouse gas emissions from other sectors of the economy. Neither the state of Oregon nor the federal government have established specific carbon storage goals so quantifying BLM's contribution to that goal is not possible. Assuming no changes in disturbance regimes such as fire and insects (acres affected and severity of impact) from the recent past, timber harvesting is the primary activity affecting carbon storage (USDI Bureau of Land Management, 2016b, p. 169).

The Proposed RMP / Final EIS estimated the effects of implementing actions consistent with the Northwestern and Coastal Oregon and the Southwestern Oregon RMPs as follows:

	Current	2033	2063
Carbon Storage	336 Tg C	404 Tg C	482 Tg C
Greenhouse Gas Emissions	123,032 Mg CO_2e/yr	256,643 Mg CO_2e/yr	230,759 Mg CO_2e/yr

The carbon storage and greenhouse gas emissions analysis was based on assumptions concerning the level of management activity:

- The Proposed RMP/Final EIS assumed an average annual harvest level of 278 MMbf per year (205 MMbf from the HLB and 73 MMbf from non-ASQ related harvest) over the entire decision area (USDI Bureau of Land Management, 2016b, p. 307). The expected annual harvest for the Eugene District Sustained Yield Unit is 72 MMbf (53 MMbf from the HLB and 20 MMbf from non-ASQ related harvest). The Siuslaw Field Office contribution to the ESYU ASQ is 7MMbf, and Non-ASQ is 20MMbf annually (USDI - Bureau of Land Management, 2019a).
- Activity fuels treatments are aligned with the harvest program with estimated acres of prescribed fire treatment type provided by the Woodstock model (USDI Bureau of Land Management, 2016b, p. 1300). The decadal average of activity fuels prescribed burning for the first 20 years of the RMP would be an estimated 64,806 acres over the entire decision area (USDI Bureau of Land Management, 2016b, p. 362). For the Eugene Sustained Yield Unit, the expected decadal average activity fuels program covers 16,045 acres.
- The Proposed RMP/Final EIS assumed that the non-commercial hazardous fuels (natural fuels) treatment levels would not differ from the 2003-2012 period although there is substantial year-to-year variability in the size of the program over the planning area and within any one District (USDI Bureau of Land Management, 2016b, p. 270). Approximately 173,300 acres of natural fuels treatment is expected to occur on average each decade across the planning area (USDI Bureau of Land Management, 2016b, p. 167). The expected natural fuels treatment program for the Eugene Sustained Yield Unit is 11,568 acres per decade, on average.

Under the Northwestern and Coastal Oregon 2016 ROD/RMP, no allotments would be available for livestock grazing through the issuance of a grazing lease (USDI Bureau of Land Management, 2016b, p. 481; USDI - Bureau of Land Management, 2016a, p. 84) . As a result, no greenhouse gas emissions from a regular grazing program would occur.

The amount of activity fuels prescribed burning is the primary driver of greenhouse gas emissions (USDI Bureau of Land Management, 2016b, p. 178). Greenhouse gas emissions would increase substantially largely due to the projected increases in activity fuels prescribed burning. The Proposed RMP/Final EIS assumed no change in the natural fuels prescribed burning program from the recent past. Greenhouse gas emissions analyzed included those from grazing, prescribed burning, and harvest operations (USDI Bureau of Land Management, 2016b, p. 174).

There is no new information or changed circumstances that would substantially change the effects anticipated in the 2016 Proposed RMP/Final EIS. This is because:

1. The harvest levels remain within the range of that analyzed in the Final EIS. Within the Final EIS and 2016 ROD/RMP, harvest levels within the Eugene Sustained Yield Unit were calculated based on stand composition and attributes on a yearly and decadal rate. Eugene Sustained Yield unit has a target of 52MMbf per year in the HLB for ASQ, and predicted 20MMbf/year in non-ASQ (LSR), with an allowance of 40 percent variance per year, and 20 percent variance per decade (USDI Bureau of Land Management, 2016b, p. 6). This project is expected to produce 7MMbf per year, for 20 years, or 140MMbf. This harvest level, in conjunction with other planned sales in non-ASQ lands, would contribute to the volume targets for 2022 through 2042. These harvest levels are directly in line with the range of harvest levels in the Final EIS and conform to the assumptions in the Final EIS regional carbon and climate analysis.
2. The acres of activity fuels prescribed burning, predicted CO2 emissions, and expected tonnage consumed remains within the range analyzed in the Final EIS. The Final EIS assumed a decadal average of 4,745 acres of activity fuels prescribed burning would occur in Eugene SYU. It is anticipated that a decadal average of 1,400 to 3,800 acres of piling and burning of activity fuels would occur under the Siuslaw HLB Landscape Project. The Final EIS assumed that in the Eugene SYU burning of piles would create 8.7 tons of CO2 per acre and consume 5.3 tons of fuel per acre. Using the assumptions built into the Final EIS, pile burning in this project would produce an estimated 12,180 to 33,060 tons of CO2 and consume approximately 7,420 to 20,140 tons of biomass from pile burning. Potential under/broadcast burning in harvest areas would occur on a decadal average of up to 500 to 1,000 acres. The Final EIS assumed that in the Eugene SYU under/broadcast burning would create 4.6 tons of CO2 per acre and consume 28 tons of fuel per acre. Using the assumptions built into the Final EIS, Under/broadcast burning would produce up to an estimated 2,300 to 4,600 tons of CO2 and consume up to approximately 14,000 to 28,000 tons of biomass.
3. The acres of natural fuels prescribed burning and expected tonnage consumed does not exceed the levels analyzed in the Final EIS. Natural fuels treatments are not part of the proposed action for this project.

5.2.2.2 ***What would be the social cost of carbon from the alternatives?***

The BLM received public comments during project scoping that asked the BLM to disclose the social cost of carbon from the alternatives. The BLM determined that all action alternatives analyzed in detail would remain within the range of effects described in the Final EIS and did not present this issue in detail because it does not inform the decision and is not associated with environmental effects (USDI - Bureau of Land Management, 2008, p. 41). As described in the Green House Gases, Carbon Sequestration, and Carbon Storage issue above, the Final EIS modeled a total timber harvest of 53 MMbf on HLB land use allocation (ASQ) and 20 MMbf on Late Successional Reserve and Riparian Reserve land use allocations (non-ASQ) under the Proposed RMP [(USDI Bureau of Land Management, 2016b, p. 353) Table 3-58]. This table also shows a total of 278 MMbf/yr being removed from all land use allocations. All alternatives are fully within the analysis of the Final EIS's discussion on Carbon Storage, which is hereby incorporated by reference (USDI Bureau of Land Management, 2016b, pp. 598-560).

The Final EIS used a similar approach to the U.S. Interagency Working Group (IWG) on the Social Cost of Carbon (SCC) (USDI Bureau of Land Management, 2016b, p. 599). The BLM first calculated the SCC of metric tons of CO_2 emissions in year 2017 ($38 (average) and $112 ($95^{th}$ percentile) in 2012 dollars), and then converted this to the total SCC of metric ton of C in year 2017 ($152 (average) and $445 ($95^{th}$ percentile) in 2012 dollars) (USDI Bureau of Land Management, 2016b, p. 599). For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.3 Fisheries:

5.2.3.1 ***What are the effects of timber harvest, timber sale road work, and timber haul on fish populations and fish habitat?***

The BLM received comments during public scoping asking the BLM to consider the effects of each alternative on ESA listed fish, Oregon Coast coho salmon, Oregon Coast ESU of spring-run Chinook salmon, (ESA list candidate, status review ongoing, NMFS April 2020), fish habitat, fish rearing habitat, fish populations, and streams. The BLM assumes these comments regard potentially significant impacts from timber harvest, timber sale road work, and timber haul on fish populations and fish habitat.

BLM considers stream temperature, sediment, large wood loading, and stream flow as stream characteristics that have influence on fish populations and fish habitat in the planning area. The 2008 Final EIS for the Revision of the Resource Management Plans of Western Oregon (USDI Bureau of Land Management, 2008b, pp. 372-390) and the 2016 Proposed RMP / Final EIS (USDI Bureau of Land Management, 2016b, p. 280) explained the influence of key ecological processes on fish habitat and fish populations, and that discussion is incorporated here by reference. Native fish species present within or near the analysis area include Spring and Fall Chinook salmon (Onchorhynchus tswhawytscha), coho salmon (Onchorhynchus kisutch), steelhead trout (Onchorhynchus mykiss), coastal cutthroat trout (Onchorhynchus clarki), western brook lamprey (Lampetra richardsonii), pacific lamprey (entosphenus tridentatus), sculpin (Cottus aleuticus, Cottus perplexus, and Cottus gulosus), speckled dace (Rhinicthys osculus), and Northern pikeminnow (Ptychocheilus oregonensis). Coho salmon is the only ESA listed fish species present in the Siuslaw watershed within the analysis area. Upper Willamette Spring Chinook is the only ESA listed fish species present in the Willamette watershed near the analysis area. Oregon Coast Spring Chinook is an ESA list candidate species that was historically present in the Siuslaw watershed. Bureau sensitive fish populations found in the project area include Oregon Coast coho salmon, Upper Willamette Spring Chinook salmon, pacific lamprey, Oregon Coast Spring Chinook salmon (candidate), and Oregon Coast Winter Steelhead trout. A summary of bureau sensitive fish species and their distributions within the analysis area can be found in the Special Status Fisheries Species table in Section 5.4.4: Coastal cutthroat trout, brook lamprey, sculpin, speckled dace, and Northern pikeminnow are found in both the Siuslaw and Willamette drainages.

All of the alternatives would implement BMPs (see section 5.5.3 Appendix E – BMPs Table), Riparian Reserve management direction (USDI Bureau of Land Management, 2016b, pp. 68-74)), and project design features (see section 5.5 Appendix E – Project Design Features) created specifically to reduce potential negative effects to water quality, streams, fish, and fish habitat. The BLM formally consulted with NMFS on actions that may affect ESA listed anadromous fish species and NMFS provided the Forest Management Biological Opinion (FOMBO) (USDC - NMFS, 2018). All the alternatives are consistent with project design criteria (USDC - NMFS, 2018) Section 2.8.1 and BMPs outlined within FOMBO. Project design features consistent with FOMBO would be implemented for each alternative and do not represent major difference across the alternatives (see section 5.5 Appendix E – Project Design Features). The BLM would either make a No Effect determination or submit a notification to NMFS on each action prior to implementation, as described in the Consultation section of this document (see section 4.0 Consultation), based on specific project conditions.

Timber harvest, road work, and timber haul activities have the potential to impact analyzed stream characteristics and associated fish populations and fish habitat. However, these activities associated with this project are not expected to measurably affect analyzed stream characteristics because all perennial and fish bearing streams would be protected by a full site-potential tree height no-harvest buffer on each side of these streams, and BMPs and PDFs (described above) would be implemented based on site-specific conditions to minimize potential impacts to stream characteristics. With full site-potential buffers on streams closest to fish presence, no measurable impacts are expected to occur to stream characteristics beyond those analyze in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, p. 301).

Yarding corridors and timber sale road work activities would be allowed in Riparian Reserves to enable treatment of adjacent HLB stands, as described in Management Direction (USDI - Bureau of Land Management, 2016a, p. 68). Spacing of yarding corridors will follow BMP TH 01 which limits the number of cleared corridors to ensure

there will be no measurable impact to stream temperature. Additionally, it is not expected that yarding corridors would be commonly cleared of trees for the full 12 to 15 foot width in the Riparian Reserves of this project area. Trees along yarding corridors at the stream crossings would often be left standing because yarded logs can be flown over or between riparian trees. New road construction near streams is not expected to have significant impact on stream temperatures, in part, because the newly installed culvert would protect most of the opening from solar inputs. See Hydrology Section 5.2.4.2 for a more detailed discussion of effects of timber harvest and roads on stream temperature, which concludes there would be no measurable impact on stream temperature related to project activities beyond those analyze in the Proposed RMP/Final EIS.

Timber harvest and road work are not expected to introduce measurable amounts of sediment to fish streams, in large part, due to the site potential tree height buffers along perennial streams and fish streams. Sediment can be introduced at yarding corridor stream crossing. However, this project would utilize BMPs and PDFs at the site-specific analysis to reduce potential for sediment delivery. For example, BMP TH 03 requires full suspension overflowing streams and TH 06 describes erosion control measures that would limit potential for sediment delivery to waterbodies and floodplains. Soils Section 5.2.6.1 provides a discussion of how timber harvest would not have a significant effect on soils disturbance. Table 1. in Section 5.2.6.1 identifies specific BMPs that would be used, as applicable on specific projects to reduce potential erosion. Soils Sections 5.2.6.3 and 5.2.6.6 discuss hillslope stability in Riparian Reserves, and road construction and timber harvest soil erosion, respectively, and conclude the project will have no significant impact beyond what was analyzed in the 2016 RMP. Hydrology Section 5.2.4.3 discussed how road construction may affect sediment delivery to streams and concludes the project would result in less than 1 percent increase in delivery throughout the project area, which is within the threshold analyzed in the 2016 proposed RMP / Final EIS. Hydrology Section 5.2.4.3 also provides a discussion of sediment delivery related to road renovation and timber haul, which incorporates a detailed sediment analysis from the N126 Landscape Plan EA (USDI - Bureau of Land Management, 2021a, pp. 51-57). Timber haul have the potential to increase sediment delivery to streams when roads are hydrologically connected or near to stream channels. However, road renovation has the potential to decrease sediment delivery from haul with the addition of cross-drains, replacement of failing culverts eroding soil, road surface sloping (see BMP section 5.5.3 Appendix E –. R 01-R99) These road renovation actions would help reduce sediment delivery beyond the period of harvest activities and haul. For example, sediment delivery related to haul would be minimized by following R39 to R47, which provide guidance for cross-drain installation, spacing, and installation methods to reduce ditch flow and sediment delivery to streams. In addition, BMPs R 77 to R81 and R93 to R99 provide guidance for how to stormproof roads prior to haul and sediment reducing practices to follow during wet-season haul. For these reasons, this project would have no measurable impact to local fish populations or fish habitat related to sediment delivery to streams beyond those analyze in the Proposed RMP / Final EIS.

The 2016 Proposed RMP / Final EIS concluded that all action alternatives and the no timber harvest alternative would increase the amount of large and small functional wood delivered to streams over time (USDI – Bureau of Land Management, 2016, p. 282-297). BLM is not proposing treatment of Riparian Reserves associated with this project, which is similar to the no timber harvest alternative, analyzed as a reference alternative in the Final EIS (USDI Bureau of Land Management, 2016b, p. 100), in the wood delivery issue analyzed in the 2016 Proposed RMP / Final EIS (USDI Bureau of Land Management, 2016b, pp. 282-297). For these reasons, this project would have no measurable impact to local fish populations or fish habitat related to wood delivery to streams beyond those analyze in the Proposed RMP/Final EIS.

Hydrology Sections 5.2.4.4 and 5.2.4.6 discuss timber harvest effect on peak flows and summer low flow, respectively. In these sections, BLM concludes that timber harvest will not measurably impact peak or summer low stream flows. Therefore, this project would have no measurable impact to local fish populations or fish habitat related to stream flow alterations beyond those analyze in the Proposed RMP/Final EIS.

The BLM also considered if the 2020 Holiday Farm fire impacted fish populations and fish habitat in the HLB EA analysis area. The Holiday Farm fire did not burn within the analysis area and therefore geomorphic response to the fire will not impact fish habitat in the analysis area. The Holiday Farm fire did not impact fish populations in the analysis area because there is not a direct linkage between fishes that use habitat in the Holiday Farm perimeter and the analysis area. Therefore, this project would have no significant impact to fish populations or fish habitat

potentially impacted by the Holiday Farm fire. For these reasons, this issue was considered, but not analyzed in detail because it does not meet the purpose and need and is not associated with impacts beyond those analyzed the Proposed RMP / Final EIS.

5.2.3.2 ***How would the alternatives affect blockages to fish passage?***

The BLM received an external comment suggesting an issue to analyze watershed restoration actions to improve fish passage. BLM assumes watershed restoration efforts are more specifically referencing replacing culverts to improve fish passage. The BLM considered this issue but did not analyze it in detail because it does not address the purpose and need and is not associated with significant impacts beyond those analyzed in the Proposed RMP/Final EIS (USDI - Bureau of Land Management, 2008a, p. 41). The 2016 ROD/RMP has Management Direction to remove or modify human-caused fish passage barriers to provide passage for all life stages of native fishes present (USDI - Bureau of Land Management, 2016a, p. 78). Stream culvert condition would be evaluated prior to haul to determine if stream culverts are safe to haul across. Culvert replacements on fish streams would be designed to provide fish passage for all life stages of native fishes present by following BMP R17 so that fish passage condition through the new culvert would be consistent with ODFW fish passage criteria and meet ARBO II fish passage criteria in streams with ESA Listed fish present (USDI – Bureau of Land Management, 2016, p. 144). The BLM would use the Northwest Oregon District Aquatic and Riparian Habitat Restoration Environmental Assessment (DOI-BLM-ORWA-N000-2018-0006-EA) to actively seek out and replace barriers to fish passage. It is unknown at this scale of analysis the amount of fish passage culverts each alternative would replace during project implementation, but the effects of this action are fully disclosed in the Northwest Oregon District Aquatic and Riparian Habitat Restoration Environmental Assessment and are hereby incorporated by reference (USDI - Bureau of Land Management , 2020c). While analysis of the project-specific and site-specific conditions could give greater specificity to the analysis in the Proposed RMP/Final EIS, there is no potential for reasonably foreseeable significant effects of the proposed action beyond those disclosed in the Proposed RMP/Final EIS.

5.2.3.3 ***How would timber harvest, timber sale road work, and timber haul affect past aquatic restoration efforts?***

The BLM received an external comment suggesting an issue to analyze watershed restoration actions. The BLM assumes watershed restoration efforts are more specifically referencing previously implemented fish passage improvement, stream habitat complexity, riparian planting, or water quality improvement projects. The BLM assumes this comment regards potentially significant negative impacts of timber harvest, timber sale road work, and timber haul on watershed restoration sites. All of the alternatives would implement BMPs (see section 5.5 Appendix E – Project Design Features), Riparian Reserve management direction (USDI - Bureau of Land Management, 2016a, pp. 68-74), and project design features (see section 5.5 Appendix E – Project Design Features) created specifically to reduce potential negative effects to water quality, streams, fish and fish habitat. There will be no treatments in Riparian Reserve land use allocation, the lands closest to the aquatic restoration sites, and there is no reasonably foreseeable mechanism related to HLB treatments that could significantly influence aquatic restoration sites. See Fisheries Section 5.2.3.1 for further discussion of how BMPs and PDFs will be used to reduce potential impacts to fish habitat, which would include past aquatic restoration sites. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.4 Hydrology:

5.2.4.1 ***How would timber harvest affect the water supply and water purity of the neighboring households?***

During scoping a comment from the public was made concerning the effects of timber harvest on the water supply of nearby households. This issue was considered but not presented for detailed analysis in the Siuslaw HLB

Landscape Plan EA because it does not address the purpose and need and is not associated with significant impacts.

BLM interpreted water supply to include Public Water Systems (PWS), groundwater or surface water, Water Rights, valid or otherwise. All water is publicly owned under Oregon law and water users must obtain a permit for a water right from the Oregon Water Resources Department to use surface water from any source with a few exceptions. BLM does not regulate waters of the state but complies with all state laws and regulations. A PWS is defined by the Environmental Protection Agency (EPA) as a "public water system that provides water for human consumption though pipes or other constructed conveyance to at least 15 service connections or serves and average of at least 25 people for at least 60 days a year" (EPA, 2021). Oregon Administrative Rules (OAR) give guidance in regard to water supply and forest practices, specifically, OAR 629-635-000-310 for Riparian Management Areas (RMSs). Water classification under this system with the sole purpose matching physical characteristics with beneficial uses of a water body to a set of appropriate protection measures (OAR 629-635-0200). A domestic water use stream is defined as "the use of water for human consumption and other household human use" (OAR 629-600-0100 (18)). Please see OAR 629-635-0200 (3) through (8) for vegetation retention rules of the Water Protection Rules (division 42) for further descriptions of types of streams.

There are three PWS's (table below) within the vicinity of the HLB project area. It should be noted that the boundaries of a PWS do not line up with the boundaries of a watershed. A PWS is a service area (above description) where a watershed is a drainage area based on local hydrology drainage characteristics and topography The percentage of HLB acres that fall within the PWS perimeter (not necessarily close to a Water Right) can be seen in the table below.

PWS City	Area (Acres)	ID	County	Watersheds	HLB (%) Acres
Halsey	153,218	4192152	Lane	Upper & Lower Coast Fork Willamette River	<.05
Monroe	257,649	4100540	Benton	Long Tom River	1.89
Creswell	123,049	4100246	Lane	Coast Fork Willamette River	0.5

In addition to the proximity of HLB acres to PWSs above the BLM has identified three domestic Water Rights. The water protection rules for vegetation retention along streams that "all understory vegetation within 10 feet of the high water level; all trees within 20 feet of the high water level; and all trees leaning over the channel would be retained (OAR 629-642-0400 2 (a) (b) (c).The BLM provides more than the minimum protections based on Oregon law by buffering at least a 200ft distance from any drinking water sources and buffers around streams regardless of the legal standing of the water withdrawal.

During the implementation of forest management actions under the Siuslaw HLB Landscape Plan EA, the BLM hydrologist performs surveys of areas that are planned for timber harvest. This includes online investigation of water wells and water rights within the vicinity listed with the Oregon Department of Water Resources. These areas would be protected through the following project design feature: "To protect domestic water sources, project treatments would be adjusted within 100 feet of a well or 200 feet of a spring or known diversion used as a domestic water source, unless a written waiver is granted by the user or owner, to have no impact on that source."

For example, two units proposed within the project area are located T. 19 S., R. 4 W., Section 3 has three (3) water wells within the vicinity of the unit proposed for timber harvest. The closest water well is 600-1,000 feet from the unit boundary of the forest harvest area. This distance is in excess of a distance that would result in any disturbance or impacts to the water well.

On the issue of water supply, water supply for water wells and surface water is primarily supplied through ground water recharge through seasonal precipitation locally. The Siuslaw HLB Landscape Plan EA considered flow surplus, and deficits at the watershed scale as it relates to regeneration harvests; see section 5.2.4.5 “How would regeneration harvest affect summer low flow?” Surface waters located proximate to regeneration forest management practices would not experience a substantial change in annual water yield as a small catchment would need a greater than 25 percent clearcut that included the Riparian Reserve in the HLB rain-dominated Hydroregion (USDI Bureau of Land Management, 2016b, pp. 408-409) to detect a measurable increase in annual water yield, which is not proposed under any of the alternatives.

The BLM concluded that there would be no significant effect due to: the distances of forest management practices to vicinity groundwater and surface Water Right sources, the fact that there are no limited or critical groundwater drainages within the HLB EA area that Oregon Department of Water Resources would impose restrictions on Water Rights due to groundwater declines, and Riparian Reserve trees in the inner zone would not be removed under any alternative protecting surface Water Rights that drawdown on streams (USDI Bureau of Land Management, 2016b, p. 409).

Water quality or water purity as it relates to timber harvest would be related to sedimentation from new road construction; the BLM analyzed this issue in detail but did not present it for detailed analysis. All action alternatives would be <1 percent increase in sediment per the Proposed RMP / Final EIS analysis, see section 5.2.4.3 “How would road construction affect sediment delivery to streams?”. New road construction within 200 feet of a stream is limited to 5-8 miles across the entire HLB landscape Plan project area. See section 5.5.3 for site-specific Best Management Practices that will be utilized during implementation to remove the risks of erosion and sedimentation to streams.

For these reasons above, the BLM determined that all action alternatives would not have an effect beyond those described for annual water yield (USDI Bureau of Land Management, 2016b, p. 408) low flows (USDI Bureau of Land Management, 2016b, p. 409) and water purity related to sedimentation (USDI Bureau of Land Management, 2016b, pp. 401-408). For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn’t necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.4.2 ***How would timber harvest and road construction affect stream temperature?***

During public scoping, the BLM received comments with concerns regarding the effects of timber harvest and road building on stream temperature. BLM interpreted this to mean the effect of removing canopy shade that covers the stream. This would occur through the removal of trees for harvest related activities or the installation of a stream crossing. BLM is not proposing any harvest within the Riparian Reserve; however, BLM proposes up to 5 stream crossings over the course of implementing this EA.

Riparian Reserve

The effects of harvest on stream temperature with accompanying unharvested Riparian Reserves were previously described in the Proposed RMP/Final EIS, to which this analysis is tiered, and that discussion is hereby incorporated by reference (USDI - Bureau of Land Management, 2016b, pp. 369-384). That analysis concluded that there would be no measurable increase in stream temperature (USDI Bureau of Land Management, 2016b, p. 380). None of the alternatives propose timber harvest in the Riparian Reserve; the existing and effective stream shading would be maintained under all alternatives. All Riparian Reserve buffers for perennial streams would be based on HUC 12 Class Site-Potential Tree height ranging 200-220 for the Siuslaw HLB Landscape Plan. Stream temperature increase would be avoided due to Riparian Reserve zone HUC 12 class management direction from the ROD / RMP to select site-level Best Management Practices (USDI - Bureau of Land Management, 2016a, pp. 79, 139-179). BLM meets its compliance with the Clean Water Act through the Best Management Practices (BMP) that maintain stream integrity and avoid the reduction of stream flows, channel exposure, or increase stream solar radiation which would increase stream temperatures due to project actions. The following list are examples of BMPs that would be utilized during project implementation (USDI - Bureau of Land Management, 2016a, pp. 139-180):

- Locate stream-crossing culverts on well- defined, unobstructed, and straight reaches of stream. Locate these crossings as close to perpendicular to the streamflow as stream allows. When structure cannot be aligned perpendicular, provide inlet and outlet structures that protect fill, and minimize bank erosion. Choose crossings that have well-defined stream channels with erosion-resistant bed and banks (Appendix C R16)
- Design stream crossings to minimize diversion potential in the event that the crossing is blocked by debris during storm events. This protection could include hardening crossings, armoring fills, dipping grades, oversizing culverts, hardening inlets and outlets, and lowering the fill height (Appendix C R18)
- Design stream crossings to prevent diversion of water from streams into downgrade road ditches or down road surfaces (Appendix C R19)
- Install underdrain structures when roads cross or expose springs, seeps, or wet areas rather than allowing intercepted water to flow down gradient in ditchlines (Appendix C R35)
- Design roads crossing low-lying areas so that water does not pond on the upslope side of the road. Provide cross drains at short intervals to ensure free drainage (Appendix C R36)
- Remove stream crossing culverts and entire in-channel fill material during ODFW instream work period (Appendix C R49)
- Maintain water flow conveyance, sediment filtering and ditch line integrity by limiting ditch line disturbance and groundcover destruction when machine cleaning within 200 feet of road stream crossings (Appendix C R71)
- Place and remove temporary stream crossings during the dry season, without overwintering, unless designed to accommodate a 100-year flood event. (See also Appendix C R49)
- Design yarding corridors crossing streams to limit the number of such corridors, using narrow widths, and using the most perpendicular orientation to the stream feasible. Minimize yarding corridor widths and space corridors as far apart as is practicable given physical and operational limitations, through practices such as setting limitations on corridor width, corridor spacing, or the amount of corridors in an area. For example, such practices could include, as effective and practicable: Setting yarding corridors at 12–15 foot maximum widths, and Setting corridor spacing where they cross the streams to no less than 100 feet apart when physical, topography, or operational constraints demand, with an overall desire to keep an average spacing of 200 feet apart (Appendix C TH01 and TH012).
- Require full suspension over flowing streams, non-flowing streams with highly erodible bed and banks, and jurisdictional wetlands. (Appendix C TH03)

For the reasons described above, BLM considered the issue on effects of timber harvest on stream temperature but did not present it in detail. Because such analysis is not necessary to evaluate how the alternatives respond to the Purpose and Need, nor is detailed analysis of the issue necessary to determine that there is no potential for significance of impacts beyond those disclosed in the Proposed RMP/Final EIS.

Stream Crossings

Stream temperature is one of many water quality and stream characteristics that has the greatest influence on aquatic habitats and the ability of that habitat to support invertebrate and vertebrate populations (USDI-Bureau of Land Management, 2016, p. 280). The thresholds for 303 (d) impaired streams are outlined and enforced by the Oregon Department of Environmental Quality (ODEQ) under the purview of the Environmental Protection Agency (EPA) through the total maximum daily load (TMDL) process. Project related road construction and stream crossings would occur within the Willamette and Midcoast Oregon Watershed Basins (the State of Oregon evaluates TMDL by Basin and Sub basin). There are no proposed stream crossing locations currently listed as 303 (d) impaired streams or tributaries to impaired streams. However, BLM would adhere to the 303 (d) TMDL threshold for temperature increase by implementing project design feature JT1 (Appendix E, p. 163). Which states, for, “Design stream crossings to follow regulatory guideline OAR 340-041-0028. Road construction over a perennial stream would result in a ≤ 0.3 degree Celsius increase in stream temperature under the criteria set by the Williamette and MidCoast TMDLs OAR 340-041-0028 rule (A) and rule (B).” New Stream crossings that would open up the shade canopy were not specifically analyzed in the Proposed RMP / Final EIS. However, there is no potential for significance because BLM would comply with ODEQ state regulation and thus there is no chance for significance, and BLM would be in conformance with the 2016 ROD/RMP.

The five potential new stream crossings are within two watersheds that have a north south oriented streams (both perennial and intermittent) within the Siuslaw HLB Landscape Plan project area. These stream crossing sites

would include installation of culverts, which would remove the primary and secondary shade zones for new road construction. Each potential site is located on a different stream. In considering the installation of a stream crossing, BLM calculated worst case scenarios, in other words the maximum removal of shade. BLM calculated the removal of the Riparian Reserve trees in a scenario where the stream would be *fully exposed to solar radiation* when in fact, the culvert itself provides shading that eliminates solar radiation as the water flows under the road. Thus, the BLM is overestimating the potential solar loading input. To obtain the solar radiation at specific sites the BLM utilized the National Oceanic and Atmospheric Administration's solar position calculator and found the estimated periods of primary and secondary shading, and total radiative heat flux from solar radiation for each latitude and longitude where potential stream crossing culverts would be installed. Each site would have an approximate 4-hour period of solar loading from 11 AM to 3 PM. Calculations for a representative four-foot channel-oriented north to south would not increase in stream temperature for a volume of water traveling through the solar loading window above the ODEQ TMDL thresholds (a ≤ 0.3 degree Celsius increase in stream temperature). The calculated temperature increase on the representative stream is 0.09 degree Celsius for the full 45-foot width outlined in the Proposed RMP / Final EIS for new road construction disturbance (USDI Bureau of Land Management, 2016b, p. 752). Again, the 45-foot width is an overestimation, the likely size of the canopy opening would be smaller. The removal of trees, even assuming absence of the cooling effect of the installed culverts, would not introduce enough solar radiation to change stream temperature beyond the ODEQ threshold. Additionally, there is no additional downstream warming related to this crossing of the Riparian Reserve. Rather, the 7DAMT (average of the daily maximum stream temperatures for the seven warmest consecutive days during the summer) has been shown to cool rapidly as stream water flowed into forested reaches (Bladon, Segura, Cook, Bywater-Reyes, & Reiter, 2017). BLM performs continuous water temperature monitoring on BLM-administered lands in the analysis area. This monitoring demonstrates that temperatures, specifically 7DAMT, are colder in smaller drainage basins, and warmer downstream in larger drainage basins (USDI - Bureau of Land Management, 2020b). BLM would calculate these values during specific project planning, where Riparian Reserve shading would be potentially reduced during forest management actions. To ensure that a project is adhering to the regulation OAR 340-41-0028 (≤ 0.3 degree Celsius increase to stream temperature) (Project Design Feature JT1). If BLM does not meet this standard, BLM would not install the stream crossing.

In conclusion, there are not any TMDL listed streams for temperature, but BLM would still apply the ≤ 0.3 degree Celsius increase to stream temperature standard. BLM would protect stream temperature increase due to (1) the preservation of the Riparian Reserve Site-Potential buffer upstream and downstream at each stream crossing (2) limited effective shade loss per site during the sun's zenith (July-August); and (3) the stream flow is shaded from the Riparian Reserve, through the culvert (a shaded environment), and again within the Riparian Reserve downstream where cooling continues. BLM considered the issue of new stream crossings on steam temperature but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects.

5.2.4.3 ***How would road construction, renovation, and haul affect sediment delivery to streams?***

During public scoping, the BLM received comments with concerns regarding sediment delivery to streams from road related sediment. Effects of roads within 200-feet of a stream were previously described in the 2016 Proposed RMP / Final EIS, to which this analysis is tiered, and that discussion is hereby incorporated by reference (USDI - Bureau of Land Management, 2016a, pp. 401-408). The 2016 Proposed RMP/ Final EIS analysis concluded that there would be an average of a 1 percent increase (above current levels) in new and temporary roads within the 200-foot sediment delivery distance (USDI - Bureau of Land Management, 2016a, p. 406). The analysis further concluded that there would be < 1 percent increase in sediment delivery above current levels from existing roads (USDI - Bureau of Land Management, 2016a, p. 405).

The BLM analyzed over 30,000 acres on the issue of sediment delivery, due to road-related sediment within 200-feet of a stream, for the N126 LSR Landscape Plan EA and that analysis is incorporated by reference (USDI - Bureau of Land Management, 2021a, pp. 51-57). That analysis specifically evaluated sediment delivery to streams in detail: existing sediment delivery, sediment delivery increases due to road construction, timber haul, and stream crossing installation. The analysis concluded that decreases in sediment delivery would occur from: decommissioning existing road segments, adding cross drains that currently deliver sediment to streams, replacing existing aging stream crossings, and cross drain culverts to reduce chronic sediment delivery. This analysis concluded sediment delivery would increase for alternatives that included new road construction (<10

miles across alternatives). However, the incremental (not all roads are constructed simultaneously) potential increase would be 0.55 tons/mi/year, which is well below the Proposed RMP / Final EIS analysis of 2.26 tons/mi^2/year (USDI - Bureau of Land Management, 2021a, pp. 54-55). Overall, there would be a <0.5 percent increase sediment delivery across the 7 HUC 10 watersheds analyzed (USDI - Bureau of Land Management, 2021a, p. 56). Because there was such a small change in sediment delivery, the N126 LSR Landscape Plan FONSI concluded there is not a chance for significance, and that discussion is incorporated by reference (USDI - Bureau of Land Management, 2021b, p. 3).

The Siuslaw HLB Landscape Plan has >90 percent of its haul route within N126 LSR analysis area. Because of the shared haul routes between the two analysis areas, the same roads would receive the same actions of increase and decrease of sediment delivery to streams. Haul from the HLB Landscape Plan would add an additional <1 percent to the total sediment delivery to those HUC 10 watersheds that overlap with the N126 LSR Landscape Plan. Due to the majority of the HLB haul route being shared with the N126 LSR Landscape Plan the existing sediment delivery for HLB was assumed to be the same (123.5 tons/year) as the N126 LSR analysis existing sediment delivery. The <1 percent increase in sediment delivery from HLB is due to new construction and haul on roads outside of the N126 LSR analysis area. The additional 8 percent (39 miles) of haul route outside of the analysis area for the N126 LSR Landscape Plan, was analyzed for existing sediment delivery increases in sediment delivery to streams for timber haul on roads within 200-feet of a streams (see paragraph below). The total current sediment delivery rate for the BLM controlled HLB road segments (using GTRN) within 200-feet of a stream is 0.02 tons/mi/year (0.40 (BLM) tons/year/20 miles). Which is less than the existing sediment rates of those watersheds analyzed in the N126 LSR Landscape Plan of 0.55 tons/mi/year (USDI - Bureau of Land Management, 2021a, pp. 54-55). This rate is also below the rate found in the Final EIS for the watershed potential fine sediment delivery of 2.26 tons/mi^2/year (USDI - BLM, 2016b, pp. 403, Table 3-66). The increase in sediment delivery from the addition of these haul route roads (not analyzed under N126 LSR Landscape Plan EA) that would be utilized for HLB forest treatments would result in sediment delivery increases due to construction (0.08 percent), and sediment delivery due to timber haul (0.8 percent). This results in a total increase in sediment delivery across all HUC 10 watersheds of <0.05 percent, which is similar to that found in the N126 LSR Landscape Plan analysis (USDI - Bureau of Land Management, 2021a, p. 56).

The Siuslaw HLB Landscape Plan proposes less new road construction (average<50 percent) that would occur near streams, than the N126 LSR Landscape Plan. The project design would include 5-8 miles of new road construction within the < 200-feet sediment delivery distance to streams; this amount would be the same across action alternatives. Construction would include the removal of vegetation for the installation of new stream crossings where Project Design Features from the Siuslaw HLB Landscape Plan Appendix E would be implemented. This 5-8 miles of new road construction would occur where short segments of the road dip into the Riparian Reserve; the 5-8 miles would not be a contiguous segment.

Sediment delivery from existing roads within 200-feet of a stream on the HLB proposed haul route produce 1.02 tons/year of fine sediment to streams. This results in an existing sediment delivery rate of 0.02 tons/mi/year on the 39 additional miles of road within 200-feet of streams, which are outside of the N126 LSR analysis area. Of the 1.02 tons/year, 0.48 tons/year (47 percent) are from aggregate surface roads. The remaining 53 percent (0.5 tons/year), comes from natural surface roads (0.14 tons/year) and paved roads (0.41 tons/year). The highest potential sediment yield is from aggregate surface roads, which average 0.5 tons/mi/year. The lowest yield is from natural roads, which average 0.14 tons/mi/year (USDI - BLM, 2016b, p. 402).

Sediment delivery due to stream crossing culvert installations and removal would be limited to up to 8 hours in duration and elevated turbidity would extend tens to hundreds of feet downstream (USDI Bureau of Land Management, 2016b, p. 299). The application of BMPs would further reduce the effects of elevated turbidity (USDI Bureau of Land Management, 2016b, p. 299). Sediment delivery from roads within a 200-feet sediment delivery distance are below the concluded results in the 2016 Proposed RMP / Final EIS. The BLM concluded there would be no substantial change in sediment delivery due to road construction activities across alternatives. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects.

5.2.4.4 *How would timber harvest affect peak flow events?*

During public scoping, the BLM received comments with concerns regarding peak flow events. The BLM considered this issue but did not present it in detail because it does not address the purpose and need and is not associated with significant impacts beyond those analyzed in the Final EIS.

Peak flow events in the Rain-On-Snow (ROS) Hydroregion was analyzed in detail in the Final EIS (USDI Bureau of Land Management, 2016b, pp. 384-394) , to which this analysis is tiered. The Final EIS analysis concluded that there is little evidence that timber harvest activities can elevate peak flows in the rain on snow hydroregions (USDI Bureau of Land Management, 2016b, p. 386). The Final EIS found that for BLM areas to be susceptible to ROS events, the following criteria must apply:

- The elevation is approximately 2000-3,600 feet;
- BLM-administered lands are >1 percent of the subwatershed**;**
- The subwatershed has > 100 acres of BLM land in the ROS hydroregion**;**
- More than 60 percent of the subwatershed is in the ROS (USDI Bureau of Land Management, 2016b, pp. 384-394)

Peak flows are defined as greater than or equal to a 1-year recurrence interval flow because events less than this are unlikely to affect stream channel morphology (Grant, Lewis, Swanson, Cissel, & McDonnell, 2008, p. 9). The subwatersheds associated with the Siuslaw HLB Landscape Plan are low risks (WPN 1999, IV-8 to IV-11) for peak flows from ROS events from forestry related activities and do not meet the above criteria outlined above by the Proposed RMP/Final EIS analysis that must be met in whole to produce susceptibility.

In general, ROS events occur when there is a rapid release of water from shallow snowpacks that are within large, open areas. This normally occurs during unusually warm, high-intensity rain and wind events in the transient snow zone. The transient snow zone is at elevations above the rain-dominated zone and below the snow dominated zone. The Holiday Farm fire is within the transient snow zone but not within the HLB project area or within the Siuslaw Resource area. There would be no affects from the Holiday Farm fire on hydrology resources. Due to the lack of qualifying criteria of more than 60 percent of any HLB subwatershed in the ROS; the HLB project is not susceptible to peak flows from forest management activities and there is no new information that would change the analytical conclusions in the Proposed RMP / Final EIS. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.4.5 *How would timber harvest affect mercury mobilization to streams due to erosion?*

During internal scoping, the BLM received a comment concerning mercury mobilization to streams. The BLM considered this issue, but did not present it in detail because of the similarity in effects across all alternatives, as erosion and mercury mobilization occur in the no action alternative as well as the action alternatives, it does not address the purpose and need; and it is not associated with significant impacts.

Mercury can be mobilized to streams during the erosional process. The mobilization and methylation of mercury was analyzed in detail in the 2020 BLM Northwest Oregon District Aquatic & Riparian Habitat Restoration Environmental Analysis and that discussion is hereby incorporated by reference (USDI - Bureau of Land Management, 2020b, pp. 61-72). The analysis found that the transport of fine-grained sediments contains the greatest concentration of mercury during erosional processes. This can occur when the soil is disturbed during road construction, replacement, addition, or removal of in-stream drainage structures. This period of increased turbidity would last up to 8 hours in duration and would extend tens to hundreds of feet downstream from the site of disturbance (USDI Bureau of Land Management, 2016b, p. 299). Because of the BMPs controlling possible erosion and thus mercury mobilization, The 2020 BLM Northwest Oregon District Aquatic & Riparian Habitat Restoration FONSI found no chance for significance, that discussion is incorporated by reference (USDI - Bureau of Land Management , 2020c, p. 4).

Both the Proposed RMP/Final EIS and the 2020 BLM Northwest Oregon District Aquatic & Riparian Habitat Restoration Environmental Analysis promote the use of Best Management Practices (BMPs) to minimize the effects of erosion. These effects from erosion are greatly reduced by the use of BMPs during ground disturbing activities. The 2016 ROD/RMP further provides management direction to address sediment delivery and erosional process through the use of BMPs. Hatten, et al., found, in 2018, that the implementation of BMPs for forest harvest and new road construction were effective and that pre-harvest and post-harvest suspended sediment concentration or yields in adjacent streams were found to be similar to historical levels. BLM's effectiveness monitoring program includes post-harvest field days that specifically analyses erosion and other levels of detrimental soil disturbance to ensure BMPs are reducing impacts from erosion. These field inspections are reported quarterly as part of the BMP effective monitoring program.

The 2016 Final EIS incorporated by reference the 2008 Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management found that the mobilization of heavy metals is primarily caused by naturally occurring events such as landslides (USDI Bureau of Land Management, 2008b, p. 351). Landslides were further analyzed in detail in the 2016 Proposed RMP / Final EIS, and described the most susceptible areas as steep slopes over 70-80 percent with the exception of the TYEE core area at 65 percent slope. Probabilities of failure are highly correlated with extreme storms and forest vegetation at the time of the event (USDI Bureau of Land Management, 2008b, p. 348). The analysis in the 2008 Final EIS is hereby incorporated by reference. The BLM excludes areas where potential landslides would occur in the vicinity of timber harvest. For this reason, landslides due to timber harvest would not likely occur.

Mercury exists in sediments, soils, and the water column; mobilization of mercury is caused by both natural and anthropogenic (human-caused) ground disturbing activities. The methylation of mercury is driven by bacteria that are naturally occurring in soils, and sediments. The speciation of mercury is ubiquitous and varies by geology, environmental conditions, site history, and degrees of disturbance. Preventative measures to reduce ground disturbance would be implemented to eliminate the transport and mobilization of mercury through the use of BMPs (R-61 through R-66).

There are no streams or water bodies currently that are 303 (d) listed for mercury within the vicinity of the Siuslaw HLB Landscape Plan project area and there are no alternatives that propose l timber removal in the Riparian Reserves. The Siuslaw Resource Area hydrologist and soil scientist work closely together regarding ground disturbing activities that would be monitored using the USFS Page-Dumroese Detrimental Soil Disturbance protocol as outlined in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 746-755). This protocol for detrimental soil disturbance is listed in the ROD/RMP on page 127. Under all proposed actions the BLM would implement BMPs that assist in reducing erosion and the transport of sediments and thereby eliminate effects of mercury mobilization. For these reasons, the BLM considered this issue but did not analyze it in detail because it does not address the purpose and need and is not associated with significant impacts.

5.2.4.6 ***How would regeneration harvest affect summer low flow?***

During public scoping, the BLM received an external comment with concerns regarding the effects of regeneration harvest on summer low flows. The BLM considered this issue but did not present it as an issue because it does not address the purpose and need and is not associated with environmental effects (USDI - Bureau of Land Management, 2008, p. 41). This issue was considered in the Final EIS but not analyzed in detail because, "*…none of the alternatives or the Proposed RMP would have a measurable effect on low water flows at the subwatershed or watershed scale.*" The Final EIS continues by recognizing inconsistencies between studies but that an important difference between these studies and the Proposed RMP "*…is that riparian vegetation would not be removed under any of the alternatives or the Proposed RMP.*", and this discussion is hereby incorporated by reference (USDI Bureau of Land Management, 2016b, p. 408). This discussion concluded by stating, "*Given that no stands along streams would be completely removed…under all alternatives and the Proposed RMP, there is no reasonable measurable effect… on low water flows* (USDI Bureau of Land Management, 2016b, p. 408).

The BLM analyzed the existing condition of the low flow hydrological stages using the current age class distribution and forest management based on ownership for the Siuslaw HLB Landscape Plan proposed actions.

BLM determined that the pre-harvest level base flows (existing condition) would be maintained throughout the subwatersheds over time, as the BLM-managed and privately managed lands continue to exhibit a mix of age classes across the landscape (Hydrology Graph 1). BLM acres evaluated all land use allocations and included the Late-Successional Reserve and Riparian Reserve in addition to the HLB. Late-Successional Reserve and Riparian Reserve are both forest reserves that do not allow for regeneration harvest. These reserve acres exist alongside HLB acres within each HUC 12 watershed and would continue to age toward hydrologic recovery, thus contributing to the overall hydrological stage within each HUC 12.

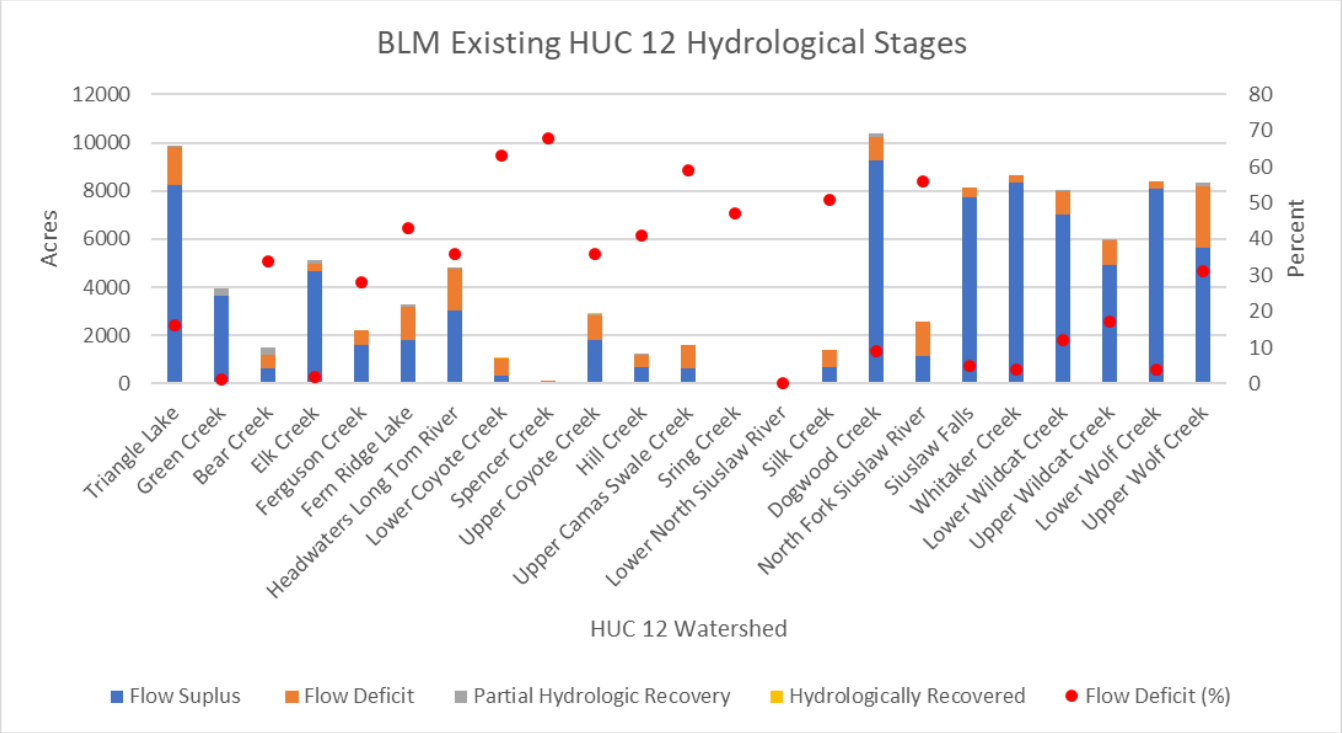
The key to understanding post-harvest shifts in low flow hydrological stages is understanding the proportions of acres that fall into these hydrological categories and their respective age class distributions and how tree age class has the greatest effect on stand differences in water use (Moore & Wondzell, 2005). Changes in the streamflow are generally proportional to the amount of vegetation removed from *forest management practices* (Harr, Hydrology of small forest streams in western Oregon, 1976, pp. 11-12); (Harr, Fredriksen, & Rothacher, Changes in Streamflow, 1979, p. 1); (Bosch & Hewlett, 1982, pp. 28, Figure 1), and detrimental measurable changes in low flows are associated with the complete removal (clearcutting) of vegetation that includes the removal of the riparian vegetation (Perry & Jones, 2016); (Coble, et al., 2020); (USDI Bureau of Land Management, 2016b, p. 409). The conversion of hydrologically recovered stands (130+ years) in mature forest to young plantation stands that includes clearcutting 100 percent of an area has been shown to lower streamflow (low flow deficit) for 20-25 years post-harvest when compared to 130-450 year old, mature, old-growth reference basins (Perry & Jones, 2016, pp. 8-9). Contrasting results regarding low flow increases/decreases occur with varying forest practices that include/exclude the retention of Riparian reserve buffers along streams. The retention of 15 m Riparian buffers along streams in the Alsea watershed did not alleviate 50 percent low flow declines post-harvest of 110-year-old stands (Segura, et al., 2020). This study suggests that the stand age of the reference watershed greatly impacts the directionality of the low flow response i.e., the comparison using a 40-53-year-old reference watershed increases the low flow response, while low flows decreased when compared to 110-year-old reference stand. Both (Segura, et al., 2020) and (Coble, et al., 2020) are in agreement in their conclusion that the contemporary forest practice of clearcutting coupled with the retention of Riparian buffers had only a minor effect on streamflow deficits overall, and two years post-harvest summer streamflow deficits were similar to those observed prior to harvest. The BLM does not propose clearcutting 100 percent of a stand under any alternative in the Siuslaw HLB Landscape Plan and would maintain the Riparian Reserve Site-Potential-Tree-Height buffers by HUC 12 watershed in accordance with the 2016 RMP management direction in Table 5 (USDI - Bureau of Land Management, 2016a, p. 70).

Forest management practices change with ownership, which in turn results in hydrologic changes to low flow response. Differing practices that influence hydrological stages include rotations of forest stand and harvest of the existing age class of acres that are > 130 years at the time of harvest. These acres are considered hydrologically recovered and decreased rotation time frames remove these hydrologically recovered acres and insert them into the cycle of low flow surplus (<20 years) and low flow deficit (21-80 years), never reaching a hydrological recovery state as long as harvest continues. The BLM rotation cycles are typically 80-100 years (USDI Bureau of Land Management, 2016b, p. 317) while private lands range 40-60 years. In the Siuslaw HLB Landscape Plan project area private lands exceed 80 percent across the entire project area and >50 percent for any single HUC 12 watershed with over 10 of the 23 HUC 12 watersheds exceeding 90 percent for private ownership. Of the acres the BLM manages in each HUC 12 watershed, shown in Graph 1, the hydrological stages are primarily in a range between the low flow surplus stage (<20 years) and the low flow deficit stage (21-80 years). The graph below represents all acres within each HUC 12 watershed; this includes the HLB alongside reserve acres of Late-Successional Reserve and Riparian Reserve, Areas of Critical Environmental Concern, and District Designated Reserves.

Low flow surplus acres would continue to grow through time as the HLB proposed harvest includes age classes 50-90 years. Acres within the low flow deficit (21-80 years) percentage (Hydrology Graph 1) contain the largest portion of acres that would be harvested under the HLB project with a smaller portion of the partial hydrologically recovered stage (90-year and above age class) contributing to harvest acres. These harvest acres would cycle from the low flow deficit stage to low flow surplus within the first 20 years post-harvest. All reserve acres within the

adjacent to the project area range 28-97 percent for individual HUC 12 watersheds and would continue to maintain existing hydrological recovery or age towards hydrological recovery.

Hydrology Graph 1. BLM Project Area and Adjacent LUAs in HUC 12 Hydrological Stages



The results of this analysis are not unique. By definition, in order to see a measurable effect on low flows harvest would need to occur in the hydrologically recovered stage. The timber harvest evaluated in this EA is proposed on less than 0.1 percent of the acres within the hydrologically recovered stage.

There would be no timber harvest in the Riparian Reserve in this project. The Proposed RMP/Final EIS concluded that there would be no reasonably foreseeable measurable effect of harvesting outside of riparian areas on low water flows (USDI Bureau of Land Management, 2016b, p. 409). Recent research has confirmed the Final EIS conclusion that the retention of Riparian Reserve buffers significantly decreases low flow deficits due to regeneration harvest. Segura et al. (2020) found that low flow response to clearcutting plantations with Riparian Reserves intact were similar to preharvest conditions within two years. Coble et al. 2020 further concluded for large scale catchments that >25 percent of the watershed must be harvested before a low flow response is detected.

The proposed regeneration harvest in this project would not result in measurable change for summer low flow at the subwatershed scale. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.4.7 What are the effects of timber harvest, timber sale road activities, and timber haul on free flow, water quality, and outstandingly remarkable values of suitable river segments?

During internal scoping, BLM considered the effects of timber harvest, timber sale road activities, and timber haul on lands adjacent to Wild and Scenic Rivers (WSR). There are no designated WSR in the project area. However, the project area is adjacent to two segments of the Siuslaw River (segment B and C) that the BLM has identified as suitable for inclusion in the National Wild and Scenic Rivers System. These lands adjacent to the HLB are classified as Congressionally Reserved Land and are outside of the project area; no BLM actions will occur on

Congressional Reserved lands under this EA. The HLB units adjacent to the Congressionally Reserved Land along the Siuslaw River consist of approximately 114 acres, within section 11 and 3 of Township 19S Range 8W.

As described in the 1994 Eugene District WSR suitability report, the three outstandingly remarkable values (ORVs) for the Siuslaw River segment B and C are: fish, recreation, and wildlife. The WSR suitability reports were published in Appendix Y of the 1994 Eugene District Proposed RMP / Final EIS; this suitability was carried forward in the 2016 Proposed RMP / Final EIS (p. 1026). The 2016 Proposed RMP / Final EIS did not specifically analyze the effects of BLM actions on proposed or suitable wild and scenic rivers. However, the 2016 Proposed RMP / Final EIS did analyze the effects to fish, wildlife, and recreation (the ORVs), which this EA also considered (see pp.84-87;113-127; and 100-101).

The actions analyzed in this EA would not diminish the free flow, water quality, and ORVs of the suitable segments of the Siuslaw River. No timber harvest, timber sale road activities, and timber haul actions would take place between the bed and the banks of the river; thus, there would be no impact to the free flow of the river. Further, no BLM actions would occur within the ¼ mile Congressionally Reserved Land LUA buffer along the Siuslaw river. The BLM evaluated impact to water quality in the issues, “How would timber harvest affect the water supply and water purity of the neighboring households?” and “How would road construction affect sedimentary delivery to streams?” These issues concluded that BLM actions would not diminish water quality.

Fish species identified in the WSR suitability report include steel head and chinook, as well as coho, sea run and resident cutthroat trout, and nongame species (p. 188 & 191). This EA evaluated impact to fish in the “What are the effects of timber harvest, timber sale road activities, and timber haul on fish populations and fish habitat?” This issue concluded that BLM actions would not diminish fish species.

The river corridor's opportunities for fishing, watching wildlife, nature photography, drift boating, campgrounds, and canoeing led to the finding of recreation as an ORV in the 1994 suitability report. These activities as experienced from the river or from key travel routes or observation points would not be diminished by the timber harvest on the adjacent HLB units. The suitable river corridor is designated as Visual Resource Management class III, whereas the adjacent HLB units are Visual Resource Management class IV. This EA evaluated impacts to Visual Resource Management in the issue, “How would timber harvest affect the Visual Landscape / Visual Resource Management?” This issue concluded that alteration of scenic qualities would occur from surface-disturbing activities, such as those associated with regeneration timber harvest or with construction of roads within the project area. Scenery is not an ORV for this suitable WSR corridor and VRM Class III allows for modification of the scenic environment if it would not dominate the casual observers viewing experience. Modification outside the WSR suitable corridor, within the adjacent HLB units, would not dominate the casual observers river related viewing experience inside the corridor. For these reasons, the proposed harvest within units adjacent to the suitable WSR corridor would not constitute a negative effect on scenery as experienced for visitors engaging in river dependent activities.

The species identified as part of the Wildlife ORV in the 1994 WSR suitability report are northern spotted owls, marbled murrelets, and bald eagles (p. 188 & 191). The two HLB units adjacent to the WSR corridor are located in whole or in part within the home ranges of three known spotted owl sites (using data through 2019[28]). All have site centers in the LSR land use allocation. None have known alternate nest sites. The years in which the latest detection of spotted owls occurred for these sites were 2007, 2009, and 2015. No HLB units are located in the core area of these spotted owl territories. Also, no other HLB units are located within the home ranges of these territories. Only one of these sites currently has ≥ 50 percent suitable habitat within its core area. Suitable habitat would not be removed under this landscape EA. Removal of suitable habitat on these HLB units could occur but would need to be analyzed under a separate NEPA process. All spotted owl sites currently have <40 percent suitable habitat in the home range. The 2020 large fires did not impact spotted owl habitat on the Siuslaw Field Office, as stated previously under “What are the effects of the alternatives on known spotted owl sites and incidental take of spotted owls?”

[28] Data from 2020 has not been summarized yet.

About 39 total acres of forest could be remove in HLB-LITA and 75 total acres of forest could be removed in HLB-MITA in these two units. In HLB-LITA, the 39 acres consist of 26 acres of dispersal habitat and 13 acres of non-habitat. This unit falls near the edges of three known site home ranges; all but 13 acres are within one or more home ranges (last detections were 2007, 2009, and 2015). One site is currently inactive and the other two have not been surveyed to protocol to confirm activity status. This unit is in spotted owl 2012 Critical Habitat Subunit ORC-3. In HLB-MITA, the 75 acres consist of 19 acres of suitable habitat, 3 acres of dispersal habitat, and 53 acres of non-habitat. All but 1 acre are within the home range of one known spotted owl site (last detection 2007). To protect the ORV for spotted owls, the 19 acres of suitable habitat in the HLB-MITA unit would not be harvested under this landscape EA.

Surveys, as defined in established survey protocols (currently (USDI Fish and Wildlife Service, 2012)), will continue for spotted owls in the project footprint until timber harvest has been implemented under this EA (PDC 11) (USDI Fish and Wildlife Service, 2020, pp. 49-50) and (PDC 16) (USDI Fish and Wildlife Service, 2020, pp. 52-53). If a spotted owl or an unknown species of *Strix,* is detected within a project area, occupancy status is unknown, and the project would adversely affect spotted owls if the area were known to be occupied, the local biologist and the action agency's Level 1 Team representative would contact the USFWS Level 1 Team representative and determine what measures, if any, are necessary to ensure that incidental take of spotted owls does not occur. The USFWS will provide written rationale for any determination under these circumstances (PDC 11 (USDI Fish and Wildlife Service, 2020, p. 50).

Limited removal of dispersal habitat (29 acres) in the home ranges of three spotted owl sites, not removing suitable habitat in the core areas and home ranges, and no timber harvest activities in nest patches of the known spotted owl sites would conserve the spotted owl sites adjacent to the proposed WSR corridor. Continued surveys prior to and through implementation of timber harvest to determine occupancy and avoid disruption of nesting owls would also conserve these spotted owl sites. Therefore, harvest activities in the HLB adjacent to the WSR corridor would not diminish the ORV pertaining to spotted owls.

The nearest marbled murrelet occupied site to these two HLB units is about 0.6 miles to the northeast of the HLB-MITA unit. The 19 acres that are suitable spotted owl habitat in the HLB-MITA unit could also contain trees that have nesting platforms for marbled murrelets; these acres would not be harvested under this landscape EA. Trees that potentially have suitable limbs for murrelet nesting occur about 116 feet south of the HLB-LITA unit; these are located within the WSR corridor. Since the two HLB units are within 35 miles of the Pacific Coast, the HLB stands would be evaluated for murrelet nesting habitat. If suitable nesting habitat is found, surveys for marbled murrelets using a protocol accepted by the USFWS (currently (Mack, et al., 2003)) would be conducted prior to harvest activities. If occupancy is determined, no harvest activities would be conducted in the occupied stand and all forest within 300 feet of the occupied stand per the RMP (p. 98). These measures would conserve marbled murrelet nesting habitat and avoid disrupting nesting murrelets; therefore, harvest in the remaining 95 acres of HLB would not diminish the ORV pertaining to marbled murrelets.

Bald and golden eagles are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) (USDI Fish and Wildlife Service, 2018). The act prohibits anyone from "taking" eagles by killing, molesting, or disturbing (among a list of other actions). Disturb means to agitate or bother a bald or golden eagle to the extent that it causes, or is likely to cause, injury to the eagle, decrease in productivity or nest abandonment (the latter two by substantially interfering with normal breeding, feeding, or sheltering behavior) (Office of the Federal Register and the Government Publishing Office, 2021). There was a sighting of a possible immature bald eagle on the Siuslaw River about half a mile from the HLB-MITA unit in 1986. The data does not indicate the presence of a nest at the time. The RMP directs protecting bald eagle or golden eagle nests (including active and alternate nests). The RMP prohibits removal of overstory trees within 330 feet of bald eagle or golden eagle nests (except hazard trees) and timber harvest operations during the breeding season within 660 feet of bald eagle or golden eagle nests. Additionally, it prohibits disrupting actively nesting bald eagles or golden eagles (ROD/RMP, p. 96; Appendix E of this EA). These conservation measures would protect bald and golden eagles; therefore, harvest in the 95 acres of HLB adjacent to the WSR corridor would not diminish the ORV pertaining to bald eagles.

BLM would follow the management principles outlined in the 1994 WSR suitability report: "BLM could continue to manage and protect land under its jurisdiction for the riparian values and Outstandingly Remarkable Values of recreation, fish and wildlife along the river area. The Outstandingly Remarkable Values of wildlife and recreation would not be diminished or lost by such management." (p. 191). For these reasons described above, BLM concludes that Siuslaw HLB Landscape Plan would protect ORVs outlined in the 1994 suitability report. BLM considered this issue but did not address it in detail, because it does not address the purpose and need, nor is it associated with impacts beyond those analyzed in 2016 Proposed RMP/Final EIS.

5.2.5 Recreation:

5.2.5.1 ***How would timber harvest affect the Visual Landscape / Visual Resource Management?***

During internal scoping, a commenter asked what effects timber harvest would have on visual resource management. The project area encompasses lands entirely classified as Visual Resource Management (VRM) Class IV. VRM Class IV objectives established in the 2016 ROD / RMP allow for management activities resulting in major modification of the existing character of the landscape. All proposed activities will only occur within areas that are designated as VRM Class IV. The level of change to the characteristic landscape can be high and management activities may dominate the view and be the major focus of viewer attention (USDI - Bureau of Land Management, 2016a, pp. 93-94). The Proposed RMP/Final EIS analyzed the effects to visual resources (USDI - Bureau of Land Management, 2016b, pp. 813-824). This issue tiers to that analysis and herein incorporates by reference the findings of that analysis. Alteration of scenic qualities would occur from surface-disturbing activities, such as those associated with regeneration timber harvest occurring within the HLB or with construction of roads (USDI - Bureau of Land Management, 2016b, p. 816). The project includes regeneration harvest, commercial thinning, road building and other associated activities, as described in Chapter 2. These project activities would occur on approximately 1,126-3,389 acres per decade of the project area's visual component. Stands subject to regeneration harvest would change visually over time as vegetation succession takes place and because the units would be planted with new trees. Harvest (both regeneration and thinning) and associated activities such as road building are compatible with VRM Class IV (USDI - Bureau of Land Management, 2016b, p. 822). The historic wildfires of 2020 burned outside the project area and thus did not affect the Visual Landscape / Visual Resource Management.

For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.5.2 ***How would timber harvest impact dispersed recreation, public safety and illegal or non-sanctioned, nuisance activities?***

During public scoping, a commenter expressed concern regarding recreation resources and how the project would impact dispersed recreation. The specific comment was "how would the alternatives affect unauthorized ATV/4wheel drive trails, shooting ranges and junk piles in and through riparian areas?" BLM interpreted this to mean how would timber harvest impact dispersed recreation generally and illegal/non-sanctioned activities within riparian areas specifically.

This project would not permanently change the current level of public access across the 13,225-acre project area. This project would temporarily limit public access on proposed harvest areas of 1,126-3,389 acres per decade, or 113-339 acres annually, during active harvest. The comment did not provide, nor does BLM have information suggesting timber harvest in the Siuslaw F.O. has caused significant changes in illegal and unauthorized use. Further, analysis of such activities would be entirely speculative. BLM law enforcement routinely patrols BLM lands and responds to reports of illegal activities, observed nuisances or other concerns. BLM law enforcement activities in the project area would continue unabated during and after project related activities.

The project location is entirely within the HLB, has no overlapping Recreation Management Area (RMA), and no actions are proposed for the Riparian Reserve. No locations in the project area are actively managed for

recreation specific purposes. The Proposed RMP/Final EIS describes the management criteria for recreation resources on BLM managed lands: “The BLM manages recreation resources and visitor services primarily through designation of RMAs and their associated managed recreation activities, opportunities, and recreation setting characteristics” (USDI Bureau of Land Management, 2016b, p. 559). Within the Land Use Planning Handbook H-1601-1 Appendix C for Recreation and Visitor Services as amended in 2011. It describes and explains the management expectations of BLM-administered lands for recreation and visitor services outside of an RMA in the following way. “Public lands that are not designated as RMAs are managed to meet basic R&VS (Recreation and Visuals) and resource stewardship needs. Recreation is not emphasized; however, recreation activities may occur. The R&VS are managed to allow recreation uses that are not in conflict with the primary uses of these lands” 2011 Amendment for H-1601-1 [Appendix C].

Recreation opportunities that exist in the project area are dispersed (not developed or maintained by the BLM) in nature. A common use of BLM lands in western Oregon that are not managed specifically for recreational purposes is the utilization of old logging roads for activities such as hunting, horseback riding, hiking, dog walking, bird watching, nature study, viewing vistas, biking and general outdoor exercise. Some users specifically seek out old logging roads because they tend to have little public use compared to managed trails and are often gated which provides a non-motorized yet a relatively easy to access area to pursue these activities. During the winter, these roads provide access to pursue the above mentioned activities in areas where the canopy has been reduced. This provides an opportunity to engage in outdoor recreation in areas with more direct sunlight which is something many residents of the heavily forested Pacific Northwest appreciate. Often, old landing sites are located atop hills or other prominent locations providing views of the surrounding landscape. Generally, these old, decommissioned logging roads are primarily used by local residents rather than visitors because as they provide for an easily accessible, unconfined recreation opportunities (few rules or regulations). This is common throughout Oregon, but is more pronounced in Western Oregon due to the density of west side forests and the associated steep and rugged terrain that makes access into these areas difficult.

Old roads that are re-utilized as haul routes will be re-built, and likely decommissioned after timber harvest, extending their life for this type of incidental recreation use. New roads that are decommissioned following the project would offer similar recreational use opportunities thus increasing the total mileage of old roads available for these uses.

Approximately 1,242 acres of the 13,225 acre project area has public access. Proposed actions would include regeneration harvest, commercial thinning, road construction and improvements on approximately 1,126-3,389 acres per decade. These activities would limit dispersed recreation opportunities within the project area where timber harvest activities are occurring. The primary impact to dispersed recreational activities would be temporary access restrictions for public safety during active management. For example, during active timber haul, roads may be blocked or restricted temporarily for safety purposes. These roads would be re-opened when haul or other timber activities, including timber falling or yarding operations, are completed. These restrictions would be temporary in nature and the public would be able to resume access when the harvest activities are completed. There are other dispersed recreation opportunities of similar nature (public land) within a short drive of the project area that would be available during such temporary access restrictions. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn’t necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.6 Soils:

5.2.6.1 ***How would the timber harvest affect soil disturbance?***

The BLM received a public scoping comment requesting information on how the alternatives would affect soil disturbance. The BLM determined that all action alternatives analyzed in detail would remain within the range of effects described in the Final EIS and did not present this issue in detail because it does not inform the decision and is not associated with environmental effects (USDI - Bureau of Land Management, 2008a, p. 41).

The Proposed RMP/Final EIS examined the issue of treatment related soil disturbance in detail, to which this analysis is tiered, and that discussion is hereby incorporated by reference (USDI Bureau of Land Management, 2016b, pp. 745-765). The analysis acknowledged that timber harvest may generate detrimental soil disturbance in many ways, including compaction, topsoil displacement and organic matter removal, rutting from the use of heavy equipment and the drag action of log yarding (USDI Bureau of Land Management, 2016b, pp. 746-747). It concluded that all harvest activities increase detrimental soil disturbance above existing levels; however, the magnitude of that increase is highly dependent on treatment method and site-specific factors (USDI Bureau of Land Management, 2016b, p. 752). The Siuslaw HLB Landscape Plan proposes the same types of treatments across the same landscapes, including geology and soil types as analyzed under the Final EIS. The 2016 ROD/RMP issued management direction that limits the cumulative spatial extent of detrimental soil disturbance to <20 percent of a treatment area (USDI - Bureau of Land Management, 2016a, p. 89). By complying with this management direction, the Siuslaw HLB project treatments will remain within the range of effects described in the Final EIS. The BLM determined that all action alternatives analyzed in detail would remain within the range of effects described in the Final EIS.

To comply with management direction and ensure that treatments adhere to this threshold, soil disturbance would be assessed at multiple scales and at multiple time points during land use planning, sale design, project implementation, and completion. Soil disturbance assessments would be conducted before and after harvest activities to help plan sales in a way to prevent detrimental soil disturbance creation, measure created disturbance during and after implementation, and identify the need and type of ameliorative action required to remain within limitations.

Within the Siuslaw field office, the process for applying the 20 percent detrimental soil disturbance threshold from management direction would be as follows:

1) Siuslaw Field Office soil science and natural resource staff will conduct pre-treatment soil disturbance surveys utilizing the Forest Soil Disturbance Monitoring Protocol (FSDMP) during the process of timber sale design. These assessments identify residual impacts from historic activities and provide feedback into site-specific logging design when potential harvest methods can be accurately assessed. If individual sale areas would be at risk of creating greater than twenty percent detrimental soil disturbance, then design modifications would be incorporated into the project and selected based on what would be most effective and appropriate for site conditions. These type of design modifications include adjusting the proposed treatment area, requiring operations over a slash mat, reutilizing existing disturbance features, or identifying restorative actions that can be completed in conjunction with the sale (such as road decommissioning), such that post-project soil disturbance is projected to be <20 percent.
2) During and after project implementation but prior to sale closure, sale areas would be monitored again according to the FSDMP. Changes in soil disturbance would be directly quantified, and the largest primary contributors to soil disturbance (for example, roads, skid trails, or dispersed disturbance) at the site would be identified. If the site is in compliance with management direction, no further actions would be necessary. While all actions under this project are designed to be under the 20 percent soil disturbance threshold, if post treatment monitoring identifies harvest units that do exceed the threshold, then ameliorative actions will be implemented prior to timber sale contract closure to comply with management direction. These actions would be tailored, within the scope of the sale contract and established BMPs, to address the main disturbances at the site. Post-treatment ameliorative actions may include de-compacting existing or newly created landings or compacted areas, and utilizing slash, seed, or other materials as erosion control, among other actions. See Soils Table 1 below.

This process enables detrimental soil impacts to be predicted in advance, and harvest activities to avoid disturbance beyond 20 percent of the harvest unit area. Further, on-the-ground evaluation and adaptive amelioration ensures that project activities will comply with the RMP management direction. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

Soils Table 1: Adaptive Management for Detrimental Soil Impacts

Trigger (if the unit/landing/road construction…)	Spatial Scale	Adaptive Management Response (then the BLM may take the following actions…)	Potentially Applicable BMPs	When the Action will occur
Overlap with sensitive soil features (unstable soils, wet areas, etc.)	>0.5 acre within the unit, road, or landing	Delineate the sensitive feature (from field observation, LiDAR imagery, soil survey information, or TPCC) and determine appropriate mitigation (drop from unit, equipment exclusion, etc.)	TH03, TH07, TH15, R01, R03, R04, R10, R11	Sale Planning
Overlap with sensitive soil features (unstable soils, wet areas, etc.)	<0.5 acre within the unit, road, or landing	Delineate the sensitive feature with flagging during pre-sale unit layout, and determine appropriate operations adjustments (equipment exclusion, slash mat, etc.)	TH03, TH07, TH15, R01, R03, R04, R10, R11	Sale Planning (unit layout)
Projected ground-based operations on 32% or greater of the unit area	Timber unit	Work with logging systems designer to establish skid trail spacing; skid trail, landing, and road placement; and/or consider operational strategies (seasonal restriction, operating over a slash mat) as needed such that detrimental soil disturbance is spatially limited to 20% or less of the treatment unit area.	TH01, TH08, TH11, TH12, TH13, TH 14, TH21, R06	Sale Planning
High amounts (>4%) of existing legacy disturbance are anticipated based on historical records or imagery.	Timber unit	Conduct pre-treatment soil monitoring to locate and quantify existing disturbance features; IF together existing and projected detrimental soil disturbance would impact in greater than 20% of a unit area, then: a) Incorporate existing disturbance into operation plan to limit additional disturbance if feasible; OR b) Develop legacy feature restoration plan to be accomplished in conjunction with treatment activities.	TH12, TH17, TH19, R04,	Sale Planning
Total area of new road construction (temporary and new permanent construction) exceeds 5% of the sale treatment area	Timber Sale area	Identify roads (existing legacy roads which can be re-utilized for the sale, or new temporary roads) for post-treatment decompaction to restore productive capacity.	TH 17, TH 19, TH23, R04, R06, R91, R92	Sale Planning
Projected cumulative detrimental soil disturbance is at or near 20% threshold	Timber unit	Conduct implementation or post-yarding soil monitoring to quantify soil disturbance and ensure compliance with management direction.	RMP management direction	Harvest implementation
Post-yarding detrimental soil disturbance exceeds 20%	Timber unit	Identify areas of greatest soil impact and take ameliorative action (decompaction, ground-cover reestablishment, seeding if necessary) on designated features to restore productive capacity and reduce detrimental soil disturbance to less than 20% of a unit area.	TH17, TH19, TH23	Harvest implementation

Trigger (if the unit/landing/road construction…)	Spatial Scale	Adaptive Management Response (then the BLM may take the following actions…)	Potentially Applicable BMPs	When the Action will occur
Erosion or excessive soil disturbance is evident on disturbed surfaces	Timber unit and/or associated roads or landings	Implement erosion control and surface stabilization measures including but not limited to: mulch, slash or surface rock application, or other ground cover; maintaining or installing additional drainage features or sediment traps (waterbars, wattles, silt fence, sedimentation ponds) at the erosion site.	R13, R20, R30, R31, R39, R40, R42, R43, R63, R64, R65, R66, R84, R90, R91, R92, TH06, Th17, TH18, TH19, TH23	Harvest implementation
Post-harvest pile burning fuels management is planned	Timber unit	Utilize post-harvest soil monitoring to assess if cumulative soil disturbance will remain within management direction thresholds. Work with fuels specialist to preferentially situate piles on existing disturbance areas such that cumulative post-treatment detrimental soil disturbance is less than 20% of the unit area.	F08, F09, F10, F11	Post-harvest
Post-harvest dispersed burning (broadcast or underburn) is planned	Timber unit	Utilize post-harvest soil monitoring to assess if cumulative soil disturbance will remain within management direction thresholds. If post-harvest soil fragility exists, defer burning until adequate soil recovery and stabilization has occurred.	F05, F07	Post-harvest

5.2.6.2 ***What would the effect to soils be from new road construction?***

The BLM received public scoping comment requesting analysis of soil impacts from new road construction across the alternatives. The BLM determined that all action alternatives analyzed in detail would remain within the range of effects described in the Final EIS and did not present this issue in detail because it does not inform the decision and is not associated with environmental effects (USDI - Bureau of Land Management, 2008a, p. 41). Road construction impacts on soils include removal of vegetation and organic matter; topsoil displacement and/or removal; compaction of sub soils; reduced or eliminated water infiltration. These effects were analyzed in detail within the RMP/Final EIS, where it was concluded that road construction activities have detrimental soil impacts and by their very nature limit vegetative growth (USDI Bureau of Land Management, 2016b, p. 753). These impacts are estimated and summarized in Appendix D, see section 5.4.1, with acres removed from the HLB reported for permanent road construction, as well as and new temporary road construction, and potential road decommissioning post-harvest, incorporated in estimates of detrimental soil disturbance and contribute to the 20 percent detrimental soil disturbance threshold. The analysis framework of the Proposed RMP/Final EIS accounted that new road construction would constitute up to 5 percent of the 20 percent limit on detrimental soil disturbance (USDI Bureau of Land Management, 2016b, p. 764). While that 5 percent estimated detrimental soil disturbance from new roads does not constitute a management threshold, it does provide a good estimate for gauging the relative impact of new road construction. New road construction (see section 5.4.1) associated with each alternative was estimated utilizing the analytical methods described in the RMP Planning Criteria (USDI Bureau of Land Management, 2014, pp. 127-129).

The alternatives vary substantially in new road construction, and their subsequent impacts on soils. The total area disturbed via construction varies three-fold between action alternatives, while the proportion of permanent and temporary new road construction varies even more. The total area disturbed from new road construction is greatest in Alternative 2 with 120 miles of new road construction, because Alternative 2 treats the largest number of acres. Further, Alternative 2 has the majority of the new road construction in the form of temporary roads (83 miles), which contribute to detrimental soil impacts. Alternatives 5 and 6 may result in the least amount of new soil disturbance from roads, with an estimated 35 and 39 miles of new construction, respectively. After that, alternatives have increasing road construction needs as the number of thinning acres increases. Alternative 6 has the second least amount of new road construction, at 39 miles, followed by Alternatives 4, 3, and 2. Alternative 2 has more than three times the amount of new road construction, with approximately 120 miles of new road construction associated with project activities. However, given the landscape scale of this analysis, the estimated new road construction falls within the scope of the RMP Final EIS analysis (generally, a 1% increase at the landscape scale, and 5 percent of detrimental soil disturbance at the treatment area scale), and site-level BMP application and layout are likely to bring the actual amounts of new road construction lower than the reported values.

For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.6.3 ***What are the effects of timber harvest and road construction on hillslope stability in the Riparian Reserve?***

The BLM received a public scoping comment requesting careful attention be paid to soil conditions in riparian areas, particularly as it related to slide- and erosion-related sediment depositions into streams. While environmental effects to riparian soils were considered, these effects were not analyzed in detail for the following reasons: unique risk of landslides in Tyee formation riparian areas was considered within the topic of landslide and slope instability, and separate project design criteria limiting yarding on hillslopes steeper than 65 percent were established; this 65 percent threshold was established by Oregon Department of Forestry because hillslope instability for fast-moving surface landslides most often initiates on slopes 65 percent or steeper (Forestry, Forest

Practices Technical Note 2: High Landslide Hazard Locations, Shallow, Rapidly Moving Landslides and Public Safety: Screening and Practices, 2003); 2) all alternatives comply with the management direction of the Riparian Reserve established by the RMP, which preserve an inner zone in which no commercial thinning would occur (though yarding corridors and road construction associated with sales may occur). All project alternatives preserve undisturbed soils in the Riparian Reserve Inner Zone as well as surface vegetation which will act as a buffer for any sediment migration from upslope disturbance and prevent sediment from reaching waterways. Soil disturbance in the Outer Zone is spatially limited by management direction in the RMP to protect against unwanted erosion or hillslope instability. For example, new road construction within Riparian Reserves is limited to less than one percent of total new construction, and harvest actions are limited to partial or full-suspension yarding through Riparian Reserves to prevent exposing mineral soil or mobilizing sediment. Therefore, proposed activities are not expected to increase hillslope instability in Riparian Reserves beyond natural levels.

For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.6.4 ***What are the effects of tree cutting and timber removal on the soil food web, fungal soil networks, and fungal mats?***

The BLM received public scoping comments asking what the effects of tree cutting and timber removal would be on the soil food web, fungal soil networks, and fungal mats. The Proposed RMP/Final EIS broadly addresses these factors as elements of soil biological and ecological function, and thus includes them through its analysis of soil quality and detrimental soil disturbance. The Proposed RMP/Final EIS speaks to soil microbial responses in response to compaction specifically on pg. 749 (USDI Bureau of Land Management, 2016b, p. 749), stating the microbial communities are generally resilient to harvest activities, but individual microbial communities vary in their response to treatment. Because the Siuslaw HLB Landscape Plan proposed actions are of the same type (namely timber harvest, road construction, and fuels treatments) and relative extent (20 percent or less of the activity area) as analyzed in the Proposed RMP/Final EIS, the project effects are within the range of effects analyzed under the Proposed RMP/Final EIS. Therefore, this issue was not analyzed in detail.

Because living host trees are important in sustaining populations of their symbiotic mycorrhizal fungi, it is hypothesized that the amount and distribution of living tree retention may result in different below-ground fungal communities following harvest. This is an area of active scientific study. Some evidence shows differential responses in the larger microbial community to clear cutting compared to other harvest types (Holden & Treseder, 2013), while research on soil fungi and ectomycorrhizal fungi specifically, show mixed conclusions, with evidence of long-term resilience in the larger fungal community, but sensitivity among some taxa to harvest methodology (Varenius, Karen, Lindhal, & Dahlberg, 2016) (Hannam, Quideau, & Kishchuk, 2006). Still, underlying ecological principles and some scientific literature suggests harvest method may impact soil fungal communities differently in the short- and long-term, despite uncertainty about resultant impacts on ecological function. It is therefore assumed that the Siuslaw HLB Landscape Plan project, with harvest methods that vary from exclusively thinning to exclusively utilizing regeneration harvest, with different living tree retention and slash generation, would therefore support different fungal communities following harvest. Alternatives 2 and 3, with a greater proportion of thinning treatments and complex patterns of living and dead tree retention, are expected to sustain higher abundance of ectomycorrhizal fungi following harvest while still having an increase in saprotrophic fungi. Alternatives with a greater proportion of regeneration harvest with wide gaps in living trees (namely, alternatives 5 and 6) may create areas of lower ectomycorrhizal abundance following harvest, and an even greater pulse of saprotrophic fungi. Alternative 4 may show an intermediate effect on mycorrhizal and saprotrophic fungal communities. The no action alternative would likely support the further differentiation of site-adapted soil microbial communities including abundant ectomycorrhizal and saprotrophic fungi. While there may be potential to alter microbial community composition through timber harvest, these impacts are highly variable and project specific. Further, changes in microbial community structure are not always correlated with detectable changes in ecological function, making it difficult to categorize changes in positive or negative terms at the landscape scale.

For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.6.5 ***How would the timber harvest affect soil function and soil productivity?***

The BLM received a public scoping comment asking how the alternatives would affect soil function and soil (site) productivity. In this analysis, soil function is understood to encompass the following:

- Physical function, including but not limited to the ability to support stable landforms and infrastructure. It also includes the soils' ability to allow for water and gas exchange through interconnected pore space.
- Hydrologic function, including the ability to regulate the water cycle and filter, store, transport, and exchange water between the soil surface and groundwater reservoirs.
- Chemical function, including the ability to buffer soil pH, cycle nutrients, and adsorb organic and inorganic compounds.
- Biological function, including the ability to sustain native above-ground vegetative communities as well as below-ground communities of bacteria, fungi, micro- and macroscopic animals. It also includes the ability to sustain their natural life cycles and processes. Soil productivity is a facet of soil biological function.

The Proposed RMP/Final EIS addresses soil functions in aggregate as the determiner of soil quality (USDI Bureau of Land Management, 2016b, p. 745) and protects soil quality by limiting detrimental soil disturbance to 20 percent or less of an activity area (USDI - Bureau of Land Management, 2016a, p. 89). By limiting the extent of soil disturbance, the Proposed RMP/Final EIS presumes that primary area that will experience changes to soil functions will remain less than 20 percent. For these reasons, project impacts on soil functions were given special consideration, but were not analyzed in detail because they are not associated with impacts beyond those analyzed in the Proposed RMP/Final EIS.

No wildfire-related effects to project area soils are expected as wildfire did not burn in the project area. Soil properties are site-specific, unless sediments are transported from one area to another, disturbance in one location does not impact the soil properties of another location. Ash and other particulates from the 2020 fires (including the Holiday Farm fire) were deposited throughout western Oregon including project area. However, ash deposition in the project area occurred in trace amounts and is not expected to have a measurable effect on soil nutrient status or chemical function.

For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.6.6 ***What would be the effect of road construction and timber yarding on soil erosion?***

The BLM received a public scoping comment asking what the effect of road construction and timber yarding would be on soil erosion. The BLM determined that all action alternatives analyzed in detail would remain within the range of effects described in the Final EIS and did not present this issue in detail because it does not inform the decision and is not associated with environmental effects (USDI - Bureau of Land Management, 2008a, p. 41).

The RMP/Final EIS addresses soil erosion as a part of detrimental soil disturbance, and thus the approach to analyzing and minimizing soil erosion is the same as those described above for detrimental soil disturbance in general (see Soils Table 1). Harvest activities are expected to create some increases in soil erosion because vegetation removal and other soil cover displacement may expose mineral soils and subject them to erosive forces during harvest and yarding. However, all alternatives will employ BMPs (Appendix E: Project Design Features) specifically designed to minimize the extent of soil erosion from harvest units, preserve hillslope stability, and to prevent delivery of eroded sediment to water bodies. In particular, ground cover retention in the form of logging slash and debris both within the harvest unit in general, as well as along equipment trails and

temporary roads to minimize erosion risk. These measures from the RMP will be incorporated in the manner previously described (Soils Table 1) to prevent and reduce soil erosion. BMP efficacy is explored in the Soils Background Information document available in the project file. Through the use of BMPs, erosion from timber harvest operations are expected to increase temporarily after harvest, but stay within the 20 percent Detrimental Soil Disturbance management direction from the RMP.

For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.7 Silviculture:

5.2.7.1 ***How would retention and reforestation affect future growth and yield?***

During public scoping, the BLM received comments to consider how retention and reforestation would affect future growth and yield. The BLM considered this issue, but did not present it in detail because it does not directly address the purpose of the project, which is to "conduct silvicultural treatments to contribute timber volume to the Allowable Sale Quantity" (USDI - Bureau of Land Management, 2016a, p. 59) and it is not associated with significant impacts beyond those analyzed in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 1189-1250). The ASQ target described in Chapter 1 is the outcome of the analysis and this project would meet that target and thus within the range of effects.

The BLM analyzed a wide range of treatments, retention levels, and reforestation methods in this project, and found reforestation method has the biggest impact on the future growth and yield predictions of a stand. Modeling outputs and summary tables for the analysis are in the administrative record, HLB_Data_Outputs_Summary_Tables. All the treatment types and reforestation methods considered for this project are based on the assumptions for the preferred alternative used in the Proposed RMP/Final EIS vegetation modeling, specifically outlined in the "Silvicultural Practices and Modeling Assumptions" in appendix C, Vegetation Modeling in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 1189-1218). A list of modeling assumptions incorporated into this project can be found in the Silviculture Report, pages 3 and 4.

During the analysis of this project, BLM determined that increasing retention by 5 percent during initial regeneration harvest would reduce the future mid-cycle thinning by approximately 5 Mbf per acre, due to overstory shading of the seedlings. Planting at a low density with mixed species (150 TPA) on medium site classes delays the mid-cycle commercial thinning opportunity by 10 or 15 years, and reduces the available volume for harvest by 10 to 15 Mbf per acre over the full rotation cycle, when compared to standard planting of 450 trees per acre of primarily Douglas-fir. Natural regeneration delays the mid-cycle thinning opportunity by 15-25 years, but has similar volume estimates to the low-density planting. Although various retention and reforestation levels would produce differences in future yield and timing of future harvests, alternatives 3, 4, 5 and 6 would meet the declared ASQ for the field office, and do so at an intensity (number of acres harvested) that mimics, or comes very close to the RMP modeling outputs (ASQ Issue, Section 3.2).

For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.7.2 ***How would timber harvest affect sustained yield?***

During public scoping, the BLM received comments to consider how timber harvest would affect sustained yield. The BLM fully analyzed this issue under the Proposed RMP / Final EIS, and there are no significant effects beyond those disclosed in the 2016 Proposed RMP/Final EIS (USDI - Bureau of Land Management, 2008a, p. 41). The 2016 Proposed RMP evaluated sustained yield in detail, that analysis and discussion is hereby incorporated by reference, to which the Siuslaw HLB Landscape Project is tiered (USDI Bureau of Land Management, 2016b, pp. 1163-1227). The 2016 Proposed RMP/Final EIS analysis modeled a repeated cycle of

harvest and regrowth within the HLB to provide for a non-declining ASQ and produce a sustained yield of timber in perpetuity and that discussion is hereby incorporated by reference (USDI Bureau of Land Management, 2016b, pp. 1163-1227). The timing and sequence of these harvest treatments were expected to vary based on the current and desired future condition of the stands. The Proposed RMP/Final EIS defines sustained yield as "the board foot volume of timber that a forest can produce in perpetuity at a given intensity of management; the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources" (USDI Bureau of Land Management, 2016b, p. 1081). The 2016 ROD/RMP declared ASQ levels for each Sustained Yield Unit (SYU), was determined by this sustained yield analysis; because sustained yield is most appropriately addressed at the scale of the entire sustained yield unit. The BLM analyzed "How each alternative meets the Siuslaw Field Office's contribution to the Eugene SYU allocated ASQ, per decade" in Issue 3.2 of this EA. BLM found that alternatives 3 through 6 would contribute to the Siuslaw Field Office's contribution of 7MMbf, or an average of 70MMbf per decade, to the ESYU target of 53 MMbf (530MMbf per decade), and do so within the parameters of the RMP modeling, according to the sustained yield calculations. Alternative 2 proposes thinning treatments to meet the Siuslaw's target of 7MMbf per year, and could do so throughout the analysis period of the Issue, which was 20 years. Although Alternative 2 would propose only thinning for the next two decades, it is reasonably foreseeable that these stands would eventually be regeneration harvested. Thus, all the alternatives would produce the declared ASQ by actions in conformance with the RMP during the temporal scope of this EA.

For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.7.3 ***What are the effects of the silvicultural practices on tree growth?***

During public scoping, the BLM received comments to consider how silvicultural practices effect tree growth. BLM considered this issue but did not analyze it in detail because the effects of the treatments within the alternatives on tree growth are analyzed within forest growth models, and is therefore not associated with significant impacts beyond those analyzed in the Proposed RMP/Final EIS (USDI - Bureau of Land Management, 2008a, p. 41). The primary growth and yield model used in this project was ORGANON growth and yield estimator. This program is also one-of-three primary growth models used in the 2016 Final EIS (USDI Bureau of Land Management, 2016b, p. 1163). The following is the first sentence on the ORGANON website, *"Organon is an **individual tree growth** model developed for Southwest Oregon, Northwest Oregon, the lands of the Stand Management Cooperative, and red alder plantations in Oregon and Washington. It will project stand development for several species mixes, stand structures and management activities"* [*(Emphasis added) http://cips.forestry.oregonstate.edu/organon]*. Current conditions, treatment results, and future predicted conditions of stands were produced using the ORGANON model. Stand data was collected across the project area. Raw stand exam data was input into BLM software EcoSurvey, which allows the BLM to view stand metrics and variables of the survey and export the stand data into formats acceptable for forest modeling software, including ORGANON. The stands were evaluated, and representative stands by age class and modeling groups (see description in Silviculture Report pgs. 9-11) were input into ORGANON. The spectrum of treatments within this project were applied to the stands in ORGANON, and summary of outputs, including existing conditions and treatments within the action alternatives, and resulting stand conditions over 140 years are all available in the administrative record under "HLB_Summary_OutputTables." These outputs are all based on the tree growth predictions from ORGANON, which as stated above, is a tree growth estimator.

For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.7.4 ***What are the effects of timber harvest on resistance to drought and insects?***

During public scoping, the BLM received comments to consider the effects of the Siuslaw HLB Landscape Project on resistance to drought and insects. This issue is not presented for detailed analysis because, regardless of

project-specific or site-specific information, there would be no reasonably foreseeable significant effects of the proposed action beyond those disclosed in the Final EIS and it does not show a reasoned choice between alternatives (USDI - Bureau of Land Management, 2008a, p. 41). That is, it does not relate to how the alternatives respond to the purpose and need. The Final EIS analyzed the effects of the proposed action on a number of key natural resources, and how management activities could be implemented to respond to drought, insects, and pathogens.

The effects of the proposed actions, within the Siuslaw HLB Landscape Project, on resistance to drought and insects tiers to the analysis in the Proposed RMP/Final EIS. As described below, the proposed action is consistent with the Northwestern and Coastal Oregon ROD, and the proposed action is not expected to have significant effects beyond those already analyzed in the Proposed RMP/Final EIS. While analysis of the project-specific and site-specific conditions could give greater specificity to the analysis in the Final EIS, there is no potential for reasonably foreseeable significant effects of the proposed action beyond those disclosed in the Proposed RMP/Final EIS. The analysis in the Proposed RMP/Final EIS addressed the effects on drought and insects of implementing the entire program of work in the timber sale program based on high quality and detailed information (USDI Bureau of Land Management, 2016b, pp. 180-211; 1295-1304). The information available on project-specific and site-specific conditions, while more specific, is not fundamentally different from the information used in the Proposed RMP/Final EIS analysis of effects on drought and insects, and thus cannot reveal any fundamentally different effects than that broader analysis.

The Proposed RMP/Final EIS examined the most recent science regarding climate change and the effect on key natural resources (including tree species, insects, and pathogens). The analysis in V. 1 on Pages 180-211 is relevant to this project and are incorporated by reference.

Key points from this issue analysis are:

- It is unclear if climate change has induced background tree mortality in the Eugene SYU (USDI Bureau of Land Management, 2016b, p. 185).
- Tree species in lower elevations, not at the extent of their range are less vulnerable to mortality induced by climate change/drought than species at higher elevations at the furthest extent of their range. Species that dominate the Siuslaw HLB project (Douglas -fir, western redcedar, western hemlock, grand fir etc.) are at low to medium vulnerability SYU (USDI Bureau of Land Management, 2016b, pp. 187-188).
- Other than the incidence of Swiss needle cast in the western slopes of the Coast Range, no obvious climate change-related changes in the incidence of insects and diseases have been clearly noted within the planning area of the 2016 ROD/RMP (USDI Bureau of Land Management, 2016b, p. 188).
- Climate based vegetation models predict a contraction of maritime climate forests (which include western hemlock, western redcedar, Pacific yew, incense cedar, Port-Orford-cedar, grand fir, white fir, noble fir, and sugar pine), and an expansion of species suitable to both the temperate conifer forest more typical of eastern Oregon and temperate cool mixed forest more typical of the central and southern Coast Range. Douglas -fir is a dominant species in all three forest types, but most models predict somewhat of a contraction of the extent of Douglas -fir. The extent of that contraction is widely variable (USDI Bureau of Land Management, 2016b, pp. 193-194).
- As climates shift, forest scientists do not expect large background mortality, rather, they anticipate die-offs with the interaction of climate change and major disturbance events, such as fire or extended droughts (USDI Bureau of Land Management, 2016b, p. 194).
- Site productivity is predicted to decrease up to one site class by mid-century due to climate changes (USDI Bureau of Land Management, 2016b, p. 195).
- Insects and pathogens could increase, new insects could be introduced, or some insects may decline due to disruptions in biological synchrony between hosts and pests, but these changes and resulting impacts are difficult to predict (USDI Bureau of Land Management, 2016b, p. 196).
- Management direction within the 2016 ROD/RMP facilitate management action to increase forest resiliency to climate change, and protect ecosystem values. These management actions include:
    - Thinning forest stands to reduce competition and drought stress, increase diversity (species, structure, age classes, sizes, patch sizes, spacing) at the stand and landscape scales, and increase resistance to fire, insects, and pathogens.
    - Protecting large old trees, large snags, and large downed wood

    - Planting new genotypes/ecotypes/climate types and species to aid development of communities that can persist under both the current and expected future climate.
    - Identifying potential climate change refugia at regional and local scales (USDI Bureau of Land Management, 2016b, pp. 199-200).
- Reserves with no active management, or limited management could act as a refugia for ecological stability, or a benchmark to compare changing vegetation patterns to actively managed lands over the next century. Whether these areas would maintain current vegetation patterns, or change due to climate change is uncertain (USDI Bureau of Land Management, 2016b, p. 201).
- The outcomes of management actions in conjunction reserving areas to increase forest resiliency are uncertain.

The effects analyzed in this issue included using various management techniques, within the management direction of the 2016 ROD/RMP to facilitate forest resiliency to climate change. These management actions would take place while meeting the declared ASQ, and non-ASQ volume targets. The Proposed RMP/Final EIS assumed an average annual harvest level of 278 MMbf per year (205 MMbf from the HLB and 73 MMbf from non-ASQ related harvest) over the entire decision area (USDI Bureau of Land Management, 2016b, p. 307). The expected annual harvest for the Eugene Sustained Yield Unit is 72 MMbf (53 MMbf from the HLB and 20 MMbf from non-ASQ related harvest) (USDI - Bureau of Land Management, 2016a, pp. 5-6). The Siuslaw Field Office contribution to the ESYU ASQ is 7MMbf, and non-ASQ is 20MMbf annually (USDI - Bureau of Land Management, 2019a).

There is no new information or changed circumstances that would substantially change the effects anticipated in the 2016 Proposed RMP/Final EIS. This is because the harvest levels and management actions would remain within the range of that analyzed in the Proposed RMP/Final EIS. Within the Proposed RMP/Final EIS and 2016 ROD/RMP, harvest levels within the Eugene Sustained Yield Unit were calculated based on stand composition and attributes on a yearly and decadal rate. Eugene Sustained Yield unit has a target of 53MMbf per year in the HLB for ASQ, and predicted 20MMbf/year in non-ASQ (LSR), with an allowance of 40 percent variance per year, and 20 percent variance per decade (USDI - Bureau of Land Management, 2016a, p. 6). This project is expected to produce 7MMbf per year, for 20 years, or 140MMbf. This harvest level, in conjunction with other planned sales, would contribute to the volume targets roughly from 2022 through 2042. These harvest levels are directly in line with the range of harvest levels in the Proposed RMP/Final EIS, and conforms to the assumptions in the Proposed RMP/Final EIS analysis on how climate change interacts with BLM management actions to alter the potential outcomes for key natural resources.

For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.7.5 ***What are the effects of silvicultural practices on the value of the stand over time, e.g., clear grain wood?***

During public scoping, the BLM received comments to consider how silvicultural practices effect the stand value over time. The purpose of the project is to meet the Siuslaw Field Office's contribution of volume towards the Eugene Sustained Yield Unit declared ASQ. The alternatives within the project presented a broad range of management strategies to reach that target, while adhering to the management directions within the 2016 ROD/RMP. Thinning and longer rotation ages could enhance the value of the stand, but site-specific factors, such as breakage, heart-rot, and defect impact the value of the stand, and cannot be predicted at the scale of this analysis. These factors can be managed at the specific project level, but would not present differences among the alternatives, to meet the purpose and need. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.7.6 ***What are the effects of silvicultural practices on forest structure, species, and structural diversity?***

During public scoping, the BLM received comments to consider how silvicultural practices effect forest structure, species, and structural diversity. The effects of the alternatives on forest structure, species, and structural diversity are evaluated in the Issue 3.3, "How would timber harvest create early successional habitat with different relative levels of complexity on the Siuslaw Field Office?" Within this issue the BLM identified specific structural elements important to complex early successional habitat that can be varied within the RMP sideboards as listed under Management Direction for the Harvest Land Base. These were used to evaluate the difference in relative complexity of the early successional habitat created under each alternative. The structural elements evaluated under each alternative were the (1) Legacy structures (green tree abundance, green tree quality and configuration, and snags); (2) Hardwood nut, berry, and drupe production and cavities; (3) Abundance of tree seedlings after reforestation; (4) Tree species diversity; and (5) the average number of years a stand remains in early successional habitat before transitioning to the Stand Establishment stage. Further, it is assumed that stands with complex structural elements in the early successional stage would remain complex throughout the lifetime of the stand. This assumption is based on the paper "Multiple Successional Pathways and Precocity in Forest Development: Can Some Forests be Born Complex?" which concludes stands that develop with high, complex early successional elements after a disturbance carry that complexity through successional stages, and can accelerate the development of old growth characteristics (Donato, Campbell, & Franklin, 2012) . Species diversity, structural diversity, and forest structure would enhance the relative complexity throughout the lifetime of the stands, when comparing the effects of the alternatives. BLM considered the issue, but did not present it in analyze it in detail because it is addressed within issue 3.3.

5.2.8 Wildlife:

5.2.8.1 ***What are the effects of the alternatives on spotted owl habitat?***

During public scoping, the BLM received an external comment requesting that the BLM assess the impacts of the Siuslaw HLB Landscape Plan EA on northern spotted owl habitat. Another external comment requested that the BLM assess dispersal habitat at the landscape, not the site, scale. This issue (i.e., the effects of the proposed project on spotted owl habitat) was considered but not analyzed in detail because it does not address the purpose and need and is not associated with significant impacts beyond those analyzed in the Final EIS.

The BLM evaluated the effects of timber harvest in the HLB on habitat for the northern spotted owl (hereafter, "spotted owl") in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 928-998, 1737-1792), to which this EA tiers. The Siuslaw HLB Landscape Plan EA is consistent with the management direction for spotted owls under the 2016 ROD/RMP (USDI Bureau of Land Management, 2016, p. 100) and with the assumptions and analysis for spotted owls in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 928-998), which is incorporated here by reference.

In the Final EIS, the BLM analyzed how the alternatives contribute to a landscape of large blocks of nesting, roosting, and foraging habitat capable of supporting clusters of reproducing owls, distributed across a variety of ecological conditions, and spaced to facilitate spotted owl movement between the blocks (USDI Bureau of Land Management, 2016b, pp. 932-941) and that analysis is incorporated here by reference. Under the Proposed RMP (USDI Bureau of Land Management, 2016b, pp. 940-941), BLM managed lands necessary to support large blocks of nesting-roosting habitat were allocated to reserve land use allocations. Analysis showed that once these lands are reserved, reserving additional lands provides little added support to the development and spacing of large habitat blocks (USDI Bureau of Land Management, 2016b, p. 941). The models used in the analysis for the Proposed RMP/Final EIS included harvest of spotted owl habitat in the HLB land use allocation. The HLB units in this EA were included in HLB under the Proposed RMP. There is no additional information specific to this project, relative to the management choices needed to achieve large blocks, which warrants further analysis.

During the next 50 years, under the Proposed RMP, the BLM would contribute to a landscape that supports large blocks of nesting, roosting, and foraging habitat (USDI Bureau of Land Management, 2016b, pp. 940, Figure 3-

182), as well as some smaller blocks of habitat. The Final EIS defines large blocks of habitat as those capable of supporting at least 25 northern spotted owl nesting pairs during each of the next 5 decades. These are spaced no more than 12 miles apart. Small blocks of habitat are capable of supporting 1-24 northern spotted owl nesting pairs and are spaced no more than 7 miles from large habitat blocks or from other small habitat blocks (USDI Bureau of Land Management, 2016b, p. 932). Habitat blocks were modeled to include spotted owl habitat on all land ownerships (USDI Bureau of Land Management, 2016b, p. 953).

In 50 years, the Proposed RMP would provide a similar amount of dispersal-capable habitat connecting large and small blocks of habitat as the No Timber Harvest reference analysis (USDI Bureau of Land Management, 2016b, pp. 943-944, 946). The No Timber Harvest reference analysis forecast potential habitat changes on Bureau of Land Management-administered land from forest ingrowth and wildfire with no timber harvest. The forecast for potential habitat changes on all other lands included forest ingrowth, timber harvest, and habitat losses due to insects, disease, and wildfire. The analysis showed that the Proposed RMP would provide more blocks of habitat with connecting dispersal habitat than current (2013) levels (USDI Bureau of Land Management, 2016b, pp. 943, Figure 3-183, p. 946, Figure 3-186) and would provide a similar amount of connecting dispersal habitat as the reference No Timber Harvest analysis (USDI Bureau of Land Management, 2016b, pp. 944, Figure 3-184).

The late-season 2020 fires in western Oregon did not impact the Siuslaw Field Office. The largest fire near the Siuslaw FO was the Holiday Farm Fire, just east of Springfield, which impacted spotted owl habitat on the adjacent Upper Willamette Field Office as well as the Willamette National Forest. This area, which includes the Upper Willamette Field Office, is in the West Cascades Physiographic Province located in the western part of the Cascade range east of the Willamette Valley. The Siuslaw Field Office is in the Oregon Coast (or North Coast) Physiographic Province, located between the Willamette Valley and the Pacific Ocean. On the Northwest Oregon District, the two provinces are separated by the Willamette Valley, which is a mix of agricultural and metropolitan areas on either side of the Willamette River. The wide valley does not have spotted owl habitat for spotted owl dispersal from one province to the other[29] until the forested areas in both provinces are closer in proximity to each other in the area of Cottage Grove and further south. In these areas spotted owls have enough habitat in a 15.5 mile diameter circle to support spotted owl movement between provinces. This was identified in the Proposed RMP/Final EIS as the area where spotted owl movement between the Oregon Coast and Oregon Western Cascades provinces could occur (USDI Bureau of Land Management, 2016b, pp. 941-947), to which this issue tiers. Here the BLM constructed “the Proposed RMP to augment the Late-Successional Reserve land use allocation specifically to support east-west northern spotted owl movement through this area” (USDI Bureau of Land Management, 2016b, p. 946).

Spotted owls that were displaced by the Holiday Farm Fire in the West Cascades physiographic province were not likely to move into suitable habitat on the Siuslaw Field Office in the North Coast physiographic province since the entire Eugene-Springfield metropolitan area and surrounding agricultural land is between the fire area and suitable habitat on the Siuslaw Field Office to the west. The owls displaced by the Holiday Farm Fire could have moved south, away from the fire areas within the West Cascades province. There they likely moved onto National Forest Lands (both Willamette and Umpqua National Forests), as well as BLM land in the Upper Willamette Field Office. The only east-west dispersal corridor that they could conceivably have used to disperse between the West Cascades and North Coast provinces onto the Siuslaw Field Office is in the area of Cottage Grove as well as farther south.

In the south, the nearest fire to the east-west dispersal corridor in 2020 was the Archie Fire, which also burned in the West Cascades physiographic province on the Roseburg District and the Umpqua National Forest. This fire burned southeast of the east-west dispersal corridor between the provinces referenced above. Spotted owls displaced by this fire could have moved northwest across the valley from the West Coast province into the North

[29] In the Proposed RMP/Final EIS, the determination of whether lands are capable of supporting northern spotted owl movement is based on the mean of all habitat values within a 15.5-mile radius circle around each point. Thus, the delineation of lands that do not support spotted owl movement is influenced by large areas of non-habitat within 15.5 miles (USDI Bureau of Land Management, 2016b, p. 947).

Coast province. The southeastern border of the Siuslaw Field Office is within about 20 miles of the northern perimeter of the fire. However, it is more likely that displaced spotted owls moved northeast or east onto the Umpqua and Willamette National Forests or south onto the Rogue Umpqua National Forest, since that is where the closest suitable habitat not affected by fires was located.

The east-west dispersal corridor was not impacted by the 2020 large fires. While some owls may have dispersed through this corridor onto the Siuslaw Field Office from the Archie Fire, as previously stated, it was not the closest nor most direct route to other nearby spotted owl habitat. Therefore, few, if any, spotted owls would have been displaced onto the Siuslaw Field Office from the 2020 large fires in western Oregon.

This Siuslaw HLB Landscape Plan EA implements 2016 RMP management direction for the HLB (USDI Bureau of Land Management, 2016, pp. 59-63) on the Siuslaw Field Office. The HLB land use allocation represents about 8.6 percent of the Siuslaw Field Office. Roughly 86 percent of the Field Office is in either Late Successional Reserves (60 percent) or Riparian Reserves (26 percent). These Reserves provide the large and small blocks of habitat on the Siuslaw Field Office that were analyzed for habitat blocks and continuity between blocks in the Proposed RMP/Final EIS. Implementation of timber harvest in the HLB is consistent with the analysis of effects on spotted owl habitat in the Proposed RMP/Final EIS.

Table 3. Harvest Land Base Acres in Spotted Owl Habitat on the Siuslaw Field Office.

Harvest Land Base	Suitable (Complex)	Suitable	Forage	Dispersal	Non-habitat	Total Acres
LITA	0	33	0	2,585	554	3,172
MITA	7	366	55	6,046	3,582	10,056
Total Acres	**7**	**399**	**55**	**8,630**	**4,136**	**13,227**
Percent of HLB	**0.05%**	**3%**	**0.4%**	**65%**	**31%**	**100%**

The acres of HLB on the Siuslaw Field Office that provide spotted owl habitat are shown in Table 3. These acres were included in the HLB analyzed under the Proposed RMP/Final EIS. That analysis showed that once the BLM-managed lands necessary to support large habitat blocks were reserved, reserving additional lands provides little added support to the development and spacing of large habitat blocks (USDI Bureau of Land Management, 2016b, p. 941). Therefore, there is no potential for significant effects from the Siuslaw HLB Landscape Plan EA to spotted owl habitat beyond those already disclosed in the Proposed RMP/Final EIS. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.8.2 ***What are the effects of the alternatives on known northern spotted owl sites and incidental take of spotted owls?***

During public scoping, the BLM received external comments requesting that the BLM assess the impacts of timber harvest on northern spotted owl sites and the incidental take of spotted owls. This issue was considered but not analyzed in detail because it does not address the purpose and need and is not associated with significant impacts beyond those analyzed in the Final EIS.

The BLM evaluated the effects of timber harvest in the HLB on spotted owls in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 928-998, 1737-1792), to which this EA tiers. The Siuslaw HLB Landscape Plan EA is consistent with the management direction for spotted owls under the 2016 ROD/RMP (USDI Bureau of Land Management, 2016, p. 100) and with the assumptions and analysis for spotted owls in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 928-998, 1736-1792), which is incorporated here by reference.

The Proposed RMP/Final EIS analyzed the effects to spotted owl habitat (USDI Bureau of Land Management, 2016b, pp. 932-947) as well as the effects to spotted owl populations (USDI Bureau of Land Management, 2016b, pp. 947-937, 1737-1792). Issue 4 in the Proposed RMP/Final EIS analyzes “the cumulative effects on northern spotted owl population response of past, present, and reasonably foreseeable future actions, including both land management on BLM managed lands and non-BLM managed lands in the planning area” (USDI Bureau of Land Management, 2016b, p. 948). The BLM determined that, under all alternatives, change in simulated spotted owl population sources over time was primarily determined by competitive interactions between northern spotted owls and barred owls, rather than habitat changes resulting from BLM planning decisions (USDI Bureau of Land Management, 2016b, p. 947). A description of the models that the BLM used for simulating spotted owl population responses is provided in Appendix T of the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 1736-1792).

Compliance with the Project Design Criteria from Appendix 5.5.1 and from the 2020 Routine Actions Biological Opinion would ensure that incidental take of spotted owls would not occur under this EA as a result of timber harvest. Activities that are likely to cause incidental take of spotted owl territorial pairs or resident singles due to disruption or habitat modification (i.e., activities that impair the functionality of a territory or cause disruption to spotted owls) are not included in the 2020 Routine Actions consultation (PDC 11) under which this project is consulted (USDA Forest Service and USDI Bureau of Land Management, 2020, p. 38) (USDI Fish and Wildlife Service, 2020, pp. 49-50). Disruption distances and times are found in Table 12 of the Biological Opinion (USDI Fish and Wildlife Service, 2020, pp. 40-43).

In dispersal-limited landscapes for spotted owls, regeneration harvest within LITA would be limited to approximately 10 percent of the HLB LITA found within any spotted owl Critical Habitat Unit per decade (PDC 15) (USDA Forest Service and USDI Bureau of Land Management, 2020, p. 40) (USDI Fish and Wildlife Service, 2020, p. 52).

Known nest trees of spotted owls or marbled murrelets would not be removed. If found, these would be added to the retention. If such a tree must be removed for safety, an emergency consultation with the Service would be initiated (PDC 14) (USDA Forest Service and USDI Bureau of Land Management, 2020, p. 40) (USDI Fish and Wildlife Service, 2020, p. 51).

Prescribed burning within 0.25 miles of a known spotted owl site, nest patch or potential site would be seasonally restricted from March 1 through July 7. If surveys to protocol determine that the known or potential site is not occupied in the same year as the prescribed burn would occur, these seasonal restrictions would not apply. Otherwise, the project wildlife biologist, in consultation with fire management personnel, may consider mitigations if they are reasonably certain that dense, persistent smoke can be kept out of the canopy and below-canopy area of the occupied or unsurveyed known or potential spotted owl sites (PDC 11) (USDA Forest Service and USDI Bureau of Land Management, 2020, p. 38) (USDI Fish and Wildlife Service, 2020, pp. 49-50).

HLB units fall (in whole or in part) within the home ranges of 56 known or potential sites with site centers on federal lands (Table 1). Of these, 52 (93 percent) have site centers located in Reserved Land Use Allocations. Additionally, HLB units would fall within four site centers on State lands and two on private lands. All but one has less than 10 percent suitable habitat in the core area (one has 23 percent) and all have less than 10 percent suitable habitat in the home range.

Of these 56 sites, only 23% (n=13) had recent detections of spotted owls (i.e., detections within the last five years (2015-2019)) (Wildlife Report, p. 16). Many of the historic sites have recent barred owl detections. In order to conserve the species on the Siuslaw FO, the sites with recent spotted owl detections are given priority for conservation of habitat under Recovery Action 10 (USDI Fish and Wildlife Service, 2011, pp. III-43 - III-47) and the 2020 Routine Actions BO, Appendix H (USDI Fish and Wildlife Service, 2020, pp. H-1-H-8), because spotted owls have been detected at these sites within the past 5 years and the goal is to conserve spotted owls that are still present on the landscape in the light of their displacement by barred owls.

At the project implementation level, the BLM would consider site-specific data pertaining to spotted owls. Per Recovery Action 10, 2020 Routine Actions BO Appendix H, (cited above) and RMP Appendix A, sites with recent detections of spotted owls will be given priority for conservation. For example, if BLM surveys indicate that a spotted owl site is "active" or had a recent detection (in the last 5 years), the Field Office would first consider harvesting an area that has been surveyed but has not had recent spotted owl detections. If this is not possible, mitigations, such as seasonal restrictions or sequencing the impacted stand (in whole or part) for later harvest, would be included to avoid incidental take of spotted owls.

Table 4. Spotted Owl Sites on Federal Lands Potentially Impacted by HLB units (data through 2019)

Land Administration	Land Use Allocation	Number of NSO Sites	Percentage of Total
Siuslaw Field Office Northwest Oregon District BLM	Reserves[30]	50	89%
	District Designated Reserve – ACEC	1	2%
	Harvest Land Base	2	4%
Swiftwater FO/Roseburg BLM	Late Successional Reserve	2	4%
Siuslaw National Forest	Unknown	1	2%
Total Sites on Federal Lands Impacted		**56**	**100%**

Surveys, as defined in established survey protocols (currently (USDI Fish and Wildlife Service, 2012)), would continue for spotted owls in the project footprint until timber harvest has been implemented under this EA (PDC 11) (USDI Fish and Wildlife Service, 2020, pp. 49-50) and (PDC 16) (USDI Fish and Wildlife Service, 2020, pp. 52-53). If a spotted owl or an unknown species of *Strix,* is detected within a project area, occupancy status is unknown, and the project would adversely affect spotted owls if the area were known to be occupied, the local biologist and the action agency's Level 1 Team representative would contact the USFWS Level 1 Team representative and determine what measures, if any, are necessary to ensure that incidental take of spotted owls does not occur. The USFWS will provide written rationale for any determination under these circumstances (PDC 11 (USDI Fish and Wildlife Service, 2020, p. 50).

In compliance with the guidance in Appendix A of the 2016 ROD/RMP for known sites located outside the Harvest Land Base, the BLM would avoid actions that (1) occur in the nest patch of a site, (2) cause the loss of nesting-roosting-foraging (i.e., suitable) habitat in the 500-acre core use area surrounding a site, and (3) cause the amount of suitable habitat in the median provincial home range surrounding a site to decline below 50 percent, when all land ownerships are considered, unless the home range already has less than 50 percent suitable habitat, considering all land ownerships (USDI - Bureau of Land Management, 2016a, p. 109). Currently there are about 402 acres of suitable habitat in HLB within provincial home ranges. This equates to about 3 percent of the HLB within the project area. Of these, about 109 acres are also in core areas of known or potential owl sites. This equates to about 1 percent of the HLB within the Field Office. Core areas represent the spatial extent most heavily used during the breeding season for nesting, foraging, and rearing young (see Wildlife Report, Spotted Owl Spatial Use of Forested Landscapes).

As stated in the previous wildlife issue not analyzed in detail, the late-season 2020 fires in Oregon did not impact the Siuslaw Field Office. The east-west dispersal corridor between the Upper Willamette Field Office and the Siuslaw Field Office was not impacted by the 2020 large fires. While some owls may have dispersed through this

[30] Congressionally Reserved Lands and National Conservation Lands, Late Successional Reserves, or Riparian Reserves

corridor onto the Siuslaw Field Office from the Archie Fire, it was not the closest nor most direct route to other nearby spotted owl habitat.

As shown above, this project would be consistent with the analysis in the Proposed RMP/Final EIS, management direction for spotted owls in the RMP, and the 2020 Biological Opinion on Northwest Oregon District, Bureau of Land Management Harvest and Routine Activities (USDI Fish and Wildlife Service, 2020). For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.8.3 ***What are the effects of the alternatives on spotted owl prey species, e.g., flying squirrel and red tree vole?***

During public scoping, the BLM received external comments requesting that the BLM assess the impacts of logging and roads on northern spotted owl prey species, such as the northern flying squirrel and red tree vole. This issue was considered but not analyzed in detail because it does not address the purpose and need and is not associated with significant impacts beyond those analyzed in the Final EIS.

The BLM evaluated the effects of timber harvest in HLB land use allocations under the Proposed RMP on spotted owl habitat (USDI Bureau of Land Management, 2016b, pp. 928-947), to which this EA tiers. Northern flying squirrels (*Glaucomys sabrinus*) favor the same habitat as spotted owls, such as old forests with large diameter downed woody debris, snags, and tall trees (Holloway & Smith, 2011, p. 668). In the Proposed RMP/Final EIS, habitat for the red tree vole (*Arborimus longicaudus*), was considered to be Mature and Structurally-complex stands within the range of the North Oregon Coast DPS (USDI Bureau of Land Management, 2016b, p. 920). This is similar to the description of spotted owl habitat that the BLM used in the Proposed RMP/Final EIS where it analyzed the effects of the Proposed RMP and other alternatives on spotted owl habitat. Thus, this late-successional forested habitat is used both by spotted owls and their prey.

In the 2020 Biological Opinion on Northwest Oregon District, BLM Harvest Routine Activities (USDI Fish and Wildlife Service, 2020, p. 26), spotted owl suitable habitat is defined as nesting/roosting and foraging (NRF) habitat. Foraging habitat implies the presence of sufficient prey to sustain territorial spotted owls. Therefore, the Proposed RMP/Final EIS analysis of impacts on spotted owl habitat implicitly includes impact to its prey species (USDI Bureau of Land Management, 2016b, pp. 928-947), and is incorporated here by reference. Under the Proposed RMP, the BLM would contribute to a landscape that supports large blocks of nesting, roosting, and foraging habitat during the next 50 years (USDI Bureau of Land Management, 2016b, p. 938). These large blocks of habitat, by definition, would also provide prey for spotted owls to be characterized as "foraging habitat."

Additionally, in the Proposed RMP/Final EIS, the BLM analyzed the effects of the alternatives on red tree voles, specifically the North Oregon Coast Distinct Population Segment (DPS) (USDI Bureau of Land Management, 2016b, pp. 919-927), to which this EA also tiers and is incorporated here by reference. The Proposed RMP/Final EIS acknowledges that "The Proposed RMP would result in sites lost south of Highway 20 within the Harvest Land Base" (USDI Bureau of Land Management, 2016b, p. 926). However, the analysis concludes that because red tree voles in the southern portion of the DPS (i.e., south of Highway 20) are relatively more abundant, "the loss of occupied stands would not reduce the distribution of the species within this portion of its range" (USDI Bureau of Land Management, 2016b, p. 926). The entire Siuslaw Field Office, including the HLB units in this EA, is located south of Highway 20.

For spotted owl and their prey, the Proposed RMP "reserved those BLM-administered lands necessary to support large habitat blocks and, once those lands are reserved, reserving additional lands provides little added support to the development and spacing of large habitat blocks" (USDI Bureau of Land Management, 2016b, p. 941). On the Siuslaw Field Office this remains the case after the 2020 late-season fires in Oregon. As previously stated, these fires did not impact the Siuslaw Field Office nor the east-west dispersal corridor between the Cascades and Coast Range south of Eugene.

For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS. It is also substantially similar to an alternative already analyzed in this EA.

5.2.8.4 ***What are the effects of the alternatives on spotted owl and barred owl interactions?***

During public scoping, the BLM received an external comment requesting that the BLM assess the impacts of timber harvest on spotted owl and barred owl interactions. This issue was considered but not analyzed in detail because it does not address the purpose and need and is not associated with significant impacts beyond those analyzed in the Final EIS.

In the Proposed RMP/Final EIS, the BLM evaluated the alternatives (including the Proposed RMP) based on their ability to contribute to a landscape that supports reproductively viable spotted owl populations, particularly in light of the encroachment of barred owls (USDI Bureau of Land Management, 2016b, pp. 928-931, 947-973, 1737-1792), to which this EA tiers. Timber harvest under the Siuslaw HLB Landscape Plan EA would only occur in the HLB land use allocation. This was analyzed as BLM managed land that would have timber harvest under the Proposed RMP. The Siuslaw HLB Landscape Plan EA is consistent with the management direction for spotted owls under the 2016 ROD/RMP (USDI Bureau of Land Management, 2016, pp. 100, 105-109) and with the assumptions and analysis for spotted owls in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 928-931, 947-973, 1737-1792), which is incorporated here by reference.

The BLM simulated spotted owl population responses to habitat changes and competitive interactions with barred owls on all land ownerships (USDI Bureau of Land Management, 2016b, p. 947). The BLM evaluated those population responses in terms of population size and population extirpation risk. In other words, the BLM simulated how spotted owl populations would respond to changing habitat conditions on a landscape occupied by barred owls (USDI Bureau of Land Management, 2016b, p. 948). Current research provides no evidence that the BLM can manage individual forest stands to provide northern spotted owls with a competitive advantage over barred owls. Instead, research reaffirms the importance of older forest conditions and managing for large blocks of unfragmented older forest (USDI Bureau of Land Management, 2016b, p. 948). This is corroborated in more recent studies by Franklin et al. (Franklin, et al., 2021) and Wiens et al. (Wiens, et al., 2021). Franklin et al. state "We found little evidence that changes to NSO [Northern Spotted Owl] habitat components due to logging or fire disturbance had significant range-wide effects on trends in NSO populations. These may be important at smaller scales where they affect smaller segments of NSO populations, but they did not appear as major drivers across the entire range of the owl." (Franklin, et al., 2021, p. 15) These studies also reinforced the importance of maintaining spotted owl habitat on the landscape "even if it is unoccupied by NSOs in the face of competitive exclusion by BOs [Barred Owls]. Maintenance of such a landscape provides 1) areas available for re-colonization by NSOs should management actions allow for reduction of BO populations and 2) it facilitates connectivity by dispersing NSO among occupied areas" (Franklin, et al., 2021, p. 18). Wiens et al. conclude that the barred owl invasion has exacerbated the issue of spotted owl habitat loss and "the availability of older forests is a necessary condition for barred owl removal to succeed" (Wiens, et al., 2021).

The BLM delineated large blocks of Late Successional Reserve on the Siuslaw Field Office, which would be managed for "large blocks of northern spotted owl nesting-roosting habitat that support clusters of reproducing spotted owls" (USDI - Bureau of Land Management, 2016a, p. 64). Riparian Reserves, while not specifically managed for spotted owls, also provide suitable habitat for spotted owls. About 60 percent of the Siuslaw Field Office is in Late Successional Reserve and about 26 percent is in Riparian Reserve land use allocations (for a total of 86 percent). Only about 8 percent is in the HLB land use allocation. Most (65 percent) of the HLB is currently spotted owl dispersal habitat. About 35 percent is currently non-habitat. Only about 3 percent of the HLB is currently suitable habitat. Of this, suitable habitat in core areas of spotted owl sites with site centers outside the HLB (96 percent of the sites on BLM managed lands) would not be removed under this EA. Therefore, the limited amount of suitable habitat that would be removed in the HLB under this EA may cause individual spotted owls to move to other areas with habitat but is not likely to affect the recovery of the species.

This analysis did not change as a result of the 2020 late season fires in Oregon. These large fires did not occur on the Siuslaw Field Office. Some owls of both species may have migrated onto the Siuslaw Field Office from the Archie Fire through the east-west dispersal corridor analyzed in the Proposed RMP / Final EIS (USDI Bureau of Land Management, 2016b, pp. 946-947). However, it is unlikely that a large influx of owls would have occurred on the Siuslaw Field Office because suitable habitat was available closer to the Archie Fire on the Umpqua National Forest and on the Upper Willamette FO.

The HLB land use allocation was designated as land that would provide timber harvest under the Proposed RMP and was analyzed as such in the Proposed RMP/Final EIS. This EA proposes actions in the HLB land use allocation in compliance with management direction in the RMP for the HLB (USDI Bureau of Land Management, 2016, pp. 59-63) and for spotted owls (USDI Bureau of Land Management, 2016, pp. 100, 105-109). All action alternatives are within the range of effects analyzed in the Proposed RMP/Final EIS for spotted owl and barred owl competitive interactions. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.8.5 ***What are the effects of the alternatives on spotted owl suitable habitat considering competitive interactions with barred owls?***

During public scoping, the BLM received an external comment requesting that the BLM assess the impacts of the Siuslaw HLB Landscape Plan EA on spotted owl suitable habitat considering competitive interactions between spotted owls and barred owls. This issue was considered but not analyzed in detail because it does not address the purpose and need and is not associated with significant impacts beyond those analyzed in the Final EIS.

The BLM evaluated the effects of timber harvest in the HLB on habitat for the spotted owl in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 928-998, 1737-1792), to which this EA tiers. The Siuslaw HLB Landscape Plan EA is consistent with the management direction for spotted owls under the 2016 ROD/RMP (USDI Bureau of Land Management, 2016, p. 100) and with the assumptions and analysis for spotted owls in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 928-998), which is incorporated here by reference.

In the Final EIS, the BLM analyzed how the alternatives contribute to a landscape of large blocks of nesting, roosting, and foraging habitat capable of supporting clusters of reproducing owls, distributed across a variety of ecological conditions, and spaced to facilitate spotted owl movement between the blocks (USDI Bureau of Land Management, 2016b, pp. 932-941) and that analysis is incorporated here by reference. Under the Proposed RMP (USDI Bureau of Land Management, 2016b, pp. 940-941), BLM managed lands necessary to support large blocks of nesting-roosting habitat were allocated to reserve land use allocations. The BLM interprets the comment "high quality subset of suitable habitat" to mean suitable habitat that meets the definition of habitat in Recovery Action 32 in the Northern Spotted Owl Recovery Plan (USDI Fish and Wildlife Service, 2011, pp. III-67). Some of the spotted owl habitat included in reserve land use allocations reserves is not yet high quality suitable habitat. However, together with suitable habitat that is already high quality, the areas in reserve land use allocations provide spotted owls with large habitat blocks. Analysis showed that once these lands are reserved, reserving additional lands provides little added support to the development and spacing of large habitat blocks (USDI Bureau of Land Management, 2016b, p. 941).

In the Final EIS, the BLM also analyzed evaluated the alternatives (including the Proposed RMP) based on their ability to contribute to a landscape that supports reproductively viable spotted owl populations, particularly in light of the encroachment of barred owls (USDI Bureau of Land Management, 2016b, pp. 928-931, 947-973, 1737-1792), to which this EA tiers. Timber harvest under the Siuslaw HLB Landscape Plan EA would only occur the HLB land use allocation. HLB was analyzed as BLM managed land that would have timber harvest under the Proposed RMP. The Siuslaw HLB Landscape Plan EA is consistent with the management direction for spotted owls under the 2016 ROD/RMP (USDI Bureau of Land Management, 2016, pp. 100, 105-109) and with the assumptions and analysis for spotted owls in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 928-931, 947-973, 1737-1792), which is incorporated here by reference.

In western Oregon, the difference in habitat availability on BLM administered lands under the Proposed RMP would not appreciably affect spotted owl population responses (USDI Bureau of Land Management, 2016b, p. 969). As stated under the previous issue, BLM habitat management alone will not be sufficient to produce stable populations of spotted owls in the Oregon Coast modeling region (USDI Bureau of Land Management, 2016b, p. 973). The greatest contribution to conservation and recovery of the spotted owl by the BLM would come from a combination of habitat management and participation in barred owl management (USDI Bureau of Land Management, 2016b, p. 973).

The HLB land use allocation was designated as land that would provide timber harvest under the Proposed RMP and was analyzed as such in the Proposed RMP/Final EIS. This EA proposes actions in the HLB land use allocation in compliance with management direction in the RMP for the HLB (USDI Bureau of Land Management, 2016, pp. 59-63) and for spotted owls (USDI Bureau of Land Management, 2016, pp. 100, 105-109). All action alternatives are within the range of effects analyzed in the Proposed RMP/Final EIS for spotted owl populations in the light of significant uncertainty due to competitive interactions with barred owls. There is no additional information specific to this project, relative to the management choices needed to achieve large blocks, which warrants further analysis. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.8.6 ***What are the effects of the alternatives on marbled murrelet nesting habitat?***

During public scoping, the BLM received an external comment requesting the BLM assess the impacts of timber harvest and associated activities on murrelet nesting habitat. This issue was considered but not analyzed in detail because it does not address the purpose and need and is not associated with significant impacts beyond those analyzed in the Final EIS.

In the Final EIS, the BLM evaluated the effects of timber harvest on marbled murrelet nesting habitat, critical habitat, and known and future occupied sites (USDI Bureau of Land Management, 2016b, pp. 895-918, 1715-1730), to which this EA tiers. The Siuslaw HLB Landscape Plan EA is consistent with the management direction for marbled murrelets under the 2016 ROD/RMP (USDI Bureau of Land Management, 2016, pp. 97-100) and with the assumptions and analysis for marbled murrelets in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 895-918, 1715-1730), which is incorporated here by reference.

In the Final EIS, the BLM analyzed the projected amount of nesting habitat available for marbled murrelets over 50 years (2013-2063) (USDI Bureau of Land Management, 2016b, pp. 899-906). The Final EIS states the following (USDI Bureau of Land Management, 2016b, p. 899):

> "*The BLM divided nesting habitat for the marbled murrelet into two categories: high-quality nesting habitat and low-quality nesting habitat. In this analysis, the BLM assumed that Structurally-complex stands within the range of the marbled murrelet represent high-quality nesting habitat, which provides trees and platforms suitable for nesting on a regular, reliable basis. Based on CVS data, the BLM estimates the average platform density in high-quality nesting habitat is 54.2 platforms/acre in Zone 1 and 41.8 platforms/acre in Zone 2. Young with Structural Legacies and Mature stands represent low-quality nesting habitat, which may have trees and platforms suitable for nesting murrelet, but the frequency and density of such structures is lower. The BLM estimates the average platform density in low-quality nesting habitat is 18.1 platforms/acre in Zone 1 and 15.3 platforms/acre in Zone 2.*" [31]

In the Final EIS, the BLM modeled habitat on lands that are not administered by the BLM using the U.S. Forest Service 2012 Gradient Nearest Neighbor (GNN) structural condition. The BLM discussion focused on high-quality habitat because GNN structural condition categories could not distinguish between lower-quality nesting habitat and non-habitat (USDI Bureau of Land Management, 2016b, p. 900). However, the Final EIS included the amount of total nesting habitat as well as high-quality nesting habitat in both HLB and Reserves under the Proposed RMP

[31] Zone 1 is land within 35 miles of the Pacific Coast. Zone 2 is land from 35-50 miles from the Pacific Coast.

(USDI Bureau of Land Management, 2016b, p. 905). It is our assumption that the difference between total nesting habitat and high-quality nesting habitat in the Final EIS reflects low-quality nesting habitat (USDI Bureau of Land Management, 2016b, pp. 905, Tables 3-258 and 3-259). These tables show that 93 percent of total nesting habitat and 99 percent of high-quality murrelet nesting habitat is in Reserve land use allocations under the Proposed RMP (USDI Bureau of Land Management, 2016b, pp. 905, Tables 3-258 and 3-259).

Conversely, only 7 percent of total nesting habitat and 1 percent of high-quality nesting habitat is in HLB (USDI Bureau of Land Management, 2016b, p. 905). The loss of habitat in these areas is offset by the protection and restoration of higher quality habitat closer to the ocean where occupancy is more likely and provides better support for recovery of the species (USDI Bureau of Land Management, 2016b, p. 426).

In the first decade (i.e., 2023), the Proposed RMP would reduce the amount of high-quality nesting habitat by one percent or 3,425 acres in the HLB (USDI Bureau of Land Management, 2016b, p. 1720). The amount of high quality habitat that would be removed in HLB on the Siuslaw Field Office during the first decade is 340 acres (Table 6). This is about 10 percent of the 1 percent (3,425 acres) of high quality nesting habitat that was expected to be lost in the HLB land use allocation under the Proposed RMP / Final EIS (USDI Bureau of Land Management, 2016b, p. 1720). Stated another way, these 430 acres are about 0.15 percent of the total high quality marbled murrelet nesting habitat in the FEIS planning area in 2013 (i.e., “Current Condition” Table S-74, 232,493 acres) which was used in the Proposed RMP / Final EIS analysis (USDI Bureau of Land Management, 2016b, p. 1715). The BLM analysis found that the total amount of marbled murrelet nesting habitat would increase incrementally in each decade under the Proposed RMP (USDI Bureau of Land Management, 2016b, p. 902) and that sufficient high-quality nesting habitat would develop by the second decade to surpass current amounts (USDI Bureau of Land Management, 2016b, p. 903).

In the Final EIS, the BLM determined that the amount of nesting habitat within Reserves on BLM managed land under the Proposed RMP would increase from 459,072 acres in 2013 to 734,918 acres in 2063 (USDI Bureau of Land Management, 2016b, p. 1720). High-quality nesting habitat in the reserve land use allocations would increase from 229,067 acres in 2013 to 307,174 acres in 2063 in the planning area (USDI Bureau of Land Management, 2016b, p. 1720). By inference, low-quality nesting habitat would increase from 230,005 acres in 2013 to 427,744 acres in 2063.

On the Siuslaw Field Office, decades of surveys for marbled murrelets generally did not find trees with murrelet structure in stands less than 70 years old. It was also difficult to accurately estimate the number of acres in Young with Structural Legacies stands. Therefore, low-quality habitat in the HLB on the Siuslaw Field Office was estimated using Mature stands only. These are stands in the 70-90 ten-year age classes (or 65-94 years old). High-quality habitat was estimated based on Structurally Complex stands, which are greater than or equal to 95 years old.

Table 5. Acres of Marbled Murrelet Habitat on the Siuslaw Field Office by Zone and Land Use Allocation. *Percentages in parentheses are percentages of the entire habitat type in all zones. For example, 99 percent of all high quality suitable habitat on the Siuslaw Field Office is found in Reserves.*

Type of Habitat	Age Class	Zone 1			Zone 2			All Zones		
		Reserves*	DDR**	HLB	Reserves	DDR	HLB	Reserves	DDR	HLB
High Quality Suitable (Structurally complex)	≥100	31,570 (99%)	174 (1%)	49 (0.2%)	19,495 (93%)	322 (3%)	449 (4%)	42,063 (98%)	496 (1%)	499 (1%)
Minimally or Low Quality Suitable (i.e., Mature)	70-90	28,218 (91%)	287 (1%)	2,454 (8%)	9,743 (87%)	169 (2%)	1,244 (11%)	37,961 (90%)	455 (1%)	3,698 (9%)

** Reserve land use allocations include Late Successional Reserves, Riparian Reserves, and Congressionally Reserved Land & National Conservation Lands.*

*** DDRs are District Designated Reserves that include non-habitat such as roads, facilities, seed orchards, etc.*

Table 6. Acres of Marbled Murrelet Habitat treated in the first decade (2017-2026) in the Harvest Land Base on the Siuslaw Field Office by Murrelet Zone. *These acres were submitted as part of the 2019 Routine Actions LAA BA, under which this EA is consulted. Percentages in parentheses refer to total habitat of that type in both zones. For example, 0.05 percent of high quality suitable habitat would be removed in Zone 1 in the first decade (2017-2026).*

Structural Stage	Marbled Murrelet Habitat	Zone 1 Acres	Zone 2 Acres	Total Acres
Marbled Murrelet Habitat Planned to be Removed in HLB, Siuslaw Field Office				
Structurally Complex	High-quality suitable	20 (0.05%)	320 0.7%	340 2.3%
Mature	Minimally suitable or low-quality habitat	450 (1%)	500 (4%)	950 (2.3%)
Marbled Murrelet Habitat Planned to be Maintained (i.e., thinned) in HLB, Siuslaw Field Office				
Structurally Complex	High-quality suitable	50	15	65
Mature	Minimally suitable or low-quality habitat	200	250	450

Table 6 shows the acres of high- and low-quality marbled murrelet habitat that would be removed in the HLB over the first decade following implementation of the 2016 RMP on the Siuslaw Field Office by Zone. This is measured from 2017 through 2026. The Routine Actions Biological Assessment used these years as the first decade to be consistent with measurement of the first decade under the RMP. For consistency, we are using these dates as the first decade for removal of marbled murrelet habitat as well. In the 2019 Biological Assessment and its accompanying 2020 Biological Opinion, the acres of habitat removed in this decade are projected ahead for each decade thereafter, through the third decade (i.e., 2046).

On the Siuslaw Field Office, less than one percent (0.05%) of the high quality suitable habitat would be removed in the first decade (2017-2026) in Zone 1 and 0.7 percent would be removed in Zone 2 (for total of 0.8 percent of high quality suitable habitat removed). About one percent of low quality suitable habitat would be removed in the first decade (2017-2026) in Zone 1 and about 4 percent would be removed in Zone 2 for a total of about 2.3 percent low quality habitat removed. As stated previously, these are well within the range of habitat acres analyzed in the Proposed RMP/Final EIS[32] (USDI Bureau of Land Management, 2016b, pp. 903, 905, 1715, 1720).

Additionally, the Siuslaw Field Office may thin HLB in marbled murrelet habitat (Table 6). Suitable habitat functionality for marbled murrelets would be maintained. Therefore, thinning in marbled murrelet habitat would not reduce the amount of suitable habitat available for marbled murrelets on the Siuslaw Field Office.

In context, about 99 percent of high quality suitable habitat in Zone 1 and 93 percent in Zone 2 would remain, as they are in reserve land use allocations (Table 4). Only one percent of high quality suitable habitat is found in the HLB entire on the Siuslaw FO. Additionally, about 91 percent of the low quality suitable habitat in Zone 1 and 87 percent in Zone 2 would also remain in reserves. Only 9 percent of low quality suitable habitat is found in the HLB entire on the Siuslaw FO. Therefore, the vast majority of the marbled murrelet habitat on the Siuslaw Field Office is in reserved land use allocations where it continues to provide habitat for murrelets.

The HLB land use allocation was designated as land that would provide timber harvest under the Proposed RMP and was analyzed as such in the Proposed RMP/Final EIS. This EA proposes actions in the HLB land use allocation in compliance with management direction in the RMP for the HLB (USDI Bureau of Land Management,

[32] Low-quality marbled murrelet habitat in the PRMP/FEIS was calculated by subtracting the high-quality marbled murrelet nesting habitat in Table 3-259 from total marbled murrelet nesting habitat in Table 3-258 (USDI Bureau of Land Management, 2016b, p. 905).

2016, pp. 59-63) and for marbled murrelets (USDI Bureau of Land Management, 2016, pp. 97-100). All action alternatives are within the range of effects analyzed in the Proposed RMP/Final EIS for marbled murrelet nesting habitat. The 2020 large fires in Oregon did not affect marbled murrelet habitat as they occurred in the West Cascades physiographic province, which is located in the western part of the Cascade Range east of the Willamette Valley. The Siuslaw Field Office is in the North Coast physiographic province, which is located between the Willamette Valley and the Pacific Ocean. The effects of the large fires in the West Cascades Province (which does not have marbled murrelets) are not experienced in the North Coast Province. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.8.7 ***How would the alternatives affect altered microclimate and nest predation of marbled murrelets?***

During public scoping, the BLM received an external comment requesting the BLM assess the impacts of the logging and roads on altered microclimate and nest predation caused by fragmentation. The BLM interpretation is that this comment referred to marbled murrelets, as they are listed as Threatened under the Endangered Species Act (ESA) and edge effects may negatively impact reproductive success. Edge effects occur when there are sharp boundaries between one type of forested stand adjacent to a different type, such as an early successional stand adjacent to mature or structurally complex forest. While the boundary may be observable and measurable, the effects depend on the parameter (e.g., microclimate variable), organism, or process of interest (e.g., disturbances, increased plant productivity) (Franklin, Johnson, & Johnson, 2018, p. 121). For marbled murrelets, edge effects include changes in microclimate at the nest site and nest predation. This issue was considered but not analyzed in detail because it does not address the purpose and need and is not associated with significant impacts beyond those analyzed in the Final EIS.

In the Final EIS, the BLM assessed habitat connectivity, edge habitat, and nest depredation on marbled murrelet nests as part of its analysis of the effects of the Proposed RMP on marbled murrelet habitat (USDI Bureau of Land Management, 2016b, pp. 899-909), to which this issue tiers. The Siuslaw HLB Landscape Plan EA is consistent with the management direction for marbled murrelets under the 2016 ROD/RMP (USDI Bureau of Land Management, 2016, pp. 97-100) and with the assumptions and analysis for marbled murrelets in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 895-918, 1715-1730), which is incorporated here by reference. The 2020 late-season large fires in Oregon did not burn in murrelet habitat.

The BLM assessed habitat connectivity and edge effects by calculating the amount of edge habitat and core habitat for marbled murrelets on BLM managed lands. Core habitat was defined as the interior part of a contiguous block of nesting habitat more than 295 feet from non-habitat. Edge habitat was defined as the nesting habitat within 295 feet of non-habitat. The distance was based on findings that marbled murrelets have reduced nest success along forest edges due to nest depredation, primarily by corvids. The BLM assumed that the risk of nest predation by corvids is greater along habitat edges and less within larger patches of nesting habitat. Although there are no quantified thresholds for the amount of core habitat needed by marbled murrelets, the BLM assumed that the quality of nesting habitat would increase as the proportion of available habitat in the core increases and as patch size increases (USDI Bureau of Land Management, 2016b, p. 901).

The BLM determined that the Proposed RMP "would provide nesting habitat in a configuration that would lead to reduced risk of nest predation (e.g., larger patch size and less edge habitat)" (USDI Bureau of Land Management, 2016b, p. 906). The BLM further concluded that since the Proposed RMP would provide nesting habitat in larger patches that would reduce nest predation, this would aid successful marbled murrelet reproduction and population growth (USDI Bureau of Land Management, 2016b, p. 908). On the Siuslaw Field Office, 86 percent of BLM lands are in either Late Successional Reserve or Riparian Reserve land use allocations. These would provide large blocks with either currently suitable habitat or habitat that is developing into suitable habitat for marbled murrelets.

The HLB land use allocation was designated as land that would provide timber harvest under the Proposed RMP and was analyzed as such in the Proposed RMP/Final EIS. About 8 percent of the Siuslaw Field Office is in HLB. This EA proposes actions in the HLB in compliance with management direction in the RMP for the HLB (USDI

Bureau of Land Management, 2016, pp. 59-63) and for marbled murrelets (USDI Bureau of Land Management, 2016, pp. 97-100). All action alternatives are within the range of effects analyzed in the Proposed RMP/Final EIA for marbled murrelet nesting habitat. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS. Also, it is substantially similar to an alternative already analyzed in this EA.

5.2.8.8 ***How would the alternatives affect wildlife species due to fragmentation? How do the alternatives affect landscape connectivity?***

During public scoping, the BLM received external comments requesting the BLM assess the impacts of logging and roads on wildlife species due to habitat fragmentation. A related comment requested that the BLM assess the effect of the alternatives on landscape connectivity. The BLM interpreted that "wildlife species" referred to spotted owls and marbled murrelets, as these are species listed under the Endangered Species Act and the BLM has an obligation under the Act to consider the effects of its actions on listed species. Bureau Sensitive Species are addressed in a separate issue not considered in detail. This issue was considered but not analyzed in detail because it does not address the purpose and need and is not associated with significant impacts beyond those analyzed in the Final EIS.

In the Final EIS, the BLM assessed habitat fragmentation and connectivity for spotted owls (USDI Bureau of Land Management, 2016b) and for marbled murrelets (USDI Bureau of Land Management, 2016b, pp. 899-909) as part of its analysis of the effects of the Proposed RMP on spotted owl and marbled murrelet habitat, to which this EA tiers. The Siuslaw HLB Landscape Plan EA is consistent with the management direction for spotted owls (USDI Bureau of Land Management, 2016, pp. 100, 105-109) marbled murrelets (USDI Bureau of Land Management, 2016, pp. 97-100) under the 2016 ROD/RMP and with the assumptions and analysis for spotted owl habitat (USDI Bureau of Land Management, 2016b, pp. 928-947) and marbled murrelet habitat (USDI Bureau of Land Management, 2016b, pp. 895-909, 1715-1720) in the Proposed RMP/Final EIS, which is incorporated here by reference. The 2020 late-season large fires in Oregon did not burn spotted owl or murrelet habitat on the Siuslaw FO. Spotted owl habitat was burned in the Cascade Province to the east of the Field Office in the Archie and Holiday Farm Fires, as discussed under 5.2.1. Murrelet habitat was not affected by the fires.

Spotted owls: In the Final EIS, the BLM analyzed how the alternatives contribute to a landscape of large blocks of nesting, roosting, and foraging habitat (decreased fragmentation) capable of supporting clusters of reproducing owls, distributed across a variety of ecological conditions and spaced to facilitate spotted owl movement between the blocks (connectivity) (Spotted Owl Issues 1 & 2) (USDI Bureau of Land Management, 2016b, pp. 932-947). Analysis showed that once these lands are reserved, reserving additional lands provides little added support to the development and spacing of large habitat blocks (USDI Bureau of Land Management, 2016b, p. 941). Habitat connectivity was analyzed in the Final EIS Issue 2 for spotted owls (USDI Bureau of Land Management, 2016b, pp. 941-947). Under the Proposed RMP, by 2063, BLM managed lands would allow for connectivity between the northern and southern portions of the Oregon Coast Range and between the Oregon Coast Range and the Oregon Western Cascades provinces, two areas where current habitat conditions appear to create barriers or strong filters to spotted owl movement and survival (USDI Bureau of Land Management, 2016b, pp. 944, 946, Figure 3-186). The BLM specifically augmented the Late-Successional Reserve land use allocation in the Proposed BLM to support east-west northern spotted owl movement between the Oregon Coast and Oregon Western Cascades provinces. While the Proposed RMP would provide slightly less support to east-west spotted owl movement than the No Timber Harvest reference analysis, the BLM "is confident that the Proposed RMP would support northern spotted owl east-west movement through this area as well as can be achieved with its administrative lands" (USDI Bureau of Land Management, 2016b, pp. 946-947).

The models used in the analysis for the Proposed RMP/Final EIS included harvest of spotted owl habitat in the HLB land use allocation. The HLB units in this EA were included in HLB under the Proposed RMP. There is no additional information specific to this project, relative to the management choices needed to achieve large blocks or unfragmented habitat with connectivity, which warrants further analysis.

Marbled murrelets: In the Final EIS, the BLM analyzed marbled murrelet habitat and connectivity by calculating the amount of core and edge habitat on BLM managed lands. Core habitat was defined as the interior part of a contiguous block of nesting habitat more than 295 feet from non-habitat. Edge habitat was defined as nesting habitat within 295 feet of non-habitat (USDI Bureau of Land Management, 2016b, p. 901). Although there are no quantified thresholds for the amount of core habitat needed by marbled murrelets, the BLM assumed that the quality of nesting habitat would increase as the proportion of available habitat in the core increases and as patch size increases (USDI Bureau of Land Management, 2016b, p. 901).

In the first decade (2013-2023), the Proposed RMP would have a loss of one percent of high-quality nesting habitat for marbled murrelets. However, by the second decade, sufficient high-quality nesting habitat would develop to surpass current amounts of high-quality nesting habitat (USDI Bureau of Land Management, 2016b, p. 903). The Proposed RMP has allocated 93 percent of existing nesting habitat within reserves and 99 percent of existing high-quality nesting habitat within reserves (USDI Bureau of Land Management, 2016b, p. 904). In 2013, about 35 percent of nesting habitat was core habitat. Core habitat would increase to 38 percent by 2063 under the Proposed RMP. The mean patch size would increase from 33.2 acres (in 2013) to 42.3 acres (in 2063) (USDI Bureau of Land Management, 2016b, pp. 905, Table 3-260). Within the planning area, high-quality nesting habitat would increase from 9 percent to 12 percent of all habitat-capable lands in 50 years (USDI Bureau of Land Management, 2016b, p. 906).

Summary: The HLB land use allocation was designated as land that would provide timber harvest under the Proposed RMP and was analyzed as such in the Proposed RMP/Final EIS. This EA proposes actions in the HLB land use allocation in compliance with management direction in the RMP for the HLB (USDI Bureau of Land Management, 2016, pp. 59-63), for spotted owls (USDI Bureau of Land Management, 2016, pp. 100, 105-109) and for marbled murrelets (USDI Bureau of Land Management, 2016, pp. 97-100). All action alternatives are within the analysis in the Proposed RMP/Final EIS for spotted owl and marbled murrelet habitat. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.8.9 *How would the alternatives affect Bureau Sensitive Species such as songbirds, salamanders, and invertebrates such as butterflies?*

During public scoping, the BLM received external comments requesting the BLM assess the impacts of the Siuslaw HLB Landscape Plan EA on Bureau Sensitive Species such as songbirds, salamanders, and invertebrates. This issue was considered but not analyzed in detail because it does not address the purpose and need and is not associated with significant impacts beyond those analyzed in the Proposed RMP/Final EIS.

In the Final EIS, the BLM evaluated the effects of timber harvest in the HLB on habitat for Bureau sensitive, Bureau strategic, former survey and manage, and landbird focal wildlife species (USDI Bureau of Land Management, 2016b, pp. 830-852,1667-1697), to which this EA tiers. Appendix E Special Status Species Table in this EA considered the effects of the proposed project on Federally listed species, Bureau sensitive species, species with specific management direction in the RMP, US Fish and Wildlife Focal Species, US Fish and Wildlife Birds of Conservation Concern, and Partners in Flight Species of Continental Concern for Western Forests that are documented or suspected of occurring on the Siuslaw Field Office of the Northwest Oregon District.

The BLM is responsible for providing habitat that supports the recovery of species listed under the Endangered Species Act (ESA) and minimizes the likelihood of listing of Bureau Sensitive Species (USDI Bureau of Land Management, 2008, pp. 6840.01, 6840.02). The RMP was designed to support these goals; therefore, implementation of management direction in the RMP would accomplish these objectives. This project is consistent with the management direction for the HLB (USDI Bureau of Land Management, 2016, pp. 59-63), northern spotted owls, marbled murrelets, and other wildlife (USDI Bureau of Land Management, 2016, pp. 95-102, 105-109).

Species are designated as Special Status Species because their habitats have declined to well below historic levels or they are associated with naturally rare habitats, such as springs or seeps. For example, about 35

percent of Special Status Species that have been documented or are suspected of occurring on the Siuslaw Field Office have grass/forb dominated areas as one of their primary habitats and about 35 percent are strongly associated with shrub habitat (Table D-5.4.2.6). These early successional habitats support a greater diversity of species when their structure is complex (see Early Successional Structural Complexity Issue in this EA). Alternative 3 and one third of Alternative 4 would provide complex early successional habitat for these species. About 51 percent of Special Status Species are strongly associated with riparian areas (Table D-5.4.2-6). These are protected under the Riparian Reserve land use allocation in the RMP (USDI Bureau of Land Management, 2016, pp. 68-74, 95). For a complete list of special status species that are documented or suspected on the Siuslaw Field Office and that were evaluated under this EA, see Appendix D, 5.4.2 Special Status Wildlife Species.

In the Final EIS (USDI Bureau of Land Management, 2016b, pp. 833, 836), the BLM analyzed the effects of the Proposed RMP by grouping species with roughly the same habitat requirements and evaluating the amount of habitat in which these species are found. Habitat requirements for individual Special Status Species were identified in Appendix S of the Final EIS (USDI Bureau of Land Management, 2016b, pp. 1667-1697). The BLM generalized habitat associations for Special Status Species into one of seven broad categories: early successional or stand establishment habitat associate (early), young habitat associate (mid), mature or structurally complex habitat associate (late), non-forest associate, oak woodland associate, wetland associate, and stream or near-stream associate within riparian areas (USDI Bureau of Land Management, 2016b, p. 834). In the analysis, the BLM assumed that the mature and structurally complex forest structural stages are representative of the late-successional or old-growth forests with which survey and manage species are closely associated (USDI Bureau of Land Management, 2016b, pp. 834-835).

For Bureau sensitive species, the BLM found that, in 50 years, the Proposed RMP would provide an increase in habitat for 34 of the 66 Bureau sensitive species for whom habitat was modeled. Approximately 45 percent of Bureau sensitive species would have no change in habitat availability because they are associated with special habitats that would be protected under the Proposed RMP (USDI Bureau of Land Management, 2016b, p. 845).

For Bureau strategic species, the BLM found that, in 50 years, the Proposed RMP would provide an increase in habitat for 34 of the 51 Bureau strategic species for whom habitat was modeled. Approximately one-third of Bureau strategic species would have no change in habitat availability because they are associated with special habitats that would be protected under the Proposed RMP (USDI Bureau of Land Management, 2016b, pp. 845-846).

For former Survey and Manage Species, the BLM found that the Proposed RMP would provide an increase in mature or structurally complex habitat for the 13 former survey and manage species for whom habitat was modeled (USDI Bureau of Land Management, 2016b, p. 846).

For landbird focal species, the BLM found that, in 50 years, the Proposed RMP would provide an increase in habitat for 26 of the 34 landbird focal species for whom habitat was modeled (USDI Bureau of Land Management, 2016b, pp. 845, 850).

The 2020 late-season large fires did not burn on the Siuslaw FO and thus there was no loss of habitat for Special Status Species on the Siuslaw FO.

The Siuslaw HLB Landscape Plan EA is consistent with the management direction for Special Status Species under the 2016 ROD/RMP (USDI Bureau of Land Management, 2016, p. 95) and with the assumptions and analysis for Special Status Species in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 830-852). The HLB units in this EA were included in HLB land use allocation under the Proposed RMP. There is no new information to warrant additional analysis. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.8.10 *What are the effects of the alternatives on the recruitment of snags and dead wood?*

During public scoping, the BLM received external comments requesting the BLM assess the impacts of the Siuslaw HLB Landscape Plan EA on recruitment of snags and dead wood. This issue was considered but not analyzed in detail because it does not address the purpose and need and is not associated with significant impacts beyond those analyzed in the Final EIS.

Under the RMP, except for safety, operational, or fuels reduction reasons, the following dead wood would be retained in all units with commercial harvest (USDI Bureau of Land Management, 2016, pp. 60-61):

- Snags > 20 inch dbh,
- Snags 6-20 inch dbh in decay classes III, IV, and V,
- Down woody material > 20 inch diameter at the large end and > 20 feet long, and
- Down woody material 6-20 inch diameter at the large end and > 20 feet long in decay classes III, IV, and V.

Snags ≥ 6 inch dbh that are cut for safety or operation reasons would be retained as down wood unless they are also a safety hazard as down wood.

One snag > 20 inch dbh would be created per acre within one year of yarding the timber in the timber sale (USDI Bureau of Land Management, 2016, p. 61). If the snag sub-alternative is selected (under Alternative 3 or 4), the BLM could create an additional 1-2 trees per acre taken from the retention. Snags would be created as outlined in the RMP (USDI Bureau of Land Management, 2016, p. 61).

Future recruitment of large dead wood and snags in the HLB would occur from the trees that remain after harvest as green tree retention (USDI Bureau of Land Management, 2016b, pp. 1198-1199). Higher green tree retention levels provide more large wood available for dead wood recruitment in the future. The BLM evaluated the effects of different levels of retention in the HLB in the Proposed RMP/Final EIS for Western Oregon (USDI Bureau of Land Management, 2016b, pp. 45, 50, 56-57, 64, 68, 78, 89, 90, 110, 843- 844, 1198-1199, 1663-1666), to which this Environmental Assessment tiers and which is incorporated here by reference. The late-season 2020 large fires in Oregon did not burn on the Siuslaw FO.

In the Proposed RMP/Final EIS, the BLM found that habitat for species associated with snags and down wood in younger stands would increase under the proposed RMP (USDI Bureau of Land Management, 2016b, p. 843). Habitat for species associated with legacy structures in older stands would also increase because larger reserves result in an increased development of Mature and Structurally-complex habitat that contains snag and down wood legacy structures (USDI Bureau of Land Management, 2016b, p. 844).

The BLM developed snag and down woody material creation targets by comparing the number of existing snags and down wood against desired amounts. Any deficit from the desired condition was used as a creation target for silvicultural treatments (in these types of projects snags and dead wood would be added to reach the desired condition) (USDI Bureau of Land Management, 2016b, p. 1663).

The BLM quantified target levels for snags and down woody material using the Decayed Wood Advisor (DecAID) (Mellen-McLean et al. 2012) as a reference. The BLM assumed that the Westside Lowland Conifer-Hardwood Forest Oregon Coast Range in DecAID was representative of the Siuslaw Field Office. The BLM also assumed that the Small/Medium Trees from DecAID provided an appropriate context based on typical tree size in projects (WLCH_OCO_S) (USDI Bureau of Land Management, 2016b, p. 1663). In the HLB, the BLM used the 30 percent tolerance level from DecAID to establish target levels of snags and down woody material (USDI Bureau of Land Management, 2016b, p. 1664). The BLM calculated existing snag density and quantities of down woody material using the BLM forest inventory data from CVS plots (USDI Bureau of Land Management, 2016b, p. 1665). The difference between the target and existing conditions showed that the Oregon Coast Province is deficit in snags ≥ 20 inch dbh (-1.3), has a surplus of snags > 10 inch dbh (+3.2) and has a surplus in down wood (percent cover is +1.4 and trees per acre is +6.5) (USDI Bureau of Land Management, 2016b, p. 1665).

The BLM used the following assumptions to interpret the calculated amounts of snags and down woody material into management direction (USDI Bureau of Land Management, 2016b, p. 1666):

- Additional dead wood (snags) would be created at the time of treatment to compensate for calculated deficits,
- Existing snags and down woody material would be retained, unless it poses a safety hazard, even if there are surplus snags or down woody material,
- Snags > 20 inch dbh size class would contribute towards deficits of snags > 10 inch dbh,
- Snags > 20 inch dbh or > 10 inch dbh would eventually contribute to down material because approximately 30 percent fall within 10 years,
- Total trees per acre to be created snags would be the greatest number of: 20 inch dbh snag deficit, 10 inch dbh snag deficit, or the down woody material deficit, and
- Deficit of > 20 inch dbh snags would be met from this greatest number; balance of trees to be created snags would be > 10 inch dbh

In the Siuslaw HLB Landscape Plan EA, snags and down wood would be provided by three components of management direction: 1) retention of existing snags and down wood (USDI - Bureau of Land Management, 2019a, p. 63); 2) creation of new snags (USDI - Bureau of Land Management, 2019a, p. 63); and 3) retention of live trees that would eventually develop into snags and down logs (USDI - Bureau of Land Management, 2019a, p. 63). Retention in the Siuslaw HLB Landscape Plan EA includes all trees greater than 50 inch dbh and all trees greater than 40 inch dbh that were determined to have established prior to 1850.

The Siuslaw HLB Landscape Plan EA analyzed different levels of green tree retention in the action alternatives for future recruitment of snags and dead wood. Green tree retention varies from the high end of retention under Alternative 3 (up to 30 percent in LITA and up to 15 percent in MITA), high to medium levels of retention under Alternative 4, and medium to low levels of retention under Alternatives 5 and 6 (15 percent in LITA and 5 percent in MITA). Under Alternative 2 ASQ targets would be attained through thinning-only.

All levels of green tree retention analyzed in this EA are within the levels analyzed for the HLB in the Proposed RMP/Final EIS. The Siuslaw HLB Landscape Plan EA is consistent with management direction for snags and dead wood (USDI Bureau of Land Management, 2016, pp. 60-62). As such, there is no potential for significant effects from the proposed actions on snags and downed wood or the recruitment of dead wood in the future beyond those already disclosed in the Proposed RMP/Final EIS. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.8.11 ***What are the effects of the alternatives on marbled murrelet nesting habitat?***

In the first decade (i.e., 2023), the Proposed RMP would reduce the amount of high-quality nesting habitat by one percent or 3,425 acres in the HLB (USDI Bureau of Land Management, 2016b, p. 1720). The amount of high quality habitat that would be removed in HLB on the Siuslaw Field Office during the first decade is 340 acres (Table 6). This is about 10 percent of the 1 percent (3,425 acres) of high quality nesting habitat that was expected to be lost in the HLB land use allocation under the Proposed RMP / Final EIS (USDI Bureau of Land Management, 2016b, p. 1720). Stated another way, these 430 acres are about 0.15 percent of the total high quality marbled murrelet nesting habitat in the FEIS planning area in 2013 (i.e., "Current Condition" Table S-74, 232,493 acres) which was used in the Proposed RMP / Final EIS analysis (USDI Bureau of Land Management, 2016b, p. 1715). The BLM analysis found that the total amount of marbled murrelet nesting habitat would increase incrementally in each decade under the Proposed RMP (USDI Bureau of Land Management, 2016b, p. 902) and that sufficient high-quality nesting habitat would develop by the second decade to surpass current amounts (USDI Bureau of Land Management, 2016b, p. 903).

In the Final EIS, the BLM determined that the amount of nesting habitat within Reserves on BLM managed land under the Proposed RMP would increase from 459,072 acres in 2013 to 734,918 acres in 2063 (USDI Bureau of Land Management, 2016b, p. 1720). High-quality nesting habitat in the reserve land use allocations would increase from 229,067 acres in 2013 to 307,174 acres in 2063 in the planning area (USDI Bureau of Land Management, 2016b, p. 1720). By inference, low-quality nesting habitat would increase from 230,005 acres in 2013 to 427,744 acres in 2063.

On the Siuslaw Field Office, decades of surveys for marbled murrelets generally did not find trees with murrelet structure in stands less than 70 years old. It was also difficult to accurately estimate the number of acres in Young with Structural Legacies stands. Therefore, low-quality habitat in the HLB on the Siuslaw Field Office was estimated using Mature stands only. These are stands in the 70-90 ten-year age classes (or 65-94 years old). High-quality habitat was estimated based on Structurally Complex stands, which are greater than or equal to 100 years old.

Table 7. Acres of Marbled Murrelet Habitat on the Siuslaw Field Office by Zone and Land Use Allocation. *Percentages in parentheses are percentages of the entire habitat type in all zones. For example, 99 percent of all high quality suitable habitat on the Siuslaw Field Office is found in Reserves.*

Type of Habitat	Age Class	Zone 1			Zone 2			All Zones		
		Reserves*	DDR**	HLB	Reserves	DDR	HLB	Reserves	DDR	HLB
High Quality Suitable (Structurally complex)	≥100	31,570 (99%)	174 (1%)	49 (0.2%)	19,495 (93%)	322 (3%)	449 (4%)	42,063 (98%)	496 (1%)	499 (1%)
Minimally or Low Quality Suitable (i.e., Mature)	70-90	28,218 (91%)	287 (1%)	2,454 (8%)	9,743 (87%)	169 (2%)	1,244 (11%)	37,961 (90%)	455 (1%)	3,698 (9%)

**** Reserve land use allocations include Late Successional Reserves, Riparian Reserves, and Congressionally Reserved Land & National Conservation Lands.***

***** DDRs are District Designated Reserves that include non-habitat such as roads, facilities, seed orchards, etc.***

Table 8. Acres of Marbled Murrelet Habitat treated in the first decade (2017-2026) in the Harvest Land Base on the Siuslaw Field Office by Murrelet Zone. *These acres were submitted as part of the 2019 Routine Actions LAA BA, under which this EA is consulted. Percentages in parentheses refer to total habitat of that type in both zones. For example, 0.05 percent of high quality suitable habitat would be removed in Zone 1 in the first decade (2017-2026).*

Structural Stage	Marbled Murrelet Habitat	Zone 1 Acres	Zone 2 Acres	Total Acres
Marbled Murrelet Habitat Planned to be Removed in HLB, Siuslaw Field Office				
Structurally Complex	High-quality suitable	20 (0.05%)	320 0.7%	340 2.3%
Mature	Minimally suitable or low-quality habitat	450 (1%)	500 (4%)	950 (2.3%)
Marbled Murrelet Habitat Planned to be Maintained (i.e., thinned) in HLB, Siuslaw Field Office				
Structurally Complex	High-quality suitable	50	15	65
Mature	Minimally suitable or low-quality habitat	200	250	450

Table 6 shows the acres of high- and low-quality marbled murrelet habitat that would be removed in the HLB over the first decade following implementation of the 2016 RMP on the Siuslaw Field Office by Zone. This is measured from 2017 through 2026. The Routine Actions Biological Assessment used these years as the first decade to be consistent with measurement of the first decade under the RMP. For consistency, we are using these dates as

the first decade for removal of marbled murrelet habitat as well. In the 2019 Biological Assessment and its accompanying 2020 Biological Opinion, the acres of habitat removed in this decade are projected ahead for each decade thereafter, through the third decade (i.e., 2046).

On the Siuslaw Field Office, less than one percent (0.05%) of the high quality suitable habitat would be removed in the first decade (2017-2026) in Zone 1 and 0.7 percent would be removed in Zone 2 (for total of 0.8 percent of high quality suitable habitat removed). About one percent of low quality suitable habitat would be removed in the first decade (2017-2026) in Zone 1 and about 4 percent would be removed in Zone 2 for a total of about 2.3 percent low quality habitat removed. As stated previously, these are well within the range of habitat acres analyzed in the Proposed RMP/Final EIS[33] (USDI Bureau of Land Management, 2016b, pp. 903, 905, 1715, 1720).

In context, about 99 percent of high quality suitable habitat in Zone 1 and 93 percent in Zone 2 would remain, as they are in reserve land use allocations (Table 4). Only one percent of high quality suitable habitat is found in the HLB entire on the Siuslaw FO. Additionally, about 91 percent of the low quality suitable habitat in Zone 1 and 87 percent in Zone 2 would also remain in reserves. Only 9 percent of low quality suitable habitat is found in the HLB on the Siuslaw FO. Therefore, the vast majority of the marbled murrelet habitat on the Siuslaw Field Office is in reserved land use allocations where it will continue to provide habitat for murrelets.

The HLB land use allocation was designated as land that would provide timber harvest under the Proposed RMP and was analyzed as such in the Proposed RMP/Final EIS. This EA proposes actions in the HLB land use allocation in compliance with management direction in the RMP for the HLB (USDI Bureau of Land Management, 2016, pp. 59-63) and for marbled murrelets (USDI Bureau of Land Management, 2016, pp. 97-100). The effects of all action alternatives on marbled murrelets are within the range of effects analyzed in the Proposed RMP/Final EIS for marbled murrelet nesting habitat. The 2020 large fires in Oregon did not affect marbled murrelet habitat as they occurred in the West Cascades physiographic province, which is located in the western part of the Cascade Range east of the Willamette Valley. The Siuslaw Field Office is in the North Coast physiographic province, which is located between the Willamette Valley and the Pacific Ocean. The effects of the large fires in the West Cascades Province (which does not have marbled murrelets) are not experienced in the North Coast Province. For these reasons, the BLM considered this issue but did not analyze it in detail. Analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.8.12 ***What are the effects of the alternatives on fisher habitat?***

During public comment on the draft EA, the BLM received external comments requesting the BLM take a hard look at the impacts of the Siuslaw HLB Landscape Plan EA on fisher. This issue was considered but not analyzed in detail because it is not necessary to evaluate how the alternatives respond to the Purpose and Need and is not associated with significant impacts beyond those analyzed in the Final EIS.

The Siuslaw Field Office is within the historic but outside the current range of the fisher (USDI Fish and Wildlife Service, 2016, p. 27). The Final Species Report for the Fisher (*Pekania pennanti*) West Coast Population shows sightings of fisher prior to 1993 that could be on the Siuslaw Field Office (Field Office boundaries are not shown on the map) (USDI Fish and Wildlife Service, 2016, pp. 35, Figure 8). Locality records from 1993 to 2013 show no sightings in the Siuslaw Field Office (USDI Fish and Wildlife Service, 2016, pp. 34, Figure 7).

On the Siuslaw Field Office, there is one documented record of a fisher near the northern border of the Field Office observed on 6/4/2012 which is in the BLM internal GIS database GeoBob (last accessed 10/23/2021). This was a visual observation with unknown reliability (i.e., the reliability of the observation is unknown or not recorded). There are three historic locations in or near the Siuslaw Field Office in the ORBIC (Oregon Rare Fauna

[33] Low-quality marbled murrelet habitat in the PRMP/FEIS was calculated by subtracting the high-quality marbled murrelet nesting habitat in Table 3-259 from total marbled murrelet nesting habitat in Table 3-258 (USDI Bureau of Land Management, 2016b, p. 905).

Species Locations) GIS database that is curated by and resides at the Institute for Natural Resources at Oregon State University. Two sightings occurred in the Siuslaw Field Office (one in 1975 and one in 1980) and one sighting occurred to the south on the Swiftwater Field Office (Roseburg District BLM) in 1975.

The historic sightings in the ORBIC database provide a historic context that fishers did occur on the Siuslaw Field Office. The Fish and Wildlife Report also indicated the difficulty in detecting fishers since they are wide-ranging animals that tend to live in remote locations. They naturally occur at low population densities because they are territorial and require large areas of forested habitat for a few individuals (USDI Fish and Wildlife Service, 2016, p. 29). The report acknowledges that "we cannot be sure that a lack of detections in Washington and much of Oregon indicates the species is entirely absent" (USDI Fish and Wildlife Service, 2016, p. 37). However, based on available verified detection data, the Service identified two native populations of fishers in the southern portion of the analysis area: one in southern Sierra Nevada (Southern Sierra Nevada Population) and the other in northern California and southwestern Oregon (Northern California-Southwestern Oregon or NCSO Population) (USDI Fish and Wildlife Service, 2016, p. 32).

The Final Rule to determine endangered species status for the fisher determined that "after assessing the best available scientific and commercial information, we determine that the NCSO DPS of fishers is not in danger of extinction throughout its range, nor likely to become so in the foreseeable future" (USDI Fish and Wildlife Service, 2020, p. 29561). It concludes that "Our review of the best available scientific and commercial information indicates that the NCSO DPS of fisher does not meet the definition of an endangered species or threatened species in accordance with sections 3(6) and 3(19) of the Act. Therefore, we find that listing of the NCSO DPS of fisher is not warranted at this time." (USDI Fish and Wildlife Service, 2020, p. 29562).

At this time the fisher is a Sensitive Species under the BLM State Director Special Status Species List (USDI Bureau of Land Management, 2021). The objectives of the BLM special status species policy (USDI Bureau of Land Management, 2008, p. .01) are to:

A. Conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA protections are no longer needed for these species, and
B. Initiate proactive conservation measures that reduce or eliminate threats to Bureau sensitive species to minimize the likelihood of and need for listing of these species under the ESA.

Within their home ranges, fisher habitat includes a variety of forest conditions that have access to a diversity and abundance of prey species as long as features that support reproduction and thermoregulation are available (USDI Fish and Wildlife Service, 2016, p. 16). Forests with diverse successional stages containing a high proportion of mid- and late-successional characteristics are preferred (USDI Fish and Wildlife Service, 2016, p. 16). Forest structure must provide both natal and maternal den and rest sites. Fishers are obligate users of tree or snag cavities for birthing dens. Once weaned the kits stay with the female and use structures such as tree cavities, hollow logs, and log piles until the juveniles disperse (USDI Fish and Wildlife Service, 2016, p. 17). Similar to den site selection, fishers select resting sites with characteristics of late successional forests such as large diameter trees, coarse downed wood, large snags, tree cavities, and deformed trees (USDI Fish and Wildlife Service, 2016, p. 17). Studies indicate that fishers rested primarily in deformed or deteriorating live trees and secondarily in snags and logs (USDI Fish and Wildlife Service, 2016, p. 18). In most cases, cavities in live trees, snags and down logs that were used as reproductive dens (both natal and maternal) and rest sites were the result of heartwood decay. Since fishers do not excavate their own natal or maternal dens, other factors such as heartwood decay of trees, excavation by woodpeckers, broken branches, frost, or fire scars are important in creating cavities and narrow entrance holes (USDI Fish and Wildlife Service, 2016, p. 18). The physical complexity of coarse woody debris such as downed trees and branches provides a diversity of foraging and resting locations in the understory (USDI Fish and Wildlife Service, 2016, p. 19).

Fishers avoid non-forested habitats with little or no cover, such as open forest, grassland, and wetland habitats. However, they also occupy younger and mid-seral forests if complex forest structural components such as trees with cavities, large logs, and snags are maintained in sufficient numbers (USDI Fish and Wildlife Service, 2016, p. 19). These are described as forests with "a mosaic of seral stages" with "significant older residual components in harvested stands" or "patches of dense-canopy and dead wood habitat elements that most likely provide the

structural complexity required by fishers (USDI Fish and Wildlife Service, 2016, p. 19). Forest structure that provides high quality fisher habitat also supplies a high diversity of prey (USDI Fish and Wildlife Service, 2016, p. 19).

The impacts to fisher from the HLB was analyzed in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 870-880), to which this EA tiers. However, in the Proposed RMP/Final EIS analysis, the BLM determined that the northern extent of the current range of the fisher was just south of the Siuslaw Field Office (USDI Bureau of Land Management, 2016, pp. 872, Figure 3-159). This extent was based on subbasins where there are documented, reliable observations which had "excellent" reliability in GeoBOB or ORBIC (USDI Bureau of Land Management, 2016b, p. 872). The BLM defined fisher habitat by Structural Stage. Young with structural legacies is defined as foraging habitat, Mature is resting habitat, and Structurally-complex is equivalent to denning habitat (USDI Bureau of Land Management, 2016b, p. 873).

The project area is not within the current range of the fisher. If there were to be fisher in the project area in the future, the BLM considered the amount of potential fisher habitat on BLM lands managed by the Siuslaw Field Office, using and incorporating by reference the structural stages used in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, p. 873). Of the potential fisher habitat on BLM lands managed by the Siuslaw Field Office, 90 percent is in Reserve land use allocations (Table 7). Ninety-seven (97) percent of potential denning habitat and 90 percent of potential resting habitat is in Reserve land use allocations. Only about 1 percent of potential denning and 9 percent of potential resting habitats are in the HLB land use allocation. Combined, only 5 percent of potential denning and resting habitats are in the HLB. The BLM also considered potential foraging habitat for fisher. The data available at the Field Office level does not distinguish between Young stands and Young with Legacy stands. Therefore, the amount of foraging habitat shown in Table 7 are likely an overestimation of the amount of potential foraging habitat present because not all Young stands have legacy structures. Even so, the majority of Young stands (85 percent) are in Reserve land use allocations as well.

Under the RMP, LSRs were designed to provide large blocks of late-successional habitat for northern spotted owls. This configuration is also beneficial to fishers, which are found more often in more contiguous patches of habitat. The FEIS states "Fisher are detected more in habitat that has a greater amount of Douglas-fir, a greater amount of 51-75 percent canopy cover, less barren areas, a higher density of low use roads (closed to public or seasonal use only), and fewer disjunct core habitat [sic] (Lofroth et al. 2011)." (USDI Bureau of Land Management, 2016b, p. 871).

Table 9. Acres of Potential Fisher habitat by Land Use Allocation on lands managed by the BLM within the Siuslaw Field Office. *Percentages in parentheses show the percentage of habitat in that habitat type. For example, 97 percent of the denning habitat for fisher is in Reserve land use allocations.*

Fisher Habitat	Structural Stage	Age Class	Reserved*	DDR**	HLB	Total Siuslaw Field Office
Denning habitat	Structurally Complex	≥ 100	42,479 (97%)	848 (2%)	507 (1%)	43,836
Resting habitat	Mature	70-90	39,005 (90%)	485 (1%)	3,883 (9%)	43,374
Total denning and resting habitat			81,485 (93%)	1,333 (2%)	4,390 (5%)	87,209
Foraging	Young***	30-60	56,093 (85%)	1,051 (2%)	8.661 (13%)	65,805
All fisher habitats			137,578 (90%)	2,384 (2%)	13,050 (9%)	153,015

**** Reserved land use allocations include Late Successional Reserves, Riparian Reserves, and Congressionally Reserved Lands and National Conservation Lands.***

***** District Designated Reserves include acres not suitable for habitat such as roads, facilities, seed orchards, etc.***

Fisher Habitat	Structural Stage	Age Class	Reserved*	DDR**	HLB	Total Siuslaw Field Office
****** The PRMP/FEIS qualifies the Structural Stage for Foraging habitat as Young with Structural Legacies. The FOI (Field Operations Inventory) GIS layer does not provide information about structural legacies. Therefore, this category is likely to be an overestimation of the amount of habitat available for foraging only. Both denning and resting habitats would also provide for foraging.***						

If fishers are present on the Siuslaw Field Office, they have an abundance of potential habitat that is configured to create blocks of habitat in Reserve land use allocations. Additionally, all alternatives for regeneration harvest under this EA would save existing snags, if operationally feasible to do so, as well as create snags with methods that allow the snag to die slowly from heartrot and develop cavities. These would be the future snags on the landscape that fishers could use. If fishers are found in the areas of HLB proposed for treatment, the RMP direction for fisher would be applied (RMP, p. 97). Therefore, removal or thinning of the 9 percent of potential fisher habitat that are found in the HLB may affect individuals (if present) by loss of a small amount of habitat but is not likely to trend this species toward listing under the Endangered Species Act.

The Siuslaw HLB Landscape Plan EA is consistent with the management direction for Harvest Land Base under the 2016 ROD/RMP (USDI Bureau of Land Management, 2016, pp. 59-63). If fisher are found in the HLB, the BLM will apply management direction for fisher, as described in the RMP (USDI Bureau of Land Management, 2016, p. 97). Therefore, there is no new information to warrant additional analysis. For these reasons, the BLM considered this issue but did not analyze it in detail. Because analysis of this issue isn't necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.8.13 *What are the effects of the alternatives on Pacific marten habitat?*

During public comment on the draft EA, the BLM received external comments requesting the BLM take a hard look at the impacts of the Siuslaw HLB Landscape Plan EA on Pacific marten. This issue was considered but not analyzed in detail because it is not necessary to evaluate how the alternatives respond to the Purpose and Need is not associated with significant impacts beyond those analyzed in the Final EIS.

The Siuslaw Field Office is within the historic but outside the current verifiable range of the Pacific marten (USDI Fish and Wildlife Service, 2019, pp. 74, 77). The Central Coastal Oregon population is within the larger boundaries of the Siuslaw Field Office, but do not occur on lands managed by the BLM. This population occurs on shore-pine dominated forest in the coastal dunes ecosystem in the Oregon Dunes Recreation Area, which is managed by the Siuslaw National Forest (USDI Fish and Wildlife Service, 2019, p. 78). The coastal distinct population segment (DPS) of Pacific marten (Martes caurina) has been listed as Threatened under the Endangered Species Act (USDI Fish and Wildlife Service, 2020, p. 63806).

On BLM lands managed by the Siuslaw Field Office, there has been one visual observation of a Pacific marten. The animal was reported by a member of the public as a visual observation on 9/20/2020 near the northern boundary of the Siuslaw Field Office. In mid-October 2020, Field Office staff set out baited camera traps in the area where the marten sighting was reported. Camera surveys have continued throughout the year. None have yet recorded Pacific marten, although a variety of other wildlife was recorded. The BLM continues to monitor the area where the marten was sighted via baited camera traps. Additionally, there are no other records of a Pacific marten on the Field Office in either the internal BLM GIS database (GeoBOB), ORBIC, or shown in the Species Status Assessment for Coastal Marten (USDI Fish and Wildlife Service, 2019, p. 77) other than the afore mentioned Central Coastal Oregon population. For these reasons, the BLM determined that it is possible, but unlikely that marten would occur in the HLB (Appendix D, Table D-5.4.1-1). If a Pacific marten is found, the BLM would consult with the Service if HLB activities may affect Pacific marten.

Coastal martens tend to select older forest stands (e.g., late-successional, old-growth, large-conifer, mature, late-seral, structurally complex forests), or forests that have characteristics such as old and large trees, multiple

canopy layers, downed logs and other decay elements, dense understory development, and biologically complex structure and composition (USDI Fish and Wildlife Service, 2020, p. 63807).

Pacific marten were included in the PRMP/FEIS Appendix S and listed in Table S-33 describing habitat development for Bureau Sensitive wildlife species documented or suspected to occur in the decision area (USDI Bureau of Land Management, 2016b, pp. 1674, Table S-33). Although it is unlikely that marten would occur within the project area, the BLM considered the amount of potential habitat for Pacific marten found on lands managed by the BLM within the Siuslaw Field Office that are within 25 miles of the Pacific Coast (Table 8) using the same criteria for habitat as found in Table S-33 of the PRMP/FEIS, which is incorporated here by reference and to which this EA is tiered (USDI Bureau of Land Management, 2016b, pp. 1674, Table S-33). The vast majority (99%) of potential marten habitat on lands managed by the BLM within the Siuslaw Field Office are in Reserve land use allocations.

Table 10. Acres of Potential Pacific marten habitat by Land Use Allocation on lands managed by the BLM within the Siuslaw Field Office. *Percentages in parentheses indicate percentage of the total subset. For example, 99.9 percent of marten habitat in the Structurally Complex stage is in Reserves.*

Marten Habitat	Structural Stage	Age Class	Reserved*	DDR**	HLB	Total Siuslaw Field Office
Habitat	Structurally Complex	≥ 100	14,392 (99.9%)	2 (0.01%)	8 (0.06%)	14,403
	Mature	70-90	7,895 (97%)	5 (0.06%)	222 (3%)	8,122
Total habitat on BLM managed lands			22,287 (99%)	7 (<1%)	230 (1%)	22,524

**** Reserved land use allocations include Late Successional Reserves, Riparian Reserves, and Congressionally Reserved Lands and National Conservation Lands.***

***** District Designated Reserves include acres not suitable for habitat such as roads, facilities, seed orchards, etc.***

Marten resting habitat is comprised of large diameter trees with large horizontal limbs, standing snags with cavities, and downed hollow logs. In coastal Oregon, structures providing cavities or chambers are likely seasonally important during the rainy period (i.e., late fall through late spring) (USDI Fish and Wildlife Service, 2019, p. 25). The most common den structures used by Pacific martens are large diameter live and dead trees with cavities (USDI Fish and Wildlife Service, 2019, p. 26). It is expected that large trees with cavities would be protected as part of the retention under all alternatives, if operationally feasible to do so. The amount and distribution of these types of trees retained would be determined at the project implementation level.

While martens use older forests, they may be found in forests with smaller diameter trees if combined overstory and understory cover remains high (USDI Fish and Wildlife Service, 2019, p. 27). Marten also select habitat based on prey availability. Many of the key prey species for Pacific marten such as red-backed vole, flying squirrel, Douglas's squirrel, and chipmunks are most numerous in older forest stands with dense shrub layers (USDI Fish and Wildlife Service, 2019, p. 27).

Martens benefit from large blocks of suitable habitat. As the amount of unsuitable habitat within a home range increases, home range size increases (USDI Fish and Wildlife Service, 2019, pp. 30-31). Especially for females raising kits, larger blocks of habitat and correspondingly smaller home ranges support the energetic demands of lactation and providing food for kits (USDI Fish and Wildlife Service, 2019, p. 30).

Under the RMP, Late Successional Reserves were designed to provide large blocks of late-successional habitat for northern spotted owls. This configuration is also beneficial to Pacific marten, where 99 percent of their habitat is in Reserves. Eighty-two percent (82%) of marten habitat in Reserve land use allocations is in Late Successional Reserves. Only one percent of marten habitat is in the HLB. If this habitat is removed, Pacific marten would still retain 99 percent of the current habitat on lands managed by the BLM in the Siuslaw FO (Table 8).

On 25 October 2021, the US Fish and Wildlife Service published a proposed rule for Pacific marten critical habitat. The Siuslaw proposed critical habitat unit falls within the larger boundaries[34] of the Siuslaw Field Office. The majority is found on lands managed by the Siuslaw National Forest. Only 42 acres are on lands managed by the BLM within the Siuslaw Field Office (Table 9). All are in Late Successional Reserves. Therefore, harvest of HLB would not affect proposed critical habitat for the Pacific marten.

Table 11. Acres of Pacific marten habitat in the Siuslaw Proposed Critical Habitat Unit within the boundaries of the Siuslaw Field Office.

Landowner/Manager	Siuslaw Proposed Critical Habitat Unit	Percent of Proposed Critical Habitat Unit within boundaries of Siuslaw FO
BLM (all in LSR)	42	0.05%
Siuslaw National Forest	88,201	98%
Total CH on Federal Lands	**88,243**	**98%**
State	2,120	2.3%
Other ownerships	177	0.2%
Total Acres	90,457	100%

If Pacific marten are or become present on lands managed by the BLM in the Siuslaw Field Office, they have an abundance of potential habitat that is configured to create blocks of habitat in Reserve land use allocations. Additionally, all alternatives for regeneration harvest under this EA would save existing snags, if operationally feasible to do so, as well as create snags with methods that allow the snag to die slowly from heartrot and develop cavities. These would serve as the future snags on the landscape that Pacific marten could use. If Pacific marten are found in the areas of HLB proposed for treatment, the Field Office would consult with the Service regarding the effects of treatment on Pacific marten Coastal DPS and implement suggested mitigation measures (see PDF pertaining to Pacific marten Coastal DPS, Appendix E, Table 5.5.2).

The Siuslaw HLB Landscape Plan EA is consistent with the management direction for Special Status Species under the 2016 ROD/RMP (USDI Bureau of Land Management, 2016, p. 95) and with the assumptions and analysis for Special Status Species in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 830-852). At the time the BLM developed the FEIS, Pacific marten was a Bureau Sensitive Species (USDI - BLM, 2016b, p. 1674). The FEIS determined that the amount of Pacific marten habitat would increase in the Plan action area by 173 percent by 2063 under the Proposed RMP (USDI Bureau of Land Management, 2016b, p. 1674). There is no new information to warrant additional analysis because a single sighting with fair reliability[35], which the BLM has been unable to replicate, does not constitute new information requiring additional analysis. For these reasons, the BLM considered this issue but did not analyze it in detail. Analysis of this issue is not necessary to evaluate how the alternatives respond to the Purpose and Need and there is no potential for significant effects beyond those described in the Proposed RMP / Final EIS.

5.2.8.14 *What are the effects of the alternatives on birds observed in the Fox Hollow area?*

During the public comment period on the draft EA, the BLM received external comments requesting the BLM take a hard look at the impacts of the timber harvest on a list of birds they had observed in the Fox Hollow area over

[34] This includes lands of all ownerships.

[35] A reliability of “Fair” in GeoBOB indicates that there is “Some uncertainty that the identification is correct.”

the past 24 years. Of the provided list of birds, most (84 percent) have a Global IUCN[36] (2020) status of "species of Least Concern" which is the category for those that are most abundant. Five[37] are not native species in Oregon (USDI Bureau of Land Management, 2021, pp. 24-50). Of these, only the barred owl and the turkey are in the list of species covered under the MBTA. Two[38] species in the list of birds observed in Fox Hollow are listed as "near threatened" and one[39] is listed as "vulnerable." All three have already been analyzed in Table D-5.4.2-5 in the EA Appendix D.

The BLM determined that the effects to all species submitted by the above referenced public comment would remain within the range of effects described in the Final EIS. This issue was considered but was not presented in detail because it does not inform the decision and is not associated with environmental effects beyond those previously analyzed (NEPA Handbook (USDI - BLM, 2008a, p. 41) in the 2016 Proposed RMP / Final EIS (USDI Bureau of Land Management, 2016b, pp. 830-852; 1667-1697), which is incorporated reference and to which this issue tiers. This is because the BLM evaluated the effects of timber harvest on habitats used by Bureau Sensitive, Bureau Strategic, Survey and Manage Species, and Landbird Focal Species in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 1667-1697).

Restoration of historic conditions under which species evolved should provide enough habitat to maintain or restore populations to viable levels (USDI - BLM, 2016b, p. 836 to 837). The distribution of structural stages in the decision area in 50 years would be within the range of the average historic conditions (RMP FEIS p. 830).

In the Final EIS, the BLM analyzed the effects of the Proposed RMP by grouping species with habitat needs that are roughly the same and evaluating the amount of habitat available to these species under the Proposed RMP in comparison to the abundance under historic conditions (USDI Bureau of Land Management, 2016b, pp. 833; 836-837). Habitat requirements for individual special status species were identified in Appendix S of the Proposed RMP / Final EIS (USDI Bureau of Land Management, 2016b, pp. 1667-1697). These analyses and results are incorporated here by reference. Twenty (20) of the species on the Fox Hollow list were evaluated in the Proposed RMP/Final EIS in Appendix S, Table S-37 (FEIS pp. 1691-1697). Sixteen (16) of the Fox Hollow species were addressed in the HLB Landscape EA Appendix D in Tables D-5.4.2 through D-5.4-5. The remainder are addressed in the Wildlife Report (USDI Bureau of Land Management, 2021, pp. 24-50).

Thus, while not all of the species on the list for the Fox Hollow area were specifically evaluated in the 2016 RMP Final EIS or the Draft HLB EA, the general habitat types used by the species on this Fox Hollow list were evaluated in the 2016 Proposed RMP / Final EIS (USDI Bureau of Land Management, 2016b, pp. 833-852). Effects to habitats are the primary basis of effects to species.

In the Final EIS, the BLM generalized habitat associations for species into one of seven broad categories: early successional or stand establishment habitat associate (early), young habitat associate (mid), mature or structurally complex habitat associate (late), non-forest associate, oak woodland associate, wetland associate, and stream or near-stream associate within riparian areas (USDI Bureau of Land Management, 2016b, p. 834).

Restoration of historic conditions is achieved by direction in the RMP for the land use allocations that occur in most of Siuslaw Field Office, which are Harvest Land Base, Late Successional Reserve, and Riparian Reserve. These three major land use allocations are intermingled across most of the land managed by the Siuslaw Field Office. Most sections[40] with HLB will have a diversity of habitat conditions due to different management direction

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[36] IUCN Red List (International Union for Conservation of Nature's Red List of Threatened Species) (BirdLife International, 2021) is used by Cornell University Lab of Ornithology to list conservation status of birds on their Birds of the World website (Cornell Lab of Ornithology, n.d.).

[37] Barred owl, Eurasian collared dove, European starling, House sparrow, Wild Turkey

[38] Olive-sided flycatcher and Rufous hummingbird

[39] Evening grosbeak

[40] As defined by the Public Land Survey System

for each land use allocation. For example, sections that contain HLB also contain Riparian Reserve and most have some Late Successional Reserve. Most sections have at least 30 percent Riparian Reserve and some Late Successional Reserve that was designated in existing stands of complex late successional forest. Therefore, about 30-40 percent of BLM lands in sections with HLB would develop into complex late successional forest in about 50 years if they do not already have complex late successional forest characteristics. Thus, at large scales like Siuslaw Field Office and the Public Land Survey Section scale, a variety of habitat conditions would be maintained that is expected to provide for the life history requirements of the Fox Hollow species.

5.3 Appendix C – Alternatives Considered but not Presented in Detailed Analysis

5.3.1 An alternative that would defer the Conrad Creek acres from harvest for recreation and education purposes.

The BLM received a public comment during public scoping that asked the BLM to analyze an alternative that would defer harvest in order to develop recreation and education opportunities. Specifically, the commenter was interested in "preserving the Conrad Creek site from harvest planning for eventual recreational/educational uses." The BLM interpreted this request as a deferral or an avoidance of harvest of these acres. This alternative was considered but not analyzed in detail because it would not be in conformance with the 2016 RMP. The 2016 ROD/RMP states that all lands allocated to the HLB are available for harvest (USDI - Bureau of Land Management, 2016a, p. 104), and that deferral of lands can only be made for reasons stated in the management direction, or Appendix A of the 2016 ROD/RMP (USDI - Bureau of Land Management, 2016a, pp. 104-105).

The project area is comprised of public lands not designated as Recreation Management Area (RMA), which are managed to meet basic Recreation and Visitor Services and resource stewardship needs. BLM does not emphasize recreation on lands outside of RMAs; however, recreation activities may occur. Recreation and Visitor Services are managed to allow recreation uses that are not in conflict with the primary uses of these lands (USDI - Bureau of Land Management, 2016a, p. 88). The primary purpose of this project is to harvest timber in conformance with management direction in the 2016 ROD/RMP for the HLB, not to preserve areas for recreation. The BLM has a need to, "conduct silvicultural treatments to contribute timber volume to the Allowable Sale Quantity" (USDI - Bureau of Land Management, 2016a, p. 59).

BLM decided though the ROD/RMP to not designate this area as a Recreation Management Area. No portion of the project area, including Conrad Creek, overlaps with an Extensive Recreation Management Area (ERMA) or a Special Recreation Management Area (SRMA). This decision means the project area is not actively managed for recreation. Further, there is no direction to maintain or protect the dispersed recreation that is occurring outside of Recreation Management Area. Recreation benefits that are gained or lost from timber harvest for dispersed recreation on HLB acres outside of Recreation Management Areas are secondary and coincidental.

For these reasons, this alternative was considered but not analyzed in detail because it does not address the purpose and need, and is inconsistent with the basic policy objectives for the management of the land use allocation.

5.3.2 An Alternative that would focus on conservation.

Through public scoping, the BLM received a request to consider an alternative that would incorporate the following conservation components:

- "Maximizes retention in logging units (through commercial thinning and/or planning regen units for maximum retention);
- "Focuses on previously logged plantations, rather than natural stands;
- "Builds no new roads, and proactively restores roads that have resource problems (e.g. erosion, bad culverts);
- "Does not increase fire hazard for residents and firefighters;
- "Avoids all critical habitat for spotted owls and marbled murrelets, as well as bureau sensitive species."

The BLM considered this alternative but did not analyze it in detail because some conservation components are substantially similar to alternatives analyzed in detail in this EA (Maximize retention, do not log natural stands, and do not increase fire hazard). The remaining conservation components (build no new roads and avoid all critical habitat) do not meet the Purpose and Need for the project. Considering the conservation components as a whole, BLM would not be able to meet the stated Purpose and Need of this project, of contributing 70 MMbf to the Eugene SYU on decadal basis; for this reason, as explained further below, BLM did not present this alternative in detail.

Substantially Similar to Alternatives Analyzed in Detail:

The conservation measure that “maximizes retention in logging units” through thinning or regeneration harvest is substitutionally similar to alternatives 2 and 3. BLM analyzed conserving a maximum of green retention in logging units within Alternative 3. This resulted in an average decadal harvest of between 2,290-2,994 acres needed to meet the Siuslaw Field Office ASQ target of 70MMbf per decade. Alternative 2, which evaluated commercial thinning and requires approximately 3,889 acres would need to be thinned per decade to meet the Siuslaw Field Office ASQ target of 70MMbf.

The conservation measure that “focuses on previously logged plantations, rather than natural stands,” is substantially similar to all alternatives, as all of the HLB stands in the project area considered for treatment, are not considered “natural stands”. These stands have been managed for timber production for decades. The complete domination of conifers in these stands and the lack of abundant hardwood trees indicate they were managed for timber, or they were grass/forb dominated before conifers took over these sites. Some of the plantation stands in older age classes may not have been harvested in the past, but they are not natural stands. The common use of aerial herbicides or herbicides applied to hardwoods on the ground by the federal government before 1980 resulted in the lack of hardwoods in unharvested stands.

BLM interpreted, “does not increase fire hazard for residents and firefighters” as a both a short term and long term goal at the stand level. This suggestion is substantially similar to Alternative 2, which evaluated thinning only. No regeneration harvest would be conducted through this alternative and thinning only would not increase fire hazard at the stand level in the short or long term. Approximately 3,889 acres would need to be thinned per decade to meet the Siuslaw Field Office ASQ target of 70MMbf per decade.

Does not Meet the Purpose and Need of the Project:

BLM interpreted, “Builds no new roads” to mean that there would be no new road construction. By not constructing new roads, the BLM would not be able to access 4,089 acres in the HLB. BLM interpreted, “avoids all critical habitat for spotted owls and marbled murrelets” to mean that there would be no harvest in critical habitat for species listed under the Endangered Species Act (i.e., spotted owls or marbled murrelets). Other Bureau sensitive species do not have critical habitat designated by the US Fish and Wildlife Service (USFWS). For spotted owls or marbled murrelets, there are 7,432 acres of USFWS determined critical habitat in the HLB.

Considering all aspects of this alternative, BLM would not meet the Purpose and Need of contributing 70 MMbf to the Eugene SYU on decadal basis. Eliminating critical habitat from harvest would reduce available acres from 13,225 to only 5,793 acres in the HLB. Not building new roads would remove 4,089 acres; however, 2,348 of those acres are in critical habitat for spotted owls or marbled murrelets. So only 1,741 acres would be removed for not building new roads after considering the overlapping portions of critical habitat. The remaining HLB available for harvest is 4,152 acres. Commercial thinning which would not increase fire hazard; this harvest method would require approximately 3,889 acres per decade to meet the Siuslaw Field Office ASQ target of 70MMbf. BLM could potentially follow this alternative to meet ASQ in the first decade; but shortly thereafter BLM would not have enough acres to meet its decadal contribution to the Eugene SYU ASQ. For this reason, the BLM considered this alternative but did not analyze it in detail because it does not meet the Purpose and Need.

5.3.3 Create an alternative that would avoid marbled murrelet occupied sites.

During public scoping, the BLM received a comment asking the BLM to consider an alternative that would avoid marbled murrelet occupied sites. The BLM considered this alternative but did not analyze it in detail because it would not be in conformance with the approved land use plan for the HLB land use allocation (USDI Bureau of Land Management, 2016, pp. 59-63). The BLM considered how the alternatives would affect known and future occupied marbled murrelet sites in the Proposed RMP/Final EIS, to which this EA tiers (USDI Bureau of Land Management, 2016b, pp. 909-918, 1727-1730).

In the Proposed RMP/Final EIS, the BLM qualitatively evaluated the combined effects of habitat development and site management on marbled murrelet populations (USDI Bureau of Land Management, 2016b, p. 912). The BLM found that, under the Proposed RMP the BLM would discover and protect 377 occupied marbled murrelet sites

during the first five decades in all land use allocations in Zone 1 and outside the HLB in Zone 2. In the HLB in Zone 2, 39 occupied marbled murrelet sites would be lost during the first five decades, because the BLM would not conduct surveys prior to modification or removal of nesting habitat (USDI Bureau of Land Management, 2016b, pp. 914, 1730). Despite the occasional loss of undiscovered marbled murrelet sites under the Proposed RMP, the BLM concluded that the marbled murrelet population would increase incrementally, decade-by-decade, over 50 years due to the continued development of nesting habitat and the net increase in the number of occupied sites (USDI Bureau of Land Management, 2016b, pp. 916-917). The loss of marbled murrelet nesting habitat and potential occupied sites in Zone 2 under the Proposed RMP was offset by the increase in nesting habitat in 50 years (2013-2063) and an estimated 91 percent of marbled murrelet sites discovered and protected in those 5 decades (USDI Bureau of Land Management, 2016b, p. 1730).

Under the RMP, some of the management objectives for the HLB are to manage forest stands for continual timber production that can be sustained through a balance of growth and harvest, provide timber for sale under the declared Allowable Sale Quantity (ASQ), and enhance the economic value of timber in forest stands. Management direction for these stands does not include managing for marbled murrelet occupied sites unless occupied stands are identified in (1) any land use allocation within 35 miles of the Pacific Coast, and (2) Late-Successional Reserves and Riparian Reserves between 35-50 miles from the Pacific Coast. The land use allocation for such occupied stands would become Late-Successional Reserve, and these stands would no longer be managed under HLB management direction. Outside of these two conditions (i.e., in the HLB between 35-50 miles from the Pacific Coast) trees with murrelet nesting structures would be removed. For these reasons, the BLM considered this alternative but did not analyze it because it would be inconsistent with the management objectives for the management of HLB under the approved land use plan (USDI Bureau of Land Management, 2008, p. 53) (USDI Bureau of Land Management, 2016, pp. 59-63).

5.3.4 An alternative that would mitigate the impacts of commercial timber harvest and roads to fish habitat.

The BLM received a comment during public scoping asking the BLM to consider an alternative that would mitigate the impacts of commercial timber harvest and roads to fish habitat. This EA does not propose commercial timber harvest in the Riparian Reserve, however some trees may be cut for operational feasibility, those trees would not be removed. The BLM interprets the commenter usage of the word “mitigation”, to mean measures applied to reduce potential negative effects to fish habitat. The BLM considered this alternative but did not analyze it in detail because it is substantially similar to the alternatives analyzed in detail. All of the alternatives would implement BMPs (see section 5.5.3 Appendix E – BMPs Table), Riparian Reserve management direction (USDI Bureau of Land Management, 2016b, pp. 68-74), and project design features (see section 5.5 Appendix E – Project Design Features) created specifically to reduce potential negative effects to fish habitat. This EA includes numerous BMPs that are specifically included to reduce negative impact of timber harvest and roads on streams and fish habitat. Examples of BMPs and PDFs associated with timber harvest activities that would be implemented include limiting the number of yarding corridors (Th 01); requiring full suspension over streams (Th 03); locate roads and landings away from wet areas and Riparian Reserve, floodplains, waters of the state (R 03) (see section 5.5.3 Appendix E – BMPs Table). Additionally, the 2016 ROD/RMP has Management Direction for the Riparian Reserve land use allocation which limit entry into riparian reserves only when there is not an operationally and economically viable alternative to accomplish other resource management objectives (USDI - Bureau of Land Management, 2016a, p. 68). For these reasons, BLM considered this alternative but did not analyze it because each alternative includes measures to reduce impact on fish habitat.

5.3.5 An alternative that would conduct thinning only in young stands and would not harvest in stands over 80 years old.

The BLM received comments during public scoping asking the BLM to consider an alternative that would thin only in young stands and not harvest in stands over 80 years old. This alternative was considered but not analyzed in detail because it would not be in conformance with the 2016 RMP, and would not meet the purpose and need of the project. The 2016 ROD/RMP clearly states that all lands allocated to the HLB are available for harvest (USDI -

Bureau of Land Management, 2016a, p. 104), and that deferral of lands can only be made for reasons stated in the management direction, or Appendix A of the RMP (USDI - Bureau of Land Management, 2016a, pp. 104-105). Stand Age is not a viable reason to defer acres from timber harvest, because it is neither in management direction for HLB or Appendix A. Further, removing all stands over 80 years old from the project area would reduce the total amount of acres available to meet ASQ to approximately 10,000 acres, including approximately 3,800 acres in the 30-year age class or younger. Because most stands in the 30-year age-class or younger are not viable for commercial timber harvest (see methods in ASQ Issue, section 3.2.2), removing those from the first decade leaves 6,200 acres that are economically viable for harvest with HLB parameters. Approximately 1,700 acres that are younger than the 80-year age class have already been moderately thinned, and would not be viable for thinning before reaching 80 years old, leaving 4,500 acres total. To meet the ASQ target of 7MMbf per year or 70 MMbf per decade, approximately 467 acres would have to be thinned each year (assuming an average harvested volume of 15MMbf per acre, calculated by taking the weighted average of predicted harvest from the remaining stands), which would amount to 4,670 acres a decade. There are not enough acres to meet the annual target of 7MMbf for a full decade. For these reasons, this alternative was considered, but not presented in detail because it is inconsistent with the basic policy objectives for the management of the area, and would not meet the purpose and need of this project.

5.3.6 An alternative that would use an age class rotation of 300 years.

The BLM received comments during public scoping asking the BLM to consider an alternative that would evaluate an age class rotation of 300 years. This alternative was considered but not analyzed in detail because it outside the basic policy objectives for the management of the area. As described in the Age Class Issue (section 3.1), during Proposed RMP/Final EIS vegetation modeling BLM made assumptions that between 6 to 10 percent of LITA, and 7 to 18 percent of MITA would be regeneration harvested per decade. Calculating using these percentage assumptions translates into regeneration harvest rotation ages between 100 to 170 years in LITA, and 60 to 140 years in MITA. A rotation age of 300 years would result in approximately 3 percent of the HLB being regeneration harvested per decade, or 426 acres. Using the same methodology described in the ASQ issue (section 3.2.2), 426 acres a decade would produce between 14.9MMbf to 22.5MMbf per decade, depending on retention levels, and would require an additional 2,638 to 3,061 acres of thinning to reach the 70MMbf target. These numbers fall within the ranges of thinning acres in Alternatives 2 and 3, and would have very similar effects to both. The 300-year rotation is also outside of the parameters of the Proposed RMP/Final EIS modeling assumptions, and therefore would not meet the sustained yield declared ASQ over the course of a rotation. In fact, a 300-year rotation could only meet the ASQ level for two decades before running out of acres to treat, which is the same prediction as Alternative 2. Because effects from a rotation age of 300 years would be substantially similar to the effects of alternatives 2 and 3, this alternative was considered but not presented in detail.

5.3.7 An alternative that would retain the largest size class of trees in the stand.

The BLM received comments during public scoping asking the BLM to consider an alternative that would retain the largest size class of trees in the stand. This alternative was considered but not analyzed in detail because it would cause effects substantially similar to alternatives analyzed in detail. The EA modeling assumed the largest diameter classes would be retained, to the extent possible, to reach the desired retention level in regeneration harvest, and the desired post harvest density in commercial thinning (silviculture report pg. 5). Modeling was conducted to evaluate other methods of retention for possible oak treatments and fuel breaks, such as selective retention based on diameter thresholds, or treatments that maintained a canopy cover near 20 percent. These treatments would still meet the sideboards of the alternatives, and therefore would not present differences in alternatives or the analysis. Because the analysis did incorporate retaining the largest size class of trees for retention, and is therefore substantially similar in effects to alternatives presented in detail, this alternative was considered but not presented in detail.

5.3.8 An alternative that would delay harvest to create high-quality clear grain wood.

The BLM received comments during public scoping asking the BLM to consider an alternative that would delay harvest to create high-quality clear grain wood. This alternative was considered but not analyzed in detail

because it would cause effects substantially similar to alternatives analyzed in detail. Alternative 3 analyzed effects using an upper rotation age for regeneration harvest to the furthest extent assumed in the Proposed RMP/Final EIS vegetation modeling based on percentage harvested per decade, which was 140 years in MITA, and 170 years in LITA (see section 2.0 Alternatives).). Alternative 2 analyzed thinning only, so only a portion of the stands would be harvested, leaving typically one-third to one-half of the stands for future harvest. Thus, Alternatives 2 and 3 incorporate rotation ages that would delay harvest and create a high-quality clear grain wood. For this reason, the effects of this proposed alternative would be substantially similar to Alternative 2 and 3, and therefore this alternative was considered but not presented in detail.

5.3.9 An alternative that would harvest tree species other than conifers.

The BLM received comments during public scoping asking the BLM to consider an alternative that would harvest other tree species. This alternative was considered but not analyzed in detail because it is substantially similar to alternatives analyzed in detail. Every species except oak, as described in section 2.0 Alternatives, is available for harvest in Alternatives 5 and 6. Every conifer species is available for harvest in Alternatives 3 and 4, while hardwoods would be retained. Because of this, this alternative was considered but not analyzed in detail because it is substantially similar to alternatives analyzed in detail.

5.3.10 Create an alternative that would maximize retention in logging units.

During public scoping, the BLM received a comment asking the BLM to consider an alternative that maximizes retention in logging units (through commercial thinning and/or maximum retention in regeneration harvest units). The BLM considered this alternative but did not analyze it in detail because it is substantially similar to two alternatives considered in detail (USDI Bureau of Land Management, 2008, p. 53). The project considered an alternative (Alternative 2) that would meet ASQ targets by thinning only. The project also considered an alternative (Alternative 3) that would maximize retention in regeneration harvest units. Creating complexity through various levels of retention is described in the Issue: Therefore, the BLM considered this alternative but did not analyze it in detail because it is substantially similar to two alternatives that were analyzed in detail in this EA and this alternative suggested by the public would have substantially similar effects to these two alternatives.

5.3.11 An alternative that would follow the principles of sustained yield, at the declared ASQ harvest level.

The BLM received comments during public scoping asking the BLM to consider an alternative that would follow the principles of sustained yield management, at the declared ASQ level. This alternative was considered but not analyzed in detail because it is substantially similar to alternatives analyzed in detail. The Allowable Sale Quantity, or ASQ, is defined as “the timber volume that a forest can produce continuously under the intensity of management described in the RMP for those lands allocated for permanent timber production. The terms ‘annual productive capacity,’ ‘sustained yield capacity,’ and ‘allowable sale quantity’ are synonymous.” (USDI Bureau of Land Management, 2016b, p. 1063). The declared ASQ harvest level for the ESYU is 53MMbf per year (USDI - Bureau of Land Management, 2016a, p. 6), and as described in the introduction of this project, 7MMbf per year for the Siuslaw Field Office. The Issue “How each alternative meets the Siuslaw Field Office’s contribution to the Eugene SYU allocated ASQ, per decade.” analyzes the number of acres required to thin and regeneration harvest per decade to reach 70MMbf, and compares each alternative to the predicted number of acres regeneration harvested and thinned as predicted from the Proposed RMP/Final EIS modeling (section 3.2.2). As presented in the ASQ issue, alternatives 3, 4, 5 and 6 meet the declared ASQ harvest level, and can do so continuously. In other words, these alternatives follow the principles of sustained yield, at the declared ASQ harvest level. Because of this, this alternative was considered but not analyzed in detail because it is substantially similar to alternatives analyzed in detail.

5.3.12 An alternative that would follow the vegetation modeling from the Proposed RMP/Final EIS.

The BLM received comments during public scoping asking the BLM to consider an alternative that would follow the vegetation modeling from the Proposed RMP/Final EIS. This alternative was considered but not analyzed in detail because it is substantially similar to alternatives analyzed in detail. The vegetation modeling for the 2016

ROD/RMP is described in the Proposed RMP/Final EIS (USDI Bureau of Land Management, 2016b, pp. 1163-1227). In the Issue How each alternative meets the Siuslaw Field Office's contribution to the Eugene SYU allocated ASQ, per decade," BLM described in the methods section how the Proposed RMP/Final EIS vegetation modeling framed the design of the alternatives (section 3.2.2). These parameters are also described in the silviculture report for this project, pages 3 and 4. The ASQ Issue compared each alternative to the predicted number of acres regeneration harvested and thinned to the Proposed RMP/Final EIS modeling output for the first decade (section 3.2). This modeling output predicted the Siuslaw Field Office would be regeneration harvesting approximately 1,502 acres per decade, and commercially thinning approximately 362 acres per decade, to produce 61.0 MMbf from regeneration harvest, and 8.7 MMbf from thinning (68.7 MMbf total). As presented in the ASQ issue, alternatives 3,4, 5 and 6 follow the assumptions and parameters set up in the vegetation modeling. Alternatives 4 and 5 come the closest, within the range of expected harvest levels, to match the vegetation modeling exactly. For these reasons, this alternative was considered but not analyzed in detail because it is substantially similar to alternatives analyzed in detail.

5.3.13 An Alternative that would develop a Quarry.

The BLM received public comments during scoping that asked the BLM to include an alternative that would develop a Quarry. The BLM considered this alternative but did not analyze it in detail because it does not meet the Purpose and Need for the project which is to conduct commercial timber harvest to contribute to the Eugene SYU's declared ASQ. Timber harvest could occur without a new quarry. The Siuslaw Field Office's contribution to the ASQ is between 56-84 MMbf of volume per decade. For this reason, the BLM considered this alternative but did not analyze it in detail because it does not meet the Purpose and Need.

5.3.14 An alternative that would conduct Watershed Analysis and/ or use the Riparian Reserve buffers from the Northwest Forest Plan (as amended).

The BLM received comments during the scoping period requesting the analysis of an alternative consistent with the 1995 Eugene Resource Management Plan. An alternative that is consistent with the 1995 Eugene Record of Decision and Resource Management Plan was considered but not analyzed as it is inconsistent with the basic policy objectives for the management of the area. Implementing a project consistent with the management direction for the 1995 Eugene RMP is only permissible under the 2016 ROD/RMP when those projects were 1) initiated prior to the signing of the ROD (August 5, 2016), and 2) have signed decision records within two years after the signing of the ROD (by August 5, 2018). The Siuslaw HLB Landscape Plan project was initiated (publicly scoped) on November 20, 2019, and therefore does not meet the criteria for allowing implementation of actions consistent with the 1995 Eugene RMP. Alternatives that are not in conformance with the existing Land Use Plan (2016 ROD/RMP) would be inconsistent with the basic policy objectives for the management of the area and are therefore eliminated from detailed analysis.

5.3.15 Alternatives that would conduct timber harvest within the Riparian Reserve:

The BLM received a comment during public scoping asking the BLM to consider:

- an alternative that would buffer streams by 49 feet.
- alternative that would create gaps within and between streams.
- an alternative that would buffer streams by 18 feet for great wood volume in decay.
- an alternative that would buffer streams by more than 33 feet.
- an alternative that would consider tree tipping in the inner zone of the Riparian Reserve land use allocation.
- an alternative that would not do commercial timber harvest in the Riparian Reserve adjacent to HLB land use allocations.
- an alternative that would not thin stands to provide stable wood that could be delivered to streams.
- an alternative that would not treat the Riparian Reserve adjacent to HLB timber harvest.

- an alternative that would not conduct commercial timber harvest and no tree removal in the Riparian Reserve land use allocation, but treatments would be done non-commercially.
- an alternative that would consider non-commercial restoration treatments with two sight potential tree heights of all waterways.

The BLM considered each of these alternative but did not analyze it in detail because they do not meet the purpose and need. BLM will not be analyzing or treating the Riparian Reserve through this NEPA document.

5.4 Appendix D – Tables

5.4.1 Predicted New Road Construction and Soil Disturbance Tables

Predicted New Road Construction

Predicted new road construction by Alternative per decade, all road units are in miles reported as average (minimum-maximum). Mileage determined using the RMP Roads Planning Criteria (USDI Bureau of Land Management, 2014, pp. 127-129).

Alternative	*Regen Volume (MMbf)*	Temp Rock	Temp Native Surface	Perm Rock	Perm Native Surface	New Road Construction for Regen Harvest	*Thinning Volume (MMbf)*	Temp Rock	Temp Native Surface	Perm Rock	Perm Native Surface	New Road Construction for Thinning Harvest	*Total New Road Construction (miles)*
1	*0*	0	0	0	0	0	*0*	0	0	0	0	0	***0***
2	*0*	0	0	0	0	0	*70*	45.5	37.5	36.3	1	120.4	***120.4***
3	*35-44*	1.4 (1.2-1.5)	0.8 (0.7-0.9)	13.2 (11.7-14.7)	0.3 (0.2-0.3)	15.7 (13.9-17.5)	*26-35*	19.8 (16.9-22.8)	16.4 (13.9-18.8)	15.8 (13.5-18.1)	0.5 (0.4-0.5)	52.5 (44.7-60.2)	***68.1 (58.6-77.7)***
4	*53-65*	2.0 (1.8-2.2)	1.2 (1.1-1.3)	19.7 (17.7-21.7)	0.4 (0.4-0.4)	23.4 (21.0-25.8)	*5-17*	7.15 (3.3-11.1)	5.9 (2.7-9.1)	5.7 (2.6-8.8)	0.2 (0.1-0.3)	18.9 (8.6-29.2)	***42.3 (29.6-55.0)***
5	*60-73*	2.3 (2.1-2.5)	1.4 (1.2-1.5)	22.3 (20.1-24.4)	0.5 (0.4-0.5)	26.4 (23.8-29.0)	*0-10*	3.3 (0-6.5)	2.7 (0-5.2)	2.6 (0-5.2)	0.1 (0-0.1)	8.6 (0-17.2)	***35.0 (23.8-46.2)***
6	*77*	2.7	1.6	25.8	0.5	30.5	*0*	0	0	0	0	0	***30.5***

Soil Disturbance from Road Construction Across Alternatives Table

Acres of altered soil conditions from potential new permanent road construction, temporary road construction, existing legacy disturbance, and potential temporary road decommissioning within the Siuslaw HLB Landscape Plan analysis area per decade.

Activity	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
New Permanent Road Construction (Lands Converted from HLB to District Designated Reserve – Road Infrastructure. Not included in Detrimental Soil Disturbance Totals)	0	204	162	142	138	184
New Temporary Road Construction	0	435	209	89	52	30
Disturbance from Historic Activities (Legacy roads, trails, and isolated compaction)	84	25	19	16	12	9
Total Assessment Area	13225	3889	2994	2583	1917	1470
Soil Restoration from Temporary Road Decommissioning	*0*	*227*	*105*	*45*	*26*	*15*

5.4.2 Special Status Wildlife Species

The following tables list the habitat associations for Special Status Species (Wildlife only), their presence in the project area and impacts of the project on populations. Special Status Species include wildlife species that are documented or suspected on the Siuslaw Field Office and

- Are listed or proposed for listing under the Endangered Species Act;
- Have special management direction in the RMP;
- Are BLM Sensitive Species (USDI Bureau of Land Management, 2021);
- Are US Fish and Wildlife Service Focal Species (USDI Fish and Wildlife Service, 2015) or Birds of Conservation Concern (USDI Fish and Wildlife Service, 2021) and/or
- Are Partners in Flight Species of Continental Concern for Western Forests (Rosenberg, et al., 2016).

Table D-5.4.2- 1 Species listed or proposed for listing under the Endangered Species Act (ESA) that are Documented or Suspected on the Siuslaw Field Office.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags/Cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Fender's blue butterfly *(Plebejus icarioides fenderi)*	FE	Yes	1													***Documented:*** Obligate association with Kincaid's Lupine. Meadow/prairie/grassland/oak savanna habitats.	Unlikely. Habitat unlikely in HLB stands.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags/Cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Marbled murrelet *(Brachyramphus marmoratus)*	FT	Yes					2	1							2	***Documented:*** Marbled murrelet suitable habitat is at least one giant tree with suitable nesting structure that is surrounded by buffer habitat within 100 yards and within 50 miles of the ocean; most nests are within 35 miles of the ocean. Marbled murrelet nesting structure includes the following conditions: average tree size 65" DBH, average platform size 11"x 20", and overhead cover within three feet averages 80% cover (USDI Fish and Wildlife Service, 1997, pp. 35, 37-38). Live vegetation creating this overhead cover requires light. Suitable nesting structure is usually in somewhat open-grown trees because they have conditions needed to grow limbs or epicormic branches big enough to support large platforms with overhead cover. Average canopy closure in forests near nesting structure in Oregon is 43%, with one standard deviation ranging from 27-70% (USDI Fish and Wildlife Service, 1997, p. 34).	Likely. Loss of habitat from HLB EA was analyzed in the PRMP/FEIS, to which this EA tiers (USDI Bureau of Land Management, 2016, pp. 895-918, 1715-1730). In the first decade, the RMP would reduce high-quality habitat by 1%. However, sufficient high-quality habitat would develop by the second decade to surpass current amounts. See Issue Not Analyzed in Detail pertaining to marbled murrelet habitat.
Northern spotted owl *(Strix occidentalis caurina)*	FT	Yes		1			2	1				1			1	***Documented:*** Mature-late successional forest with nesting structure; especially large cavities, canopy layers, large dead wood.	Likely. Loss of habitat from HLB EA was analyzed in the PRMP/FEIS, to which this EA tiers (USDI Bureau of Land Management, 2016, pp. 928-998, 1737-1792). Large blocks of habitat would increase under the RMP in 50 years (i.e., by 2063). Connectivity between these blocks would also improve under the RMP. See Issues Not Analyzed in Detail pertaining to spotted owl habitat.
Oregon silverspot butterfly *(Speyeria zerene hippolyta)*	FT	Yes	1											1		***Suspected***: Occupies 3 types of grassland habitat: 1) marine terrace and coastal headland salt-spray meadows, 2) stabilized dunes, 3) montane grasslands. Current sites restricted to immediate coast, centered around salt-spray meadows, or within a few miles of the coastline in similar meadow-type habitat. Needs the early blue violet to reproduce (USDI Fish and Wildlife Service, 2019).	Unlikely. Known range is outside of HLB units. Therefore, this project is unlikely to impact Oregon Silverspot butterflies.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags/Cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Pacific marten (Coastal Oregon & California DPS) *(Martes caurina)*	FT	Yes		1	2	2	1	1			2	1			2	***Suspected***: Coastal martens are native to forests of coastal Oregon and coastal California. They occur in older forests but can also be found in younger forests with a significantly dense understory component that provides shelter and prey, such as in the coastal shore pine forests in and near the Oregon Dunes National Recreation Area (USDI Fish and Wildlife Service, n.d.). The Central Oregon population is known to occur within about 0.3 miles of the Pacific Ocean in the Oregon Dunes Recreational Area, managed by the Siuslaw National Forest (USDI Fish and Wildlife Service, 2018, p. 84).	Possible but unlikely. Within historic range, but HLB units are not within known current range of Pacific Marten[41]. The closest HLB unit to the Central Coastal Oregon population is about 4.4 miles from the Pacific Ocean. Therefore, this project is unlikely to impact Pacific Martens. See Issue 5.2.8.12 for further details.
Streaked horned lark *(Eremophila alpestris strigata)*	FT	Yes	1	2												***Documented:*** Prairies, dunes, beaches, pastures; areas with low grassy vegetation.	Unlikely. Habitat not likely in the project area. Therefore, this project is unlikely to impact streaked horned larks.
Taylor's checkerspot butterfly *(Euphydryas editha taylori)*	FE	Yes	1	1						2						***Suspected***: Grassland habitat dominated by fescue or other short-stature grasses, with an abundance of larval host plants and adult nectar sourced. In Oregon, historically occupied grassland and grass/oak woodland sites or southwest-facing open grassy meadows surrounded by trees. (Jordan, 2012).	Unlikely. Known populations not in HLB units and not likely to occur in the project area. Therefore, this project is unlikely to impact this species.
# of TE species use as PRIMARY habitat			**4**	**3**	**0**	**0**	**1**	**3**	**0**	**0**	**0**	**2**	**0**	**1**	**1**		
# of TE species use as SECONDARY habitat			**0**	**1**	**1**	**1**	**2**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**2**		

* 'C = Candidate FE = Federally Endangered FPT = Federally Proposed Threatened FT = Federally Threatened

** Pacific Fisher West Coast DPS in Oregon was not warranted for listing (Federal Register Vol. 85, No. 95, p. 29532). However, it is still on the 2019 OR/WA BLM Special Status Species List (USDI Bureau of Land Management, 2019), so it is included in this table.

[41] There is one record of a Pacific Marten on the northern border of the Siuslaw Field Office in GeoBOB (internal BLM GIS database). This was a sighting provided by a member of the public. A visual observation of an apparent Pacific marten was made by the public on 9/20/2020. Reliability of the observation was fair (i.e., there is some uncertainty that the identification is correct). Subsequent carnivore camera traps showed no evidence of Pacific marten in the area.

Table D-5.4.2- 2. Species on the Siuslaw Field Office with Management Direction in the Northwest and Coastal Oregon RMP, but not listed under the Endangered Species Act. Some are also BLM Sensitive Species (USDI Bureau of Land Management, 2021).

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Bald eagle *(Haliaeetus leucocephalus)*	SEN, BGEPA	Yes	1				2	2				2			1	***Documented:*** Nest and roost in large trees, late-successional forest stands within 1 mile of lakes, rivers, and large streams. Nest site selection varies widely, in deciduous, coniferous, and mixed-forest stands. Nest trees are usually large diameter trees characterized by open branching and stout limbs. Communal roost sites contain large trees with stout lower horizontal branches for perching located close to foraging areas. Most roost areas on the Eugene District are known. Usually associated with large bodies of water but can occur in any open habitat with available prey. Primarily nests in forested areas near the ocean, along rivers, and at estuaries, lakes, and reservoirs. Oregon nests were within 1 mile of water (Isaacs & Anthony, 2003). When not breeding, may congregate where food is abundant, even away from water.	Likely. If present in the project area, required protection measures will be applied (USDI - Bureau of Land Management, 2016a, p. 96). Project is not likely to cause a trend toward listing.
Fringed myotis *(Myotis thysanodes)*	SEN	Yes	1	1			2	2	1	1		2			1	***Documented:*** Crevice dweller associated with large snags and live trees, abandoned buildings, mines, caves, and some bridges. Forage in openings and late or mid-successional forests.	Likely. Habitat may be present. Under the RMP, known maternity colonies and hibernacula within caves, abandoned mines, bridges, and buildings would be protected (USDI - Bureau of Land Management, 2016a, p. 96). Since the HLB on the Siuslaw Field Office is only about 8 percent of the Field Office, this project may remove habitat for fringed myotis, but is not likely to cause a trend toward listing.
Golden eagle *(Aquila chrysaetos)*	BGEPA	Yes	1	1	2	2	2	1		1						***Documented:*** Nests in large trees, cliffs, rock outcrops.***:*** Inhabits shrub-steppe, grassland, juniper, open ponderosa pine, and mixed conifer/deciduous habitats. Year round resident east of Cascades. Irregularly observed in winter in northwest Oregon (Carey, 2003, p. 161).	Likely. If present in the project area, required protection measures will be applied (USDI - Bureau of Land Management, 2016a, p. 96). Project is not likely to cause a trend toward listing.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Oregon red tree vole *(Arborimus longicaudus)*	SEN	Yes				2	1	1								***Documented:*** Arboreal inhabitant of mid to late-successional coniferous or mixed deciduous/coniferous forests. Nests in Douglas -firs containing substrates that provide platforms (e.g., large limbs, epicormic branches, mistletoe growths, broken topped trees, etc.) for nest construction. Feeds on conifer needles. Seldom leaves canopy.	Likely. Loss of habitat from HLB EA was analyzed in the PRMP/FEIS, to which this EA tiers (USDI Bureau of Land Management, 2016b, pp. 928-998, 1737-1792). Large blocks of habitat would increase under the RMP in 50 years (i.e., by 2063). Connectivity between these blocks would also improve under the RMP. See Issues Not Analyzed in Detail pertaining to spotted owl habitat. Project is south of Highway 20 and is not likely to cause a trend toward listing.
Pallid bat *(Antrozous pallidus)*	SEN	Yes	1	1	1	2	2	2	1	1		1	2		1	***Suspected:*** Associated with desert areas in Oregon. West of Cascades restricted to drier interior valleys of the southern portion of state. In Lane County it occurs at low elevations and along the valley floor. Usually found in brushy and rocky terrain but has been observed along the edges of coniferous and deciduous woods and open farmlands. They also occur in oak woodlands (Weber, 2009). Crevice dweller associated with rock crevices, snags, large hollow trees, and human structures. Roosts in caves, mines, bridges, buildings, hollow trees, or snags.	Possible. Habitat may be present. Since the HLB on the Siuslaw Field Office is only about 8 percent of the Field Office, this project may remove habitat for individual pallid bats, but is not likely to cause a trend toward listing for the species.
Townsend's big-eared bat *(Corynorhinus townsendii)*	SEN	Yes		2	1	2			1						2	***Suspected:*** Roosts in mines, caves, tree cavities, and building attics. Forages in a variety of habitats.	Possible. Habitat (i.e., trees with cavities) may be present. Since the HLB on the Siuslaw Field Office is only about 8 percent of the Field Office, this project may remove habitat for Townsend's big-eared bats, but is not likely to cause a trend toward listing.
# Species with special management direction in the RMP– use as PRIMARY habitat			4	3	2	0	1	2	3	3	0	1	0	0	3		
# Species with special management direction in the RMP– use as SECONDARY habitat			0	1	1	4	4	3	0	0	0	2	1	0	1		
* SEN = Sensitive Species (BLM) (USDI Bureau of Land Management, 2021) BGEA = Species under the Bald and Golden Eagle Protection Act (USDI Fish and Wildlife Service, 2020)																	

Table D-5.4.2- 3. BLM Sensitive Species (USDI Bureau of Land Management, 2021), not listed above, that are Suspected or Documented on the Siuslaw Field Office, Northwest Oregon District.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
A water flea *(Dumontia oregonensis)*	SEN	No	1												1	***Suspected:*** Associated with shallow ephemeral vernal pools, native wet prairies, seasonally wet meadows, managed agricultural fields, and desert pools that fill with water in early winter and dry out by late winter. This species requires a rare habitat (primarily vernal pools) that exhibits temporary cycles. Found in several native wet prairie habitat types in the Willamette Valley (Hietala-Henschell & Blevins, Species Index, 2018, pp. 3-4).	Possible. Riparian and perennial wet areas would be buffered. However, isolated vernal pools could be removed in the HLB. This could impact individuals but is not likely to cause a trend toward listing.
Aleutian Canada goose *(Branta hutchinsii leucopareia)*	SEN	Yes	1												1	***Suspected:*** Winter resident only. Inhabits coastal grasslands, pasture, harvested agricultural fields, and marshes. Small numbers occasionally appear in the Willamette Valley, especially during migration (USDI Fish and Wildlife Service, 2001, p. 15644).	Unlikely. HLB would not occur in habitat for these geese. No impact.
Black Swift *(Cypseloides niger)*	SEN	Yes	2	2	2	2	2	2	1	1					1	***Suspected:*** Strongly associated with waterfalls in mountainous areas. Nest in canyon walls near water, sheltered by overhanging rock or moss, preferably near waterfalls or on sea cliffs. Factors for nest location appear to be temperature moderation from dripping water, little solar exposure, and high humidity to help attach nesting material to substrate. Forage on the wing for insects over forests and open areas, often at great heights.	Unlikely. If present, it would be in riparian zones, which are not treated under this EA. No impact.
Bufflehead *(Bucephala albeola)*	SEN	Yes										1		1	1	***Suspected***: Nests in flicker/pileated woodpecker cavities near ponds and small lakes. In Oregon, breeding habitat is primarily in the Cascade Mountains (Gauthier, 2014) or east of the Cascades (Scheuering, Bufflehead, 2003, pp. 124-125). Typically nests at high-elevation forested lakes in the central Cascades, using cavities or artificial nest boxes in trees close to water. In migration and winter, Buffleheads use sheltered freshwater lakes, freshwater ponds, sewage ponds, slow-moving rivers, estuaries, bays, and backwaters (Scheuering, Bufflehead, 2003, p. 125).	Possible, migrant. Trees with cavities could be removed in the HLB. This could impact individuals but is not likely to cause a trend toward listing for the species.
California brown pelican *(Pelecanus occidentalis californicus)*	SEN	Yes												1	1	***Suspected:*** A coastal marine species that rarely occurs inland or far offshore. Several records for the Willamette Valley north of Salem from 1977 to 2001 (Nehls, 2003, p. 53).	Unlikely. Habitat is not present in HLB stands. No impact.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Coastal greenish blue butterfly (*Plebejus saepiolus littoralis)*	SEN	Yes	1											1	1	***Suspected:*** Suspected based on proximity to known sites (on Siuslaw National Forest) and availability of the known host plant *(Trifolium wormskioldii).* Found in cool mountain meadows wherever moist seeps and clovers occur together. Conifer trees adjacent to meadows can serve as important shelter and windbreaks. Larvae depend on clovers, particularly springbank clover (*Trifolium wormskioldii*) (Fallon, Species Index, 2017, p. 5).	Possible. Impacts to individuals could occur if conifer trees adjacent to meadows are removed. Since there are few meadows on the Field Office, this would impact some individuals but is not likely to cause a trend toward listing for the species.
Dusky Canada goose *(Branta canadensis occidentalis)*	SEN	Yes	1												1	***Documented:*** Winters almost exclusively in the Willamette Valley. Wintering habitat consists of sanctuary in an agricultural environment that provides food; also found on lakes, reservoirs, and large rivers. Strong preference for succulent tips of young grasses and grass-like plants (Jarvis, 2003, pp. 83-84).	Unlikely. Habitat is not present in HLB stands. No impact.
Fisher (West Coast DPS)** (Pekania pennanti)	SEN	Yes		1		2	1	1		2	1	1	1		2	***Documented***: Fishers prefer large areas of dense mature coniferous or mixed forest and are solitary animals. They are mainly nocturnal but may be active during the day. They travel many miles along ridges in search of prey, seeking shelter in hollow trees, logs, rock crevices, and dens of other animals. Fishers eat snowshoe hares, rabbits, rodents, and birds, and are one of the few specialized predators of porcupines. Fishers are effective hunters, but are also known to eat insects, nuts, and berries when prey is not available (USDI Fish and Wildlife Service, 2019).	Possible, but unlikely. [42] Project is not within the known occupied range of this species (USDI - BLM, 2016b, pp. 872, Figure 3-159) (USDI Fish and Wildlife Service, 2016, pp. 37, Figure 7). Known occupied range in Oregon is in the Klamath-Siskiyou mountains in southern Oregon and the southeastern Cascade Range. See 5.2.8.11. for further details.

[42] While it is unlikely that fisher occur on the Siuslaw FO (as shown in the PRMP/FEIS, p. 872, Figure 3-159), the Reserve land use allocations have 97% of denning habitat and 90% of resting habitat on the Siuslaw FO. Only 1% of denning habitat and 9% of resting habitat is found in the HLB land use allocation. Therefore, they would have sufficient habitat in the Reserve land use allocations in large blocks of habitat. (An expanded analysis is found in the HLB EA Wildlife Report, pp. 24-26).

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Foothill yellow-legged frog *(Rana boylii)*	SEN	Yes	2	2											1	***Documented:*** A stream-breeding frog, often associated with larger streams that have coarse substrates. However, they have also been found in smaller tributaries and in areas with finer substrates or bedrock (Olson & Davis, 2009, pp. 3, 40).	Unlikely. Not within range of known existing sites, but within estimated historic range. Could occur within riparian areas, which would not be treated under this EA. Yarding could occur across some perennial streams. Prescribed burning may be allowed to back into riparian reserves. These actions may impact individuals but are not likely to cause a trend toward listing for the species.
Grasshopper sparrow *(Ammodramus savannarum)*	SEN	Yes	1													***Documented:*** In Oregon, occurrence is restricted to grasslands. Rarely in habitats with abundant woody shrubs. In the Willamette Valley they frequent lightly grazed pastures with scattered shrubs. Construct domed nests on the ground concealed under vegetation (Janes S. W., 2003, p. 553). Verified in the West Eugene Wetlands.	Unlikely. HLB is not located in grasshopper sparrow habitat. No impact.
Gray wolf *(Canis lupus)*	SEN	Yes				2	1	1							1	***Documented:*** Habitat generalist. They persist where wild ungulate populations are adequate to provide prey and conflicts with humans are low. High road densities make areas less suitable for wolf occupancy (USDI Bureau of Land Management, 2016b, p. 892). ODFW areas of known wolf activity as of December 2020 does not include the Siuslaw Field Office (Oregon Department of Fish and Wildlife, 2020)	Unlikely. If wolves move in, seasonal restrictions would be applied per the RMP to avoid disruption of active dens (USDI - Bureau of Land Management, 2016a, p. 97).
Haddock's Rhyacophilan caddisfly *(Rhyacophila haddoki))*	SEN	Yes													1	***Documented:*** Primitive, free-living caddisfly that lives in cool, perennial streams and seeps in forested areas. It's a regional endemic that occurs in the Coast Range. Documented on Marys Peak FO (USDA Forest Service and USDI Bureau of Land Management, 2017, p. 6).	Possible. Riparian and perennial wet areas would be buffered, so the effect to this species, if present, is minimal.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Johnson's hairstreak butterfly *(Callophrys johnsoni)*	SEN	Yes				2	1	1								***Documented:*** Depend on coniferous forests that contain dwarf mistletoes of the genus *Arceuthobium.* Documented host mistletoes occur on western hemlock, Brewer's spruce, true firs, and pines. Throughout much of the Oregon range, it is a late-successional associated species (Fallon & Black, Species Index - Callophrys johnsoni, Johnson's hairstreak , 2017, pp. 24-26)	Likely. Likely in stands in the HLB that have dwarf mistletoe (*Arceuthobium*). Harvest would affect individuals but is not likely to cause a trend toward listing for the species because about 86 percent of the Field Office is in Late Successional Reserves or Riparian Reserves.
Lewis's woodpecker *(Melanerpes lewis)*	SEN	Yes	2	1	1		2	2			1	1				***Documented:*** Associated with open woodland habitat. Primarily breeds in Oregon white oak, ponderosa pine, and cottonwood communities. Winters in oak savannah (Galen, 2003, p. 351).	Possible. Only two sightings of Lewis's woodpecker on the Siuslaw Field Office within past 15 years. Oak habitat may be present in the HLB. If habitat is removed, it may impact individuals, but is not likely to cause a trend toward listing for the species because oaks in the HLB would be retained under all alternatives.
Mardon skipper *(Polites mardon)*	SEN	Yes	1													***Suspected:*** Grasslands or meadows. Possible in the Willamette Valley or the Cascades.	Unlikely. Habitat that would be treated is not present in the HLB.
Monarch butterfly *(Danaus plexippus)*	SEN	No	1	1											1	***Documented:*** Adult monarch butterflies feed on nectar from a wide variety of flowers. Reproduction is dependent on the presence of milkweed, the sole food source for larvae (USDI Fish and Wildlife Service, 2020, p. 81814); Primary threats include loss and degradation of habitat from conversion of grasslands to agriculture, widespread use of herbicides, exposure to insecticides, and climate change. Reductions in milkweed is cited as a key driver in monarch declines (USDI Fish and Wildlife Service, 2020, p. 36). In western North America, nectar and milkweed resources are often associated with riparian corridors (US Fish and Wildlife Service, 2020, pp. 9-10).	Possible. Nectar plants may be present in HLB that would be treated. Riparian Reserves would not be treated. Beneficial effects from habitat modification which creates early successional habitat with abundant nectar sources.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Oregon vesper sparrow *(Pooecetes gramineus affinis)*	SEN	Yes	1	2												***Documented:*** In the Willamette Valley, it is rare to locally uncommon in pastures and open foothills in the southern valley and Christmas tree farms. In the Willamette Valley primarily associated with lightly grazed pastures with scattered shrubs or Christmas tree farms, particularly young farms 2-5 year post-planting, if extensive grasses and weeds are present (Altman, Vesper Sparrow, 2003, p. 543). One documented observation near West Eugene Wetlands.	Unlikely. Habitat that would be treated is not present in HLB. Beneficial effects from habitat modification which creates early successional habitat.
Purple martin *(Progne subis)*	SEN	Yes	1	1	2							1			1	***Documented:*** Snags and trees with suitable nest cavities, typically in openings and burned areas. Commonly associated with rivers, marshes, and open water, especially when snags are present for nesting. Purple martins are aerial feeders and need large openings (at least 20 feet from live trees) to forage (Horvath, 2003, p. 429). Also associated with oak habitats (Williams, 2002). Uncommon local summer resident, principally inhabiting the Coast Range and Willamette Valley. On the Siuslaw Field Office there are 68 documented sightings of this species between 2006 and 2016, in various locations on the Field Office.	Possible, especially in oak woodlands with openings. Beneficial effects from residual snags left in large openings after regeneration harvest.
Siskiyou short-horned grasshopper *(Chloealtis aspasma)*	SEN	Yes	1													***Suspected:*** Occurs in forest meadows and balds and along the edge of forests next to mountain meadows that have short grass and partly bare ground. It appears to be associated with drier upslope habitats along margins of wetlands and forest edges. Has been found in an old, logged clear-cut surrounded by mixed conifer forest; the area was littered with slash from an adjacent clear-cut (Hietala-Henschell, Species Index Fauna - Invertebrates, 2017, p. 5).	Unlikely. Habitat would likely be outside of HLB units that would be treated. Logging may impact individuals but would not cause a trend toward listing.
Suckley cuckoo bumble bee *(Bombus suckleyi)*	SEN	No	1	1												***Suspected:*** A few historic observations in the coast range. Three basic habitat requirements: suitable occupied nesting sites for its host (i.e., *Bombus occidentalis*), nectar and pollen from floral resources available throughout the duration of the colony period (spring, summer, and fall), and suitable overwintering sites for the queens (Hatfield, Jepsen, & Jordan, 2017, p. 4). Three source instances of *Bombus occidentalis* (i.e., Western bumblebee) on the Siuslaw Field Office (from ORBIC data only; none in GeoBob). Only one has a minor amount of HLB at the edge of the buffer.	Possible, but unlikely. Beneficial effects from increased number of flowering plants in early successional habitat created by regeneration harvest.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Western bumblebee *(Bombus occidentalis)*	SEN	Yes	1	1												***Suspected:*** This ground-nesting insect is found in diverse habitats with flowering plants that provide nectar and pollen sources throughout the colony's life cycle (early February to late November). Species richness tends to peak in flower-rich meadows of forests and subalpine zones. The amount of pollen available to foragers directly affects the number of new queens that a bumblebee colony can produce, and since queens are the only bumblebees that can form new colonies, pollen availability directly affects the future population size (Jepsen, 2014, pp. 5-6). Voucher specimen were collected on two sites on the Siuslaw Field office (one in 1935, the other in 2006 – from information provided by the Xerces Society), but no other observations on the Siuslaw Field Office are documented in the BLM database (GeoBOB). Neither site is within or adjacent to HLB.	Possible, but unlikely. Within former range and habitat may be present. However, known populations in Oregon are at higher elevations along the Cascade crest. Unlikely that habitat is found in HLB units that would be treated under this EA. Beneficial effects from increased number of flowing plants in early successional habitat created by regeneration harvest.
Western pond turtle *(Actinemys marmorata)*	SEN	Yes	1	1							1				1	***Documented:*** Occurs in rivers, streams, lakes, ponds, reservoirs, stock ponds, and permanent and ephemeral wetland habitats. Favorable pond turtle habitat is characterized by deep, slow-flowing pools with underwater cover and emergent basking sites, warm water, or both (Stone, 2009, p. 9). Terrestrial basking sites include mud banks, rocks, logs, and root wads on the bank that are within or immediately adjacent to the water. Nest on sandy banks near water or in fields or sunny spots up to a few hundred meters from water. Aspect is usually south or west facing and on a slope of 25 degrees or less. Terrestrial overwintering site characteristics are highly variable, but the microsite usually includes a thick duff layer (Stone, 2009, p. 9). On the Siuslaw Field Office, it is most abundant in the drainages of the Willamette River, but occurs in lowland aquatic habitats throughout western Oregon (Rosenberg, et al., 2009, p. 31).	Unlikely. Habitat in riparian areas. No treatments would occur in riparian areas under this EA. Yarding could occur across some perennial streams. Prescribed burning may be allowed to back into riparian reserves. These actions may impact individuals, if present, but are not likely to cause a trend toward listing for the species.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Western ridged mussel *(Gonidea angulate)*																***Suspected:*** May be in the Willamette River. Found in fish-bearing, permanently inundated habitat that ranges from perennial rivers to lakes and reservoirs from sea level up to about 5,800 ft (Blevins & Jepsen, 2020, pp. 4, 6).	Unlikely. Habitat in riparian areas. No treatments would occur in riparian areas under this EA. Yarding could occur across some perennial streams. Prescribed burning may be allowed to back into riparian reserves. These actions may impact individuals, if present, but are not likely to cause a trend toward listing for the species
# of SENSITIVE species use as PRIMARY habitat			12	7	1	0	3	3	1	1	3	4	1	3	13		
# of SENSITIVE species use as SECONDARY habitat			3	3	2	4	2	2	0	1	0	0	0	0	1		
* SEN = Sensitive Species (BLM) (USDI Bureau of Land Management, 2019)																	

Table D-5.4.2- 4. US Fish and Wildlife Service Focal Species (USDI Fish and Wildlife Service, 2015) and Birds of Conservation Concern, Northern Pacific Rainforest[43] (USDI Fish and Wildlife Service, 2021) that are documented or suspected on the Siuslaw Field Office.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Black Tern *(Chlidonias niger)*	Focal spp	No													1	***Documented:*** Very small breeding population documented at a few sites in the Willamette Valley. On the Siuslaw Field Office primarily at Fern Ridge Reservoir. Breeding black terns are usually in emergent marshes and flooded meadows, typically associated with hardstem bulrush. Primarily insectivorous, they feed on the wing, flying low over open water (Stern, 2003, p. 285).	Unlikely. Habitat is not present in HLB stands proposed for treatment. Therefore, the project would have no impact on populations of black terns.
California Gull (*Larus californicus)*	BCC	No	2											1	1	***Suspected:*** Fairly open habitat from lakes, ponds, large rivers, flooded fields, garbage dumps, the coastline, and over the ocean (Butler, 2003, p. 264).	Unlikely. Habitat is not present in HLB stands proposed for treatment. Therefore, the project would have no impact on the populations of California gulls.
Clark's Grebe *(Aechmophorus clarkia)*	BCC	No												1	1	***Documented:*** Generally eastern and southern Oregon. Documented in the summer in Fern Ridge Reservoir (Spencer, Clark's Grebe Aechmophorus clarkii, 2003, p. 37). Habitat on fresh water lakes and marshes with extensive areas of open water bordered by emergent vegetation. Overwintering on salt or brackish bays, estuaries or sheltered sea coasts (LaPorte, Storer, & Nuechterlein, 2020);	Unlikely. Habitat is not present in HLB stands proposed for treatment. Therefore, the project would have no impact on the populations of Clark's grebe.

[43] Four Birds of Conservation Concern (Chestnut-backed Chickadee (Northern), Evening Grosbeak, Olive-sided Flycatcher, and Rufous Hummingbird) are listed in Table D-5.4.2- 5, Partners in Flight Species of Continental Concern for Western Forests. They are not duplicated in this table. Two Birds of Conservation Concern (Black Swift and Oregon Vesper Sparrow) are listed in Table D-5.4.2- 3, BLM Sensitive Species and are not duplicated in this table.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Dunlin *(Calidris alpine arcticola)*	Focal spp	No													1	***Documented:*** In the Willamette Valley, birds are found roosting in flooded rice fields, sewage ponds, and managed impoundments. Feeding birds are seen in flooded parts of bare to newly planted fields (especially grass fields), and can occur in large numbers at permanent and seasonal wetlands. Little is known about the diet of Dunlin in Oregon. (Warnock, 2003, p. 243).	Unlikely. Habitat is not present in HLB stands proposed for treatment. Therefore, the project would have no impact on populations of Dunlin.
Grasshopper Sparrow *(Ammodramus savannarum)*	Focal spp	Yes	1													***Documented***: Habitat is grasslands and grainfields in relatively dry habitats. In Oregon, their distribution is restricted to grasslands. In the Willamette Valley, they frequent lightly grazed pastures with scattered shrubs. Documented at Fern Ridge Reservoir. Information on diet of grasshopper sparrows in Oregon is not available. Elsewhere they feed on both seeds and insects, usually gleaned from the ground (Janes S. W., 2003, p. 553).	Unlikely. Grasslands are not present in HLB stands proposed for treatment. Possible beneficial effect from an increase in early successional grass/forb habitat after harvest.
Greater Scaup *(Aythya manrila)*	Focal spp	No													1	***Documented:*** Locally common on reservoirs near Eugene. Greater Scaup uses large lakes, reservoirs, rivers, estuaries, and bays during migration. They feed on both animal and plant life, but small clams are the most common item in most areas (Martinson, Greater Scaup, 2003, p. 113).	Unlikely. Habitat is not present in HLB stands proposed for treatment. Therefore, the project would have no impact on populations of Greater Scaup.
Lesser Yellowlegs (*Tringa flavipes*)	BCC	No													1	***Documented:*** Documented at Fern Ridge Reservoir. Habitat is shallow ponds, water near mudflats or in seasonally flooded fields, small, isolated ponds (Contreras, 2003, p. 215). Migrant in Oregon (Tibbitts & Moskoff, 2020).	Unlikely. Habitat is not present in HLB stands proposed for treatment. Therefore, the project would have no impact on populations of Lesser Yellowlegs.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Marbled Godwit *(Limosa fedoa)*	BCC	No													1	***Documented:*** Regular spring and fall migrant on the Oregon coast; irregular in winter, mainly from Coos Bay southward. Rare and irregular spring and fall migrant in the Willamette Valley. Counts in the Willamette Valley consist of single birds in April and May. Migrants and wintering birds in Oregon prefer coastal mudflats, sandy ocean beaches, wet margins of large reservoirs or brackish lakes, and sewage ponds. May forage on coastal golf courses in spring (McGie, Marbled Godwit, 2003, p. 227).	Unlikely. Habitat is not present in HLB stands proposed for treatment. Therefore, the project would have no impact on populations of Marbled Godwits.
Northern Pintail *(Anas acuta)*	Focal spp	No													1	***Documented:*** Migration and wintering habitat includes open, shallow wetlands, flooded agricultural fields, and coastal estuaries. Pintails are largely vegetarian, feeding on marsh plant seeds and waste grain and rice (Martinson, Northern Pintail, 2003, p. 104).	Unlikely. Habitat is not present in HLB stands proposed for treatment. Therefore, the project would have no impact on populations of Northern Pintails.
Red Knot *(Calidris canutu roselaari)*	BCC (non-breeding)	No													1	***Possible:*** In Oregon, primarily found on the coast, where they are regular transients in spring and fall. Casual in summer and occasional in winter along the Oregon coast. Casual in spring and fall in the Willamette Valley. Forage on open estuarine tide flats. Inland on margins of sewage ponds and at large brackish lakes. Rarely found on margins of large freshwater lakes or reservoirs (McGie, Red Knot, 2003, p. 232).	Unlikely. Habitat is not present in HLB stands proposed for treatment. Therefore, the project would have no impact on populations of Red Knots.
Tufted Puffin (*Fratercula cirrhata*)	BCC	No												1		***Documented:*** Yaquina Head, Cape Meares, Cape Lookout, Cape Foulweather along the Oregon Coast (Hodder, 2003, p. 298).	Unlikely. Habitat is not present in HLB stands proposed for treatment. Therefore, the project would have no impact on populations of Tufted Puffin.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Varied Thrush (*Ixoreus naevius*)	BCC	Yes		1	2			2							1	***Documented:*** Fairly common winter resident in low-elevation forests and woodlands; regularly found in orchards and suburban back yards. Common in winter in the southern Willamette Valley. Wintering habitat includes riparian habitats, orchards, urban parks, suburban gardens. Winter resident in white oak woodlands in the Willamette Valley. (Hagar J. C., Varied Thrus Ixoreus naevius, 2003).	Possible Habitat may be present in HLB. May impact individuals but is not likely to cause a trend toward listing for the species. Possible beneficial effect from an increase in early successional habitat with fruiting shrubs and berries after harvest.
Vaux's Swift (*Chaetura vauxi*)	BCC	Yes					1	1				1				***Documented:*** Transient and summer resident nesting in older forests and brick chimneys. Occurs in late seral stages of coniferous and deciduous forests and in urban areas. Large-diameter hollow trees (live or dead) are used for nest and roost sites (Bull, 2003, p. 337).	Likely Habitat (large hollow snags) may be present in HLB. Snags could be protected from harvest (depending on selected alternative). May impact individuals but is not likely to cause a trend toward listing for the species.
Western Grebe (*Aechmophorus occidentalis*)	BCC	No													1	***Documented:*** Common breeder in eastern Oregon, especially at large lakes and marshes with open water. In winter most common in coastal bays, on the ocean near shore and in Columbia River estuary. Small numbers winter in the Willamette Valley (Spencer, Western Grebe, 2003, p. 35).	Unlikely. Habitat is not present in HLB stands proposed for treatment. Therefore, the project would have no impact on populations of Western Grebes.
Western Screech Owl (*Megascops kennicottii*)	BCC	No					1	1							1	***Documented:*** Fairly common year-round resident in lower elevation woodlands below 3,000 ft elevation in western Oregon. Prefers forest edges and riparian woodland habitats – especially those with older deciduous trees – adjacent to open pastures or fields and farms. Common in woodlots, orchards, and farms (Scheuering & McAtee, Western Screech-Owl Otus kennicotti, 2003, p. 311).	Likely. Habitat in woodlands may be present in HLB. Oaks will be protected under all alternatives. Other deciduous trees are protected under some alternatives. May impact individuals but is not likely to cause a trend toward listing for the species.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
White-breasted Nuthatch (*Sitta carolinensis*)	BCC	No					1									***Documented:*** Common resident in oak and mixed forests, nut orchards, and suburban plantings in the Willamette Valley region; common to uncommon resident in western Oregon lowlands. Occurs in two main habitat types in Oregon: oak and ponderosa pine. In the Willamette Valley, strongly associated with Oregon white oak. Associated with large-diameter oaks in semi-open woodlands. Nests in live trees; occasionally nest boxes. In the Willamette Valley, individuals use more than one cavity for roosting. Forage mainly on large tree limbs and trunks by gleaning from bark surface or probing into crevices. In white oak habitats of western Oregon, weevils make up a large percentage of year-round diet (Hagar J. , 2003)	Likely. Habitat in woodlands may be present in HLB. Oaks will be protected under all alternatives. Other deciduous trees are protected under some alternatives. May impact individuals but is not likely to cause a trend toward listing for the species.
Wrentit (Chamaea fasciata)	BCC0	No		1	1	1	1	1					1		1	***Documented:*** Generally rare in Coast Range forests. Detected in young, mature, and old-growth forests in the central Coast Range. Rare in young conifer forests and only found in unthinned stands (Hunter M. G., 2003). Breed in habitats that include dense shrub understory, including mature riparian valley oak, Douglas-fir forests, early-successional forests, riparian scrub, blackberry thickets, and suburban parks and larger gardens (Geupel & Ballard, 2020).	Likely. Habitat present in HLB. May impact individuals but is not likely to cause a trend toward listing for the species. Possible beneficial effect from an increase in early successional habitat with fruiting shrubs and berries after harvest.
# of BCC species use as PRIMARY habitat			**1**	**3**	**2**	**2**	**4**	4	**0**	**0**	**0**	**1**	**0**	**3**	**13**		
# of BCC species use as SECONDARY habitat			**1**	**0**	**1**	**0**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**		
BCC = Birds of Conservation Concern (USDI Fish and Wildlife Service, 2008) Focal spp = (USDI Fish and Wildlife Service, 2015)																	

Table D-5.4.2- 5. Partners in Flight Species of Continental Concern for Western Forests (Rosenberg, et al., 2016) that are documented or suspected on the Siuslaw Field Office.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Band-tailed pigeon *(Patagioenas fasciata)*	PIF-SCC	No		1		2	2	2								***Documented***: Common summer resident in forested areas west of the Cascade crest. Typically nests in forested mountain areas (<4,000 ft) in the west Cascades. Most abundant in the Coast Range with abundance increasing from eat to west. Inhabits coniferous forests. Important habitat components: (1) closed canopy forest for nest sites, (2) open canopy forests for foraging, and (3) mineral sites. Nests primarily in Douglas-fir; occasionally in hardwoods and shrubs within closed-canopy conifer forest stands. Diet includes buds, flowers, and fruits of deciduous trees and shrubs, especially oak, madrone, elderberry, cherry cascara, huckleberry, and blackberry (Sanders & Jarvis, 2003, pp. 301-302).	Likely. Beneficial effect from an increase in early successional habitat after harvest. Benefits from an increase in shrubs with berries, such as elderberry, huckleberry, and salmonberry.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Chestnut backed chickadee *(Poecile rufescens)*	PIF-SCC	No		1		2	1	1							1	***Documented:*** Permanent resident along the coast and throughout most of the Coast Range and Cascades in forests dominated by Douglas-fir. Abundant in winter west of the Cascade summit. In conifer forests, most abundant in older forests in Coast and Cascade ranges during the breeding season. Abundance was not affected by thinning in young forests of the Coast Range. Abundance declined in clearcut and two-story stands in the Coast Range, but remained stable in uncut control stands and stands that received small, group-selection cuts. Chickadees were strongly affected by the size of old-forest patches; they were more abundant in large than in small, forested patches. They were more abundant upslope than near steams in the Coast Range. They use old woodpecker cavities or partially excavate their own cavities in decayed wood for nesting. In managed young forests of the Coast Range, chickadees nested exclusively in residual snags from the previous old growth stand. Cavities located in heavily decayed snags where the outer core of the wood was still hard. From (Weikel, 2003, pp. 442-443). Insects and arthropods comprise approximately 65% of their total year-round diet. About 35% of their total diet consists of seeds and plant material (Dahlsten, Brennan, McCallum, & Gaunt, 2002).	Likely. Decline in abundance after regeneration harvest. Abundance not affected by thinning (Weikel, 2003, p. 442). Beneficial effect from an increase in hardwoods and shrubs after harvest.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Evening grossbeak *(Poecile rufescens)*	PIF-SCC	No			1	2	1	1							2	***Documented***. The Evening Grosbeak has experienced the steepest population decline (92% since 1970) of all landbirds in the continental U.S. and Canada. Formerly a favorite at winter feeders, this nomadic species has all but disappeared in the Appalachian Mountains and has suffered heavy declines elsewhere (Partners in Flight, 2020). In summer, found in coniferous forests at mid-to-high elevations. In nonbreeding season, most abundant in the lowlands. Attracted to bigleaf maples during spring incursions into western inland valleys. Consumes seeds from cones of spruce and fir; also seeds and fruits of deciduous trees. Buds of deciduous trees and shrubs also favored (Scheuering, Evening Grosbeak, 2003, pp. 612-613).	Likely. Beneficial effect from an increase in big leaf maple and shrubby early successional habitat after harvest. Benefits from an increase in seeds and berries found in early successional habitat, such as big leaf maple, elderberry, huckleberry, and salmonberry.
Mountain quail *(Oreortyx pictus)*	PIF-SCC	No		1	2											***Documented***. In western Oregon, found in most forested mountainous areas generally above 1,640 ft, but may move to valley bottoms in winter. Low numbers in northwestern Oregon. Generally found in shrub-dominated communities. In western Oregon, associated with early successional vegetation composed of a diverse array of shrubs, often associated with early seral conifer plantations. In fall and spring, they are often observed foraging along logging roads and open, shrubby mountain slopes and ridgetops. They are primarily seed eaters, but consume a variety of greenery, berries, and insects, if available. In the fall, forage on many different plant species, especially legumes (Pope, 2003, p. 187).	Likely. Beneficial effect from the increase in amount of shrubby early successional habitat after harvest.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Olive-sided flycatcher *(Contopus cooperi)*	PIF-SCC	Yes			2		1	1				2				***Documented:*** Breeds in low densities in conifer forests, particularly within forest burns where snags and scattered tall, live trees remain; near water along wooded shores of streams, lakes, rivers, etc. where standing dead trees are present; in the edge habitat between late and early successional forests; and in open or semi-open forest stands with a low percentage of canopy cover. In the Coast Range, more abundant in landscapes containing highly fragmented late-successional forest with high-contrast edges than in less fragmented landscapes (Altman, Olive-sided Flycatcher, 2003, pp. 374-375). Forages on flying insects from high, prominent perches at the top of snags or the dead tip or uppermost branch of a live tree. Foraging requires exposed perches and unobstructed air space; tall trees or snags and broken canopy provide better foraging habitat than closed-canopy forest (Altman, Olive-sided Flycatcher, 2003, p. 375).	Likely. Beneficial effect from snags retained after regeneration harvest and from isolated remnant trees in regeneration harvest units.
Rufous humingbird *(Selasphorus rufus)*	PIF-SCC	Yes	2	1	1	2	2	2							2	***Documented:*** Common transient and breeder throughout most of western Oregon, especially in forested regions. It is found in a wide variety of habitats, though it shows a breeding preference for wooded areas with a fairly high canopy and well-developed understory. In most years, they begin to arrive in western Oregon in mid-February. Feeds on nectar. *From* (Patterson, 2003, p. 347).	Likely. Beneficial effect from an increase in flowering herbs and shrubs in early successional habitat after harvest.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
Sooty grouse *(Dendragapus fuliginosus)*	PIF-SCC	Yes	1	1			1	2								***Documented:*** Breed in forest habitats from sea level to alpine/subalpine most often dominated by Douglas-fir and true firs. Both old-growth forests (where canopy gaps provide sufficient understory vegetation) and early-successional forest habitats resulting from logging and/or fire are occupied. Populations in clearcuts decline as second-growth canopies close. A key component of breeding range appears to be a well-developed herb/grass/shrub stratum (Zwickel & Bendell, 2020). Main foods are vegetable matter (needles, buds, berries) throughout the year. Small juveniles feast on invertebrates. In some areas, grasshoppers may be taken heavily by juveniles and older grouse in mid-summer to early autumn (Zwickel & Bendell, 2020).	Likely. Beneficial effect from an increase in shrubby habitat in early successional habitat after harvest. Increased amount of forest/non-forest mosaic from created openings in thinnings.
Willow Flycatcher *(Empidonax traillii)*	PIF-SCC	Yes	2	1											1	***Documented:*** Breeding habitat characterized by dense shrubs or tall herbaceous plants with scattered openings of shorter herbaceous vegetation. Both riparian and upland habitat used for nesting. Nesting habitat in conifer-dominated forest landscapes occurs in early-successional forest approximately 4-15 years following timber harvest or natural disturbance event that removes most of the forest canopy and allows for extensive growth of a shrub layer. Habitat used for nesting in the Willamette Valley includes both riparian shrub and upland thickets of shrubs, particularly patches of exotic Himalayan blackberry and Scotch broom. The willow flycatcher is an aerial insectivore that feeds primarily on the wing by capturing flying insect prey; it occasionally gleans. Its diet has not been studies in Oregon (Altman, Willow Flycatcher, 2003, p. 379).	Unlikely. Habitat unlikely in HLB stands to be treated. Beneficial effect from an increase in shrubby habitat found in early successional habitat after harvest.

Species	Source of SPECIAL STATUS*	Analyzed in the PRMP/FEIS, pp. 1667-1697	HABITAT ASSOCIATION (primary = 1 or secondary = 2) (Brown, 1985) (Johnson & O'Neil, 2001) (USDA Forest Service & USDI Bureau of Land Management, 2014)													Presence in the Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Populations
			Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes		
# of PIF-SCC species use as PRIMARY habitat			1	6	2	0	4	3	0	0	0	0	0	0	2		
# of PIF-SC species use as SECONDARY habitat			2	0	2	4	2	3	0	0	0	1	0	0	2		
PIF-SCC = Partners in Flight Species of Continental Concern for Western Forests (Rosenberg, et al., 2016)																	

Table D-5.4.2- 6. Summary of the primary habitat association of Special Status Species that are documented or suspected on the Siuslaw Field Office.

	PRIMARY HABITAT ASSOCIATION												
	Grass/Forb	Shrub	Sapling/ Pole	Young Forest	Mature Forest	Old Growth Forest	Caves Burrow	Cliffs Rims	Down Wood	Snags & cavities	Talus	Coastal/ Ocean	Riparian/Lakes
Total all Special Status Species (n=36) showing PRIMARY habitat associations. Species may have multiple primary habitat associations.	22	22	7	2	13	15	4	4	3	8	1	7	32
Percent of the total Special Status Species (n=36) showing PRIMARY habitat associations. Species may have multiple primary habitat associations.	35%	35%	11%	3%	21%	24%	6%	6%	5%	13%	2%	11%	51%

5.4.3 Existing Potential Sediment Delivery

HUC12 Watershed	HUC 12 Natural Background (Tons/Year)	Surface Type	Watershed Road (Miles)		Existing Potential Fine Sediment Delivery (Tons/Year) PRMP/FEIS Table 3-66 pp. 403		Watershed Existing Potential Fine Sediment Delivery (Tons/Mile^2/Year) PRMP/FEIS Table 3-66 pp. 403	
Triangle Lake-Lake Creek	3044	Natural	BLM	Other	BLM	Other	BLM	Other

HUC12 Watershed	HUC 12 Natural Background (Tons/Year)	Surface Type	Watershed Road (Miles)		Existing Potential Fine Sediment Delivery (Tons/Year) PRMP/FEIS Table 3-66 pp. 403		Watershed Existing Potential Fine Sediment Delivery (Tons/Mile^2/Year) PRMP/FEIS Table 3-66 pp. 403	
			5.14	7.92	14.00	29.00	0.37	0.76
		Aggregate	11.99	12.32	42.00	43.00	1.11	1.13
		Bituminous	4.39	6.70	12.00	18.00	0.32	0.47
Green Creek-Lake Creek	2886	Natural	1.70	4.29	6.00	16.00	0.19	0.48
		Aggregate	5.60	22.51	42.00	79.00	1.27	2.39
		Bituminous	0.00	4.22	0.00	11.00	0.00	0.33
Bear Creek-Long Tom River	2291	Natural	0.59	7.63	2.00	28.00	0.04	0.58
		Aggregate	1.31	20.91	5.00	73.00	0.10	1.52
		Bituminous	0.03	20.90	0.00	56.00	0.08	1.17
Elk Creek-Long Tom River	1518	Natural	6.16	3.61	42.00	24.00	1.61	0.92
		Aggregate	4.42	12.00	16.00	41.00	0.62	1.57
		Bituminous	0.11	3.63	0.03	9.78	0.01	0.38
Ferguson Creek-Long Tom River	2050	Natural	0.56	9.65	1.15	25.76	0.03	0.50
		Aggregate	3.29	18.37	12.00	64.49	0.23	1.24

HUC12 Watershed	HUC 12 Natural Background (Tons/Year)	Surface Type	Watershed Road (Miles)		Existing Potential Fine Sediment Delivery (Tons/Year) PRMP/FEIS Table 3-66 pp. 403		Watershed Existing Potential Fine Sediment Delivery (Tons/Mile^2/Year) PRMP/FEIS Table 3-66 pp. 403	
		Bituminous	0.85	12.00	2.29	32.00	0.04	0.62
Fern Ridge Lake-Long Tom River	2913	Natural	0.96	5.67	3.60	21.00	0.05	0.32
		Aggregate	3.21	29.78	9.30	105.00	0.14	1.59
		Bituminous	0.05	23.31	0.00	63.00	0.00	0.95
Headwaters Long Tom River	2120	Natural	1.01	5.30	3.75	19.70	0.12	0.62
		Aggregate	11.22	26.25	39.00	92.00	1.22	2.88
		Bituminous	0.25	10.06	0.67	27.00	0.02	0.84
Lower Coyote Creek	2389	Natural	0.82	8.35	0.56	0.52	0.01	0.52
		Aggregate	2.14	27.18	7.5	1.58	0.13	1.58
		Bituminous	0	29.88	0.00	1.35	0.00	1.35
Spencer Creek	10247	Natural	0.00	2.68	0.00	9.95	0.00	0.30
		Aggregate	0.00	13.15	0.00	81.00	0.00	2.45
		Bituminous	0.00	14.60	0.00	39.00	0.00	1.18
Upper Coyote Creek	224	Natural	2.44	8.52	9.00	32.00	0.26	0.94
		Aggregate	4.21	25.29	15.00	89.00	0.44	2.62
		Bituminous	0.02	27.03	0.00	73.00	0.00	2.15

HUC12 Watershed	HUC 12 Natural Background (Tons/Year)	Surface Type	Watershed Road (Miles)		Existing Potential Fine Sediment Delivery (Tons/Year) PRMP/FEIS Table 3-66 pp. 403		Watershed Existing Potential Fine Sediment Delivery (Tons/Mile^2/Year) PRMP/FEIS Table 3-66 pp. 403	
Hill Creek-Coast Fork Willamette River	1346	Natural	0.61	3.41	2.26	13.00	0.07	0.42
		Aggregate	1.74	21.93	6.10	77.00	0.20	2.48
		Bituminous	0.05	14.21	0.20	40.00	0.00	1.29
Upper Camas Swale Creek	1097	Natural	0.99	4.49	3.70	17.00	0.15	0.71
		Aggregate	3.44	7.84	12.00	28.00	0.50	1.17
		Bituminous	0.19	8.64	0.51	23.00	0.02	0.96
Sring Creek	1160	Natural	0.00	4.17	0.00	15.00	0.00	0.33
		Aggregate	0.00	15.42	0.00	54.00	0.00	1.17
		Bituminous	0.00	12.37	0.00	33.00	0.00	0.72
Lower North Fork Siuslaw River	3050	Natural	1.32	3.51	5.00	12.00	0.17	0.40
		Aggregate	6.23	15.97	22.00	56.00	0.73	1.87
		Bituminous	0.47	13.65	1.26	37.00	0.04	1.23
Silk Creek-Coast Fork Willamette River	1148	Natural	0.32	3.94	1.18	14.60	0.05	0.56
		Aggregate	0.92	15.35	3.23	54.00	0.12	2.08
		Bituminous	0.02	17.12	0.00	46.00	0.00	1.77
Dogwood Creek-Siuslaw River	2654	Natural	5.23	7.98	19.43	30.00	0.61	0.94
		Aggregate	10.61	11.38	37.00	40.00	1.16	1.25

HUC12 Watershed	HUC 12 Natural Background (Tons/Year)	Surface Type	Watershed Road (Miles)		Existing Potential Fine Sediment Delivery (Tons/Year) PRMP/FEIS Table 3-66 pp. 403		Watershed Existing Potential Fine Sediment Delivery (Tons/Mile^2/Year) PRMP/FEIS Table 3-66 pp. 403	
		Bituminous	2.63	6.76	7.00	18.00	0.22	0.56
North Fork Siuslaw River	1568	Natural	1.32	3.51	5.00	13.00	0.25	0.65
		Aggregate	6.23	15.97	22.00	56.00	1.10	2.80
		Bituminous	0.47	13.65	1.26	37.00	0.06	1.85
Siuslaw Falls-Siuslaw River	2247	Natural	8.42	5.56	31.00	21.00	1.15	0.78
		Aggregate	11.84	9.12	42.00	32.00	1.56	1.19
		Bituminous	4.87	6.38	13.00	17.00	0.48	0.63
Whittaker Creek-Siuslaw River	2246	Natural	2.03	4.01	8.00	15.00	0.29	0.54
		Aggregate	2.73	9.13	10.00	32.00	0.36	1.14
		Bituminous	11.42	6.99	31.00	19.00	1.11	0.68
Lower Wildcat Creek	2185	Natural	1.39	5.52	5.00	21.00	0.15	0.64
		Aggregate	4.91	13.12	17.00	46.00	0.52	1.39
		Bituminous	0.04	2.34	0.00	6.00	0.00	0.18
Upper Wildcat Creek	1517	Natural	2.86	5.06	11.00	18.79	0.50	0.85
		Aggregate	5.37	12.79	18.80	45.00	0.85	2.05
		Bituminous	0.05	2.27	0.00	6.00	0.00	0.27
Lower Wolf Creek	3666	Natural	2.38	5.24	9.65	20.00	0.33	0.72

HUC12 Watershed	HUC 12 Natural Background (Tons/Year)	Surface Type	Watershed Road (Miles)		Existing Potential Fine Sediment Delivery (Tons/Year) PRMP/FEIS Table 3-66 pp. 403		Watershed Existing Potential Fine Sediment Delivery (Tons/Mile^2/Year) PRMP/FEIS Table 3-66 pp. 403	
		Aggregate	7.75	26.61	30.00	102.00	1.03	3.52
		Bituminous	0.05	2.28	0.00	6.75	0.00	0.23
Upper Wolf Creek	2090	Natural	4.66	5.76	20.00	25.00	0.65	0.81
		Aggregate	10.30	24.56	43.00	102.00	1.39	3.29
		Bituminous	0.10	8.52	0.32	28.00	0.01	0.90

5.4.4 Special Status Fisheries Species

Species	Source of Special Status	ESA Listed/Date	Analyzed in PRMP/FEIS	Presence in Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Population
Oregon Coast Coho Salmon (Oncorhynchus kisutch)	ESA List "Threatened"	Yes. 2008.	Yes	**Documented.** Found in every HUC Code 12 in the Siuslaw watershed. Not found in Willamette Watershed.	**Likely.** Harvest areas will be adjacent to or upstream from presence and critical habitat in the Siuslaw Watershed. Project design features and BMPs (see, Appendix E; also, Section 5.2.4.1), and consultation with NMFS would minimize potential for negative impacts. For example, all harvest areas in subwatersheds with coho presence or critical habitat will have buffers equal to the site potential tree height.
Upper Willamette River Spring Chinook Salmon (*Oncorhynchus tshawytscha*)	ESA List "Threatened"	Yes. 2005.	Yes	**Documented.** Critical habitat found in mainstem Willamette River. Juvenile presence in lower 2 miles of Long Tom River, but not critical habitat. Adults and juveniles present in Coast Fork Willamette, but not critical habitat.	**Unlikely.** Harvest areas would typically be several miles from presence and more than 10 miles from critical habitat in Willamette watershed.

Species	Source of Special Status	ESA Listed/Date	Analyzed in PRMP/FEIS	Presence in Siuslaw Field Office and Habitat Associations	Presence in Project Area and Impacts of Project on Population
Oregon Coast Spring Chinook Salmon (*Oncorhynchus tshawytscha*)	ESA List "Candidate"	Candidate, status under review by NMFS initiated 2020.	No	**Possible.** Spring Chinook were historically found in the mainstem Siuslaw River. It is unknown if Spring Chinook are currently present in Siuslaw Watershed currently. If they are present, there are very few. Oregon Coast Spring Chinook are not found in Willamette watershed.	**Unlikely.** Not known if any streams in Siuslaw Watershed would be considered critical habitat. Project design feature and BMPs (see, Appendix E; also, Section 5.2.4.1), and consultation with NMFS (if ESA listed) would minimize potential for negative impacts.
Pacific Lamprey (*Entosphenus tridentatus*)	BLM/USFS	No. N/A	Yes	**Documented.** Found in every HUC Code 12 in the Siuslaw watershed. Found in Willamette watershed below large dams.	**Likely.** Harvest areas would be adjacent to or upstream from presence in the Siuslaw Watershed. Harvest areas would be upstream from presence in the Willamette. Project design features and BMPs (see, Appendix E; also, Section 5.2.4.1), and consultation with NMFS would minimize potential for negative impacts.
Oregon Coast Steelhead Trout (*Oncorhynchus mykiss*)	BLM/USFS	No. N/A	Yes	**Documented.** Found in every HUC Code 12 in the Siuslaw watershed. Not found in Willamette Watershed.	**Likely.** Harvest areas would be adjacent (with site-potential tree height buffer) to or upstream from presence in the Siuslaw Watershed. Project design features and BMPs (see, Appendix E; also, Section 5.2.4.1), and consultation with NMFS would minimize potential for negative impacts.

5.5 Appendix E – Project Design Features (PDF's)

5.5.1 PDFs from the Interdisciplinary Team

Project Design Features	*Resources*
● The Authorized Officer would ensure that all logging and road equipment is cleaned prior to arrival on BLM managed lands to reduce the spread of invasive plant species. Remove soil, plant parts, and seed. ● Survey proposed project areas for Special Status vascular plants, lichens, and bryophytes prior to project design. ● Create project design features to provide for the management of Bureau Special Status botanical species on a project and species specific basis. ● Project areas would be evaluated using BLM Manual 9015 for invasive plant species risk assessment, based on site conditions. Depending on assessment outcomes and field office weed treatment priorities, BLM would treat weed species prior to project activity and monitor for at least three to five consecutive years after timber sale completion, controlling infestations of invasive plant species. ● The BLM would sow native grass species for invasive weed exclusion on decompacted roads and other areas of exposed soil, as appropriate, after operations have been completed. ● The BLM would avoid placement of logging slash on closed roads in cases where it would inhibit ongoing weed control efforts. ● Weed free gravel or aggregate used for road construction, improvement and renovation would be recently crushed rock from active quarry sites, or from sites inspected by BLM personnel and found to be weed free, or from gravel sources certified as weed free by Oregon Department of Agriculture (ODA) Weed Free Forage & Gravel Program. ● Manage mixed hardwood/conifer communities to maintain and enhance oak and ponderosa pine persistence and structure by removing competing conifers, reserving oak and pine trees in timber sales, minimizing damage to oak and pine trees, and refraining from planting competing conifers.	***Vegetation, Soil, Invasive Species***
● Should potential cultural resources be revealed during project implementation, all project related activities in the vicinity of the find would cease, and the District Archaeologist shall be notified to evaluate the discovery. The consultation process, as outlined in Section 800.13 of the Advisory Council on Historic Preservation's regulation 36 CFR 800 would be initiated to ensure no adverse impact on cultural resources.	***Cultural***
● Suspend wet-weather haul where the road surface is deteriorating due to vehicular rutting or standing water if it cannot be mitigated, or where turbid runoff is likely to reach stream channels. ● During wet-weather haul, maintain road surface shape to decrease the likelihood of flow concentration on the road surface. ● Additional cross drain and stream crossing culverts would be added before haul occurs on roads to reduce sediment delivery. ● Design stream crossings to follow regulatory guideline OAR 340-041-0028. Road construction over a perennial stream would result in a ≤ 0.3 degree Celsius increase in stream temperature under the criteria set by the Williamette and MidCoast TMDLs OAR 340-041-0028 rule (A) and rule (B). (JT 1) ● To protect domestic water sources, project treatments would be adjusted within 100 feet of a well or 200 feet of a spring or known diversion used as a domestic water source, unless a written waiver is granted by the user or owner, to have no impact on that source. ● The BLM would identify and protect all sensitive soils (e.g., Hydric soils or mass wasting prone areas) prior to project implementation. ● Follow Oregon Department of Forestry landslide hazard assessment and activity limitations for steep slopes within the Tyee geologic formation (Forestry, Forest Practices Technical Note 2: High Landslide Hazard Locations, Shallow, Rapidly Moving Landslides and Public Safety: Screening and Practices, 2003)	***Vegetation, Soil, Water, Fish***
● Minimize the amount of surface fuel loading from harvest activities. To minimize fire hazard and facilitate reforestation, slash remaining after slash disposal treatments should not exceed 6 to 18 inches in depth. Treatment recommendations would be based on a fuels assessment completed by the Fuels Specialist, in consultation with affected specialists. ● Provide an approved prescribed fire plan prior to ignition of all prescribed burn units in compliance with the current Interagency Prescribed Fire Planning and Implementation Procedures Guide (PMS 484).	***Vegetation, Soil, Water, Wildlife, Fire/Air***

Project Design Features	*Resources*
● Conduct prescribed burning in compliance with the Oregon Department of Forestry's Smoke Management Plan. Smoke emission control could also include conducting mop-up as soon as possible after ignition is complete, covering hand piles to permit burning during the rainy season, burning lighter fuels with lower fuel moistures to facilitate rapid and complete combustion, and burn larger fuels with higher moisture levels to minimize consumption. ● Underburn, Jackpot Burn, and Broadcast Burn o To minimize impacts to soils, snags, and existing coarse woody debris (CWD), schedule burning when 1000-hour fuel moistures are above 25 percent. o Limit over-story mortality to 10 percent in trees >16in DBH. ● Pile and Burn o Piles would be located at least 20 feet from property lines, culverts, large snags, green trees, and other reserved trees to minimize damage. o Do not operate machine piling equipment within a minimum of 225 feet of perennial streams (slope distance) or within a minimum of 75 feet of intermittent streams (slope distance), except where machinery is on improved roads, designated stream crossings, or where equipment would not increase the potential for sediment delivery into a stream. o To prevent fire escapes and to minimize resource damage, schedule pile burning to occur when weather and fuel conditions limit fire spread outside the pile. When feasible, piles would be burned in the first wet season following the completion of treatment. o To prevent detrimental soil disturbance, burn slash piles when soil and duff moisture content is high. o Where feasible, burn piles will be preferentially situated on soils that have been previously disturbed, such as landings, skid trails, or decommissioned road prisms.	***Vegetation, Soil, Water, Wildlife, Fire/Air***
● Fall inner and middle zone riparian reserve trees, cut to accommodate yarding corridors, towards streams and leave the felled trees to potentially provide wood to streams, where feasible. ● Maintain 300' of buffer habitat adjacent to marbled murrelet occupied sites. ● In areas of natural regeneration, if the target stocking levels or species mix by alternative are not met, planting would be implemented to meet those targets. ● In areas of natural regeneration, silvicultural practices would be implemented to maintain stands in early successional habitat for about 30 years while maintaining the applicable stocking levels as directed in the ROD/RMP (USDI - Bureau of Land Management, 2016a, pp. 62-63). Silvicultural practices include pre-commercial thinning, manual maintenance, seedling released, etc. ● Comply with all relevant Project Design Criteria (PDC) in the Biological Assessment (USDA Forest Service and USDI Bureau of Land Management, 2020) and incorporated in the accompanying Biological Opinion (USDI Fish and Wildlife Service, 2020). Of particular note: o Activities that are likely to cause incidental take of spotted owl territorial pairs or resident singles due to disruption or habitat modification are not included in this consultation (PDC 11) (USDA Forest Service and USDI Bureau of Land Management, 2020, p. 38) (USDI Fish and Wildlife Service, 2020, pp. 49-50). Disruption distances and times are found in Table 12 of the Biological Opinion (USDI Fish and Wildlife Service, 2020, pp. 40-43). o If management activities could impair the functionality of a spotted owl territory (USDI Fish and Wildlife Service, 2020, pp. 38-39) follow PDC 11 and PDC 12 in the Biological Opinion (USDI Fish and Wildlife Service, 2020, pp. 49-51). o To ensure that the BLM does not cause incidental take of spotted owls due to timber harvest, the BLM would continue to survey for spotted owls as shown in PDC 16 until timber harvest has been implemented (USDA Forest Service and USDI Bureau of Land Management, 2020, pp. 40-41) (USDI Fish and Wildlife Service, 2020, pp. 52-53). o In dispersal-limited landscapes for spotted owls, regeneration harvest within LITA would be limited to approximately 10% of the HLB LITA found within any spotted owl Critical Habitat Unit per decade (PDC 15) (USDA Forest Service and USDI Bureau of Land Management, 2020, p. 40) (USDI Fish and Wildlife Service, 2020, p. 52). o Do not remove known nest trees of spotted owls or marbled murrelets; add these to the retention. If such a tree must be removed for safety, an emergency consultation with the Service would be initiated (PDC 14) (USDA Forest Service and USDI Bureau of Land Management, 2020, p. 40) (USDI Fish and Wildlife Service, 2020, p. 51). o In regeneration harvest, manage and report retention according to PDC 8 in the Biological Opinion (USDI - Bureau of Land Management, 2016a, pp. 47-49). o Prescribed burning within 0.25 miles of a known spotted owl site, nest patch or potential site would be seasonally restricted from March 1 through July 7. If surveys to protocol determine that the known or potential site is not occupied in the same year as the prescribed burn would occur, these seasonal restrictions would not apply. Otherwise, the project wildlife biologist, in consultation with fire management personnel, may consider mitigations if they are reasonably certain	***Vegetation, Soil, Water, Fish, Wildlife***

Project Design Features	*Resources*
that dense, persistent smoke can be kept out of the canopy and below-canopy area of the occupied or unsurveyed known or potential spotted owl sites (PDC 11) (USDA Forest Service and USDI Bureau of Land Management, 2020, p. 38) (USDI Fish and Wildlife Service, 2020, pp. 49-50). ○ Prohibit activities that disrupt marbled murrelet nesting at occupied sites or unsurveyed suitable habitat when conducting activities within all land use allocations within 35 miles of the Pacific Coast (Zone 1) and when conducting activities within reserved land use allocations from 35-50 miles of the Pacific Coast (Zone 2). See PDC 18 for measures to conform with this management direction (USDA Forest Service and USDI Bureau of Land Management, 2020, pp. 41-42) (USDI Fish and Wildlife Service, 2020, pp. 54-55). Disruption distances and times are found in Table 12 of the Biological Opinion (USDI Fish and Wildlife Service, 2020, pp. 40-43). ○ Within marbled murrelet Zone 1, assess the analysis area (all lands within 726 ft of the project boundary) for marbled murrelet nesting structure before modifying nesting habitat or removing trees with nesting structure. Apply Options 1, 2, 3, or 4 as described in the RMP (pp. 98-100) (PDC 19) (USDA Forest Service and USDI Bureau of Land Management, 2020, p. 43) (USDI Fish and Wildlife Service, 2020, pp. 55-56). ○ Removal of structurally complex habitat in the range of the marbled murrelet is covered under this consultation in Zone 2 in the Harvest Land Base outside of Critical Habitat. In other areas, in the Harvest Land Base, site-specific information is required through the variance process (PDC 24) (USDA Forest Service and USDI Bureau of Land Management, 2020, p. 45) (USDI Fish and Wildlife Service, 2020, p. 58). ○ All garbage, (especially food products) must be contained or removed daily from the vicinity of any action to minimize the risk of attracting predators to areas with treatment activities (PDC 25) (USDA Forest Service and USDI Bureau of Land Management, 2020, p. 45) (USDI Fish and Wildlife Service, 2020, p. 58). ○ Prior to log and rock haul operations during dry conditions that generate road dust through a population of federally listed Fender's blue butterflies (April 1-August 15), implement BLM-approved dust abatement measures to unpaved roads within 250 ft of federally listed plant populations and/or active federally listed butterfly populations, where log/rock haul activities exceed 15 single vehicle passes per day past a federally listed plant and/or butterfly population (PDC 37) (USDA Forest Service and USDI Bureau of Land Management, 2020, p. 48) (USDI Fish and Wildlife Service, 2020, p. 61). ○ Log and rock hauling during the flight period of Fender's blue butterfly (April 15-July 15) may not occur through their preferred habitats within 1.2 miles of known populations after 9 A.M. Log and rock hauling is allowed prior to 9 A.M., except when unseasonably high temperatures coupled with low wind (<12 mph) occur (PDC 38) (USDA Forest Service and USDI Bureau of Land Management, 2020, pp. 48-49) (USDI Fish and Wildlife Service, 2020, pp. 61-62). ○ No removal of NSO suitable habitat in the core area or home range, in HLB units adjacent to suitable segments of the Siuslaw River that have the ORV for wildlife. ○ Suitable habitat would not be removed from nest patches or core areas of known spotted owl sites that have site centers outside HLB under this EA. Removal of suitable habitat on these HLB lands could occur but would be analyzed under a separate NEPA process. ○ If Pacific marten Coastal Distinct Population Segment (DPS) are confirmed to occur in the proposed project area and proposed actions may affect Pacific marten Costal DPS, the BLM will consult with the US Fish and Wildlife Service to mitigate effects. ○ If fisher are found in the proposed project area, the BLM would follow management direction for fisher in the RMP (USDI Bureau of Land Management, 2016, p. 97), including retaining denning structures (≥ 24" diameter snags, down woody material and live trees with cavities) within the stand and retaining trees with structures (e.g., cavities, mistletoe, and rust brooms). If it is necessary to fall such trees or snags, retain them in the stand as additional down woody material.	

5.5.2 PDFs from Management Direction in the ROD/RMP

Project Design Features with ROD/RMP References	*Resources*
Management Direction for Harvest Land Base land use allocation (*ROD/RMP pp. 59*-63)	

Project Design Features with ROD/RMP References	*Resources*
During commercial harvest, except for safety, operational, or fuels reduction reasons, retain existing: ● Snags > 20 inch DBH, Snags 6-20" DBH decay classes III, IV, and V. Retain snags ≥ 6" DBH cut for safety or operational reasons as down woody material, unless they would also pose a safety hazard as down woody material. ● Down woody material > 20" in diameter at the large end and > 20 feet' in length. ● Down woody material 6–20" in diameter at the large end and > 20' in length in decay classes III, IV, and V ● All trees that are both ≥ 40" DBH and that the BLM identifies were established prior to 1850, except where falling is necessary for safety or operational reasons and no alternative harvesting method is economically viable or practically feasible. If such trees need to be cut for safety or operational reasons, retain cut trees in the stand. The BLM identification of trees established prior to 1850 may be based on any of a variety of methods, such as evaluation of bark, limb, trunk, or crown characteristics, or increment coring, at the discretion of the BLM. During Commercial Thinning: ● Conduct thinning to result in a stand average relative density between 25 percent and 45 percent after harvest. ● Leave untreated areas (skips) and create group selection openings to provide structural complexity in the post-treatment stand. Leave at least 5 percent of the planned harvest unit in untreated areas. Do not exceed 10 percent of the planned harvest unit in group selection openings. During Regeneration Harvest: ● In each regeneration harvest unit under LITA land use allocation, retain 15–30 percent of pre-harvest stand basal area in live trees. Retain trees in a variety of spatial patterns, including aggregated groups and individual trees. ● In each regeneration harvest unit under MITA, retain 5–15 percent of pre-harvest stand basal area in live trees. Retain trees in a variety of spatial patterns, including aggregated groups and individual trees. ● Include in the retention all trees that are both ≥ 40" DBH and that the BLM identifies were established prior to 1850. After regeneration harvest: ● Employ site preparation methods such as mechanical treatments (e.g., machine piling), manual treatments (e.g., brushing), and prescribed burns to prepare newly harvested and inadequately stocked areas for the regeneration of desirable tree species. ● In LITA, use natural or artificial regeneration or both to reforest a mixture of species appropriate to the site to a stand-level average of at least 130 trees per acre within 5 years of harvest. ● In MITA, use natural or artificial regeneration or both to reforest a mixture of species appropriate to the site to a stand-level average of at least 150 trees per acre within 5 years of harvest.	***Vegetation, Soil, Wildlife, Invasive Species***
Management Direction for Riparian Reserve land use allocation (*ROD/RMP pp. 68-74*)	
● Allow yarding corridors, skids trails, road construction, stream crossings, and road maintenance and improvement where there is not operationally feasible and economically viable alternative to accomplish other resource management objectives. ● Where trees are cut for yarding corridors, skid trails, road construction, maintenance, and improvement in the Inner Zone or Middle Zone, retain cut trees in adjacent stands as down woody material or move cut trees for placement in streams for fish habitat restoration, at the discretion of the BLM. Where trees are cut for yarding corridors, skid trails, road construction, maintenance, and improvement in the Outer Zone or in Riparian Reserves associated with features other than streams, retain cut trees in adjacent stands as down woody material, move cut trees for placement in streams for fish habitat restoration, or sell trees, at the discretion of the BLM. For any trees that are both >40" DBH and that the BLM identifies were established prior to 1850, retain cut trees in the adjacent stand as down woody material. ● Use site-specific BMPs (Appendix C) to maintain water quality during land management actions. ● Do not operate ground-based machinery for timber harvest within 50 feet of streams (slope distance), except where machinery is on improved roads (rocked or paved), designated stream crossings, or where equipment entry into the 50-foot zone would not increase the potential for sediment delivery into the stream. ● Establish riparian reserve distance by water features as outlined in USDI – Bureau of Land Management, 2016a, p. 70-74, Tables 5-8)	***Vegetation, Soil, Water, Fish, Wildlife***

Project Design Features with ROD/RMP References	*Resources*
Management Direction for Wildlife Resources (*ROD/RMP pp. 95-101*)	
● Protect known bald eagle or golden eagle nests (including active nests and alternate nests) and bald eagle winter roosting areas. Prohibit activities that would disrupt bald eagles or golden eagles that are actively nesting (RMP p. 96) ● Do not remove overstory trees within 330 feet of bald eagle or golden eagle nests, except for removal of hazard trees (RMP p. 96). ● Do not conduct timber harvest operations (including road construction, tree felling, and yarding) during the breeding season within 660 feet of bald eagle or golden eagle nests (RMP p. 96). ● Manage Fender's blue butterfly consistent with recovery plans, conservation agreements, designated critical habitat, and species-specific and project-specific conservation measures developed with the US Fish and Wildlife Service. Do not approve, fund, or implement actions that would adversely affect the Fender's blue butterfly (RMP p. 95).	***Wildlife***
● Except when needed to protect human safety and property, prohibit activities that disrupt marbled murrelet nesting at occupied sites when conducting activities within all land use allocations within 35 miles of the Pacific Coast (Zone 1) (RMP pp. 97-98). ● Before modifying nesting habitat or removing nesting structure in all land use allocations in Zone 1, assess the analysis area (proposed project and lands within 726 feet of the project boundary) for marbled murrelet nesting structure. If the analysis area contains no nesting structure, no further consideration of marbled murrelet habitat is required. If the analysis area contains trees with marbled murrelet structure, apply Options 1, 2, 3, or 4 as described in the RMP (pp. 98-100). ● Do not authorize timber sales that would cause the incidental take of northern spotted owl territorial pairs or resident singles from timber harvest (RMP p. 100).	***Wildlife***
Management Direction for Hydrology Resources (*ROD/RMP pp. 79-80*)	
● Select and implement site-level BMPs (Appendix C) to maintain water quality for BLM actions (including, but not limited to, road construction, road maintenance, silvicultural treatments, recreation management, prescribed burning, and wildfire management actions/activities) and discretionary actions of others crossing BLM-administered lands. ● Design culverts, bridges, and other stream crossings to pass a 100-year flood event, including an allowance for bed load and anticipated floatable debris. Culverts would be of adequate width to preclude ponding of water higher than the top of the culvert. For streams with ESA-listed fish, design stream crossings to meet design standards consistent with existing ESA consultation documents that address stream crossings in the decision area. ● Implement road improvements, storm-proofing, maintenance, or decommissioning to reduce or eliminate chronic sediment inputs to stream channels and water bodies (e.g., maintaining vegetated ditch lines, improving road surfaces, and installing cross drains at the appropriate spacing). ● Suspend commercial road use where the road surface is deteriorating due to vehicular rutting or standing water if it cannot be mitigated, or where turbid runoff is likely to reach stream channels. ● Decommission roads that are no longer needed for resource management and are at risk of failure or are contributing sediment to streams, consistent with valid existing rights.	***Vegetation, Soil, Water, Fish, Wildlife***
Management Direction for Cultural Resources (*ROD/RMP pp. 76*)	
• For all previous and newly recorded sites located within the project area of potential effect (APE) that are listed or eligible for listing in the National Register of Historic Places (NRHP), consider project actions and their potential to affect character defining features of each site (features that make a given site eligible). Clearly delineate site boundaries with coded flagging or other effective marking, including any buffers deemed necessary. Any project actions determined to have the potential to affect the character defining features of a site shall be prohibited within the demarcated boundaries. ● All previously and newly recorded sites that remain unevaluated for listing in the NRHP are to be treated as eligible, and therefore project actions must completely avoid such sites. Clearly delineate site boundaries with coded flagging or other effective marking, including any buffers deemed necessary. Any project actions determined to have the potential to affect such sites shall be prohibited within the demarcated boundaries.	***Cultural***

5.5.3 PDFs from Best Management Practices in the ROD/RMP

Best Management Practices from ROD/RMP References	***Resources***
Timber Harvest Activity (*ROD/RMP pp. 158-161*)	
Cable Yarding	
● Design yarding corridors crossing streams to limit the number of such corridors, using narrow widths, and using the most perpendicular orientation to the stream feasible. Minimize yarding corridor widths and space corridors as far apart as practicable given physical and operational limitations. Setting yarding corridors at 12–15-foot maximum widths, and setting corridor spacing where they cross the streams to no < 100 feet apart when physical, topography or operational constraints demand, with an overall desire to keep an average spacing of 200 feet apart (TH 01). ● Directionally fall trees to lead for skidding and skyline yarding to minimize ground disturbance when moving logs to skid trails and skyline corridors (TH 02). ● Full suspension is required when yarding over flowing streams, non-flowing streams with highly erodible bed and banks, and jurisdictional wetlands (TH 03). ● When logging downhill into Riparian Reserve, design the logging system to prevent converging yarding trails from intersecting the stream network (TH 04). ● Prevent streambank and hillslope disturbance on steep slopes (generally > 60 percent) by requiring full-suspension within 50 feet of definable stream channels. Yard the remaining areas across the Riparian Reserve using at least one-end suspension (TH 05). ● Implement erosion control measures such as water bars, slash placement, and seeding in cable yarding corridors where the potential for erosion and delivery to waterbodies, floodplains, and wetlands exists (TH 06).	***Soil, Water, Fish***
Ground-based Harvesting	
● Exclude ground-based equipment on hydric soils, defined by the Natural Resources Conservation Service (TH 07). ● Limit designated skid trails for thinning or regeneration harvesting to ≤ 15 percent of the harvest unit area to reduce displacement or compaction to acceptable limits (TH 08). ● Limit width of skid roads to single width of what is operationally necessary for the approved equipment. Where multiple machines are used, provide a minimum-sized pullout for passing (TH 09). ● Ensure leading-end of logs is suspended when skidding (TH 10). ● Restrict non-road, in unit, ground-based equipment used for harvesting operations to periods of low soil moisture, generally from May 15 to October 15. Low soil moisture varies by texture and is based on site-specific considerations. Low soil moisture limits would be determined by qualified BLM specialists on the ground using a qualitative method to determine an estimated soil moisture and soil texture (TH 11). ● Incorporate existing skid trails and landings as a priority over creating new trails and landings where feasible, into a designated trail network for ground-based harvesting equipment, consider proper spacing, skid trail direction, and location relative to terrain and stream channel features (TH 12).	***Vegetation, Soil, Water, Fish, Wildlife***

Best Management Practices from ROD/RMP References	*Resources*
● Limit non-specialized skidders or tracked equipment to slopes < 35 percent, except when using previously constructed trails or accessing isolated ground-based harvest areas requiring short trails over steeper pitches. Also, limit the use of this equipment when surface displacement creates trenches, depressions, excessive removal of organic horizons, or when disturbance would channel water and sediment as overland flow (TH 13). ● Limit the use of specialized ground-based mechanized equipment (those machines specifically designed to operate on slopes > 35 percent) to slopes < 50 percent, except when using previously constructed trails or accessing isolated ground-based harvesting areas requiring short trails over steeper pitches. Also, limit the use of this equipment when surface displacement creates trenches, depressions, excessive removal of organic horizons, or when disturbance would channel water and sediment as overland flow (TH 14). ● Designate skid trails in locations that channel water from the trail surface away from water bodies, floodplains, and wetlands, or unstable areas adjacent to them (TH 15). ● Apply erosion control measures to skid trails and other disturbed areas with potential for erosion and subsequent sediment delivery to waterbodies, floodplains, or wetlands. These practices may include seeding, mulching, water barring, tillage, and woody debris placement. Use guidelines from the road decommissioning section (TH 16). ● Construct water bars on skid trails using guidelines in Table C-6 where the potential for soil erosion or delivery to water bodies, floodplains, and wetlands exists (TH 17).	***Vegetation, Soil, Water, Fish, Wildlife***
● Subsoil skid trails, landings, or temporary roads where needed to achieve no more than 20 percent detrimental soil conditions, and minimize surface runoff, improve soil structure, and water movement through the roadbed. See also R 91 (TH 18). ● Block skid trails to prevent public motorized vehicle and other unauthorized use at the end of seasonal use (TH 19). ● Allow harvesting operations (cutting and transporting logs) when ground is frozen or adequate snow cover exists to prevent soil compaction and displacement (TH 20) ● Minimize the area where more than half of the depth of the organically-enriched upper horizon (topsoil) is removed when conducting forest management operations (TH 21). ● Maintain at least the minimum percent of effective ground cover needed to control surface erosion, as shown in Table C-3, following forest management operations. Ground cover may be provided by vegetation, slash, duff, medium to large gravels, cobbles, or biological crusts. (TH 23). Providing slash and duff to disturbed surfaces following operations is encouraged (TH 22). ● Consider the use of helicopter or aerial logging systems to prevent water quality impacts from road construction or ground based timber yarding, where other BMPs would be more costly or have limited effectiveness (TH 23).	***Vegetation, Soil, Water, Fish, Wildlife***
Roads & Landings *(ROD/RMP pp. (143-158)*	
General Construction	
● Locate temporary and permanent roads and landings on stable locations, e.g., ridge tops, stable benches, or flats, and gentle-to-moderate side slopes. Minimize road construction on steep slopes (> 60 percent) (R 01). ● Locate temporary and permanent road construction or improvement to minimize the number of stream crossings. (R 02)). ● Locate roads and landings away from wetlands, Riparian Reserve, floodplains, and waters of the State, unless there is no practicable alternative. Avoid locating landings in areas that contribute runoff to channels (R 03). ● Locate roads and landings to reduce total transportation system mileage. Renovate or improve existing roads or landings when it would cause less adverse environmental impact than new construction. Where roads traverse land in another ownership, investigate options for using those roads before construction new roads (R 04). ● Design roads to the minimum width needed for the intended use as referenced in BLM Manual 9113 – 1 – Roads Design Handbook (USDI BLM 2011). (R 05) ● Confine pioneer roads (i.e., clearing and grubbing of trees, stumps, and boulders along a route) to the construction limits of the permanent roadway to reduce the amount of area disturbed and avoid deposition in wetlands, Riparian Reserve, floodplains, and waters of the State. Install temporary drainage, erosion, and sediment control structures, as needed to prevent sediment delivery to streams. Storm proof or close pioneer roads prior to the onset of the wet season (R 06).	***Vegetation, Soil, Water, Fish,*** **Invasive Species**

Best Management Practices from ROD/RMP References	*Resources*
● Design road cut and fill slopes with stable angles, to reduce erosion and prevent slope failure (R 07). ● End-haul material excavated during construction, renovation, or maintenance where side slopes generally exceed 60 percent and any slope where side-cast material may enter wetlands, floodplains, and waters of the State (R 08). ● Construct road fills to prevent fill failure by using inorganic material, compaction, buttressing, sub-surface drainage, rock facing, or other effective means. (R 09) ● Design and construct sub-surface drainage (e.g., trench drains using geo-textile fabrics and drainpipes) in landslide-prone areas and saturated soils. Minimize or avoid new road construction in these areas. (R 10) ● Locate waste disposal areas outside wetlands, Riparian Reserve, floodplains, and unstable areas to minimize the risk of sediment delivery to waters of the State. Apply surface erosion control prior to the wet season. Prevent overloading areas, which may become unstable (R 11). ● Use controlled blasting techniques to minimize loss of material on steep slopes or into wetlands, Riparian Reserve, floodplains, and watershed of the State (R 12). ● Use temporary sediment control measures (e.g., check dams, silt fencing, bark bags, filter strips, and mulch) to slow runoff and contain sediment from road construction areas. Remove any accumulated sediment and the control measures when work or haul is complete. When long-term structural sediment control measures are incorporated into the final erosion control plan, remove any accumulated sediment to retain the capacity of the control measure (R 13).	***Vegetation, Soil, Water, Fish, Invasive Species***
Permanent Stream Crossings	
● Avoid use of road fills for water impoundment dams unless specifically designed for that purpose. Impoundments over 9.2-acre-feet or 10 feet in depth will require a dam safety assessment by a registered engineer. Upgrade existing road fill impoundments to withstand a 100-year flood event (R14). ● Minimize fill volumes at permanent and temporary stream crossings by restricting width and height of fill to amounts needed for safe travel and adequate cover for culverts. For deep fills (generally greater than 15 feet deep), incorporate additional design criteria (e.g., rock blankets, buttressing, bioengineering techniques) to reduce the susceptibility of fill failures (R15). ● Locate stream-crossing culverts on well-defined, unobstructed, and straight reaches of stream. Locate these crossings as close to perpendicular to the streamflow as stream allows. When structure cannot be aligned perpendicular, provide inlet and outlet structures that protect fill, and minimize bank erosion. Choose crossings that have well-defined stream channels with erosion-resistant bed and banks (R 16). ● On the construction of a new culvert, major replacement, or fundamental change in permit status of a culvert in streams containing native migratory fish, install culverts consistent with ODFW fish passage criteria (OAR 635-412-0035 (3)), and at the natural stream grade, unless a lesser gradient is required for fish passage. On the abandonment of a culvert (i.e., removal of a culvert without replacement) in streams containing native migratory fish, restore the natural stream grade, unless a lesser gradient is required for fish passage. On the construction of new culverts in streams with ESA listed fish, stream crossings must also meet ARBO II (USDC NMFS2013 and USDI FWS 2013) fish passage criteria and state fish passage criteria (R 17) ● Design stream crossings to minimize diversion potential in the event that the crossing is blocked by debris during storm events. This protection could include hardening crossings, armoring fills, dipping grades, oversizing culverts, hardening inlets and outlets, and lowering the fill height. (R 18) ● Design stream crossings to prevent diversion of water from streams into downgrade road ditches or down road surfaces. (R 19) ● Place instream grade control structures above or below the crossing structure, if necessary, to prevent stream head cutting, culvert undermining and downstream sedimentation. Employ bioengineering measures to protect the stability of the streambed and banks. (R 20) ● Prevent culvert plugging and failure in areas of active debris movement with measures such as beveled culvert inlets, flared inlets, wingwalls, over-sized culverts, trash racks, or slotted risers. (R 21) ● To reduce the risk of loss of the road crossing structure and fill causing excessive sedimentation, use bridges or low-water fords when crossing debris-flow susceptible streams. Avoid using culverts when crossing debris-flow susceptible streams, when practicable. (R 22) ● Utilize stream diversion and isolation techniques when installing stream crossings. Evaluate the physical characteristics of the site, the volume of water flowing through the project area, and the risk of erosion and sedimentation when selecting the proper techniques (R 23). ● Limit activities and access points of mechanized equipment to streambank areas or temporary platforms when installing or removing structures. Keep equipment activity in the stream channel to an absolute minimum (R 24). ● Install stream crossing structures before heavy equipment moves beyond the crossing area (R 25). ● Disconnect road runoff to the stream channel by out-sloping the road approach. If out-sloping is not practicable, use runoff control, erosion control and sediment containment measures. These may include using additional cross drain culverts, ditch lining, and catchment basins. Prevent or reduce ditch flow conveyance to the stream through cross drain placement above the stream crossing (R 26).	***Vegetation, Soil, Water, Fish,*** **Invasive Species**

Best Management Practices from ROD/RMP References	*Resources*
Temporary Stream Crossings for Roads and Skid Trails	
● When installing temporary culverts, use washed rock as a backfill material. Use geotextile fabric as necessary where washed rock will spread with traffic and cannot be practicably retrieved (R 27). ● Use no-fill structures (e.g., portable mats, temporary bridges, and improved hardened crossings) for temporary stream crossings. When not practicable, design temporary stream crossings with the least amount of fill and construct with coarse material to facilitate removal upon completion. (R 28) ● Remove temporary crossing structures promptly after use. Follow practices under the Closure/Decommissioning section for removing stream crossing drainage structures and reestablishing the natural drainage (R 29).	
Surface Drainage	
● Effectively drain the road surface by using crowning, insloping or outsloping, grade reversals (rolling dips), and waterbars or a combination of these methods. Avoid concentrated discharge onto fill slopes unless the fill slopes are stable and erosion-resistant (R 30). ● Outslope temporary and permanent low volume roads to provide surface drainage on road gradients up to 6 percent unless there is a traffic hazard from the road shape. (R 31) ● Consider using broad-based drainage dips or lead-off ditches in lieu of cross drains for low volume roads. Locate these surface water drainage measures where they will not drain into wetlands, floodplains, and waters of the State. (R 32) ● Avoid use of outside road berms unless designed to protect road fills from runoff. If road berms are used, breach to accommodate drainage where fill slopes are stable. (R 33) ● Construct variable road grades and alignments (e.g., roll the grade and grade breaks) which limit water concentration, velocity, flow distance, and associated stream power. (R 34) ● Install underdrain structures when roads cross or expose springs, seeps, or wet areas rather than allowing intercepted water to flow down gradient in ditchlines. (R 35) ● Design roads crossing low-lying areas so that water does not pond on the upslope side of the road. Provide cross drains at short intervals to ensure free drainage. (R 36) ● Divert road and landing runoff water away from headwalls, slide areas, high landslide hazard locations, or steep erodible fill slopes (R 37). ● Design landings to disperse surface water to vegetated stable areas. (R 38)	***Vegetation, Soil, Water, Fish,* Invasive Species**
Cross Drains	
● Locate cross drains to prevent or minimize runoff and sediment conveyance to waters of the State. Implement sediment reduction techniques such as settling basins, brush filters, sediment fences, and check dams to prevent or minimize sediment conveyance. Locate cross drains to route ditch flow onto vegetated and undisturbed slopes (R 39). ● Space cross drain culverts at intervals sufficient to prevent water volume concentration and accelerated ditch erosion. At a minimum, space cross drains at intervals referred to in the BLM Road Design Handbook 9113-1 (USDI BLM 2011), Illustration 11 – 'Spacing for Drainage Lateral.' Increase cross drain frequency through erodible soils, steep grades, and unstable areas (R 40). ● Choose cross drain culvert diameter and type according to predicted ditch flow, debris and bedload passage expected from the ditch. Minimum diameter is 18". (R 41) ● Locate surface water drainage measures (e.g., cross drain culverts, rolling dips and water bars) where water flow would be released on convex slopes or other stable and non-erosive areas that would absorb road drainage and prevent sediment flows from reaching wetlands, floodplains, and waters of the State. Where practicable locate surface water drainage structures above road segments with a steeper downhill grade. Locate cross drains at least 50 feet from the nearest stream crossing and allow for a sufficient non-compacted soil and vegetative filter (R 42). ● Armor surface drainage structures (e.g., broad-based dips and lead-off ditches) to maintain functionality in areas of erosive and low-strength soils (R 43). ● Discharge cross drain culverts at ground level on non-erodible material. Install downspout structures or energy dissipaters at cross drain outlets or drivable dips where alternatives to discharging water onto loose material, erodible soils, fills, or steep slopes are not available. (R 44) ● Cut protruding 'shotgun' culverts at the fill surface or existing ground. Install downspout or energy dissipaters to prevent erosion. (R 45)	***Soil, Water, Fish***

Best Management Practices from ROD/RMP References	*Resources*
● Skew cross drain culverts 45–60 degrees from the ditchline and provide pipe gradient slightly greater than ditch gradient to reduce erosion at cross drain inlet. (R 46) ● Provide for unobstructed flow at culvert inlets and within ditch lines during and upon completion of road construction prior to the wet season. (R 47)	
Timing of In-Water Work	
● Conduct all nonemergency in-water work during the ODFW instream work window unless a waiver is obtained from permitting agencies. Avoid winter sediment and turbidity entering streams during in-water work to the extent practicable (R48) ● Remove stream crossing culverts and entire in-channel fill material during ODFW instream work period (R 49).	***Soil, Water, Fish, Wildlife, Invasive Species***
Maintaining Water Quality-Non-native Invasive Plants, including Invasive plant species	
● Locate equipment-washing sites in areas with no potential for runoff into wetlands, Riparian Reserve, floodplains, and waters of the State. Do not use solvents or detergents to clean equipment on site (R 53).	***Vegetation, Soil, Water, Fish, Invasive Species***
Water Source Development and Use	
● Limit disturbance to vegetation and modification of streambanks when locating road approaches to in-stream water source developments. Surface these approaches with durable material. Employ erosion and runoff control measures (R 54). ● Do not place pump intakes on the substrate or edges of the stream channel. When placing intakes instream, place on hard surfaces (e.g., shovel and rocks) to minimize turbidity. If erodible bed material is present, use a temporary liner to create intake site. After completion of use, remove liner and restore channel to natural condition (R 58). ● Avoid water withdrawals from fish bearing streams whenever practicable. Limit water withdrawals in ESA-listed fish habitat to 10 percent of stream flow or less at the point of withdrawal, and in non-ESA-listed fish habitat to 50 percent or less at the point of withdrawal, based on as visual assessment by a fish biologist or hydrologist. The channel must not be dewatered to the point of isolating fish (R 60).	**Vegetation, Soil, Water, Fish**
Erosion Control Measures	
● Limit disturbance to vegetation and modification of streambanks when locating road approaches to in-stream water source developments. Surface these approaches with durable material. Employ erosion and runoff control measures. (R 54) ● Do not place pump intakes on the substrate or edges of the stream channel. When placing intakes instream, place on hard surfaces (e.g., shovel and rocks) to minimize turbidity. Use a temporary liner to create intake site. After completion of use, remove liner and restore channel to natural condition. (R 58) ● Avoid water withdrawals from fish-bearing streams whenever practicable. Limit water withdrawals in ESA-listed fish habitat and within 1,500 feet of ESA-listed fish habitat to 10 percent of stream flow or less at the point of withdrawal, and in non-ESA-listed fish habitat to 50 percent or less at the point of withdrawal, based on a visual assessment by a fish biologist or hydrologist. The channel must not be dewatered to the point of isolating fish. (R 60) ● During roadside brushing, remove vegetation by cutting rather than uprooting (R 61) ● Limit road and landing construction, reconstruction, or renovation activities to the dry season. Keep erosion control measures concurrent with ground disturbance to allow immediate storm-proofing (R 62). ● Apply native seed and certified weed-free mulch to cut and fill slopes, ditch lines, and waste disposal sites with the potential for sediment delivery to wetlands, Riparian Reserve, floodplains, and waters of the State. If needed to promote a rapid ground cover and prevent aggressive invasive plants, use interim erosion control non-native sterile annuals before attempting to restore natives. Apply seed upon completion of construction and as early as practicable to increase germination and growth. Reseed if necessary to accomplish erosion control. Select seed species that are fast-growing, provide ample ground cover, and have adequate soil-binding properties. Apply mulch that would stay in place and at site-specific rates to prevent erosion (R 63).	***Vegetation, Soil, Water, Fish, Invasive Species***

Best Management Practices from ROD/RMP References	*Resources*
● Place sediment-trapping materials or structures such as straw bales, jute netting, or sediment basins at the base of newly constructed fill or side slopes where sediment could be transported to waters of the State. Keep materials away from culvert inlets or outlets (R 64). ● Use biotechnical stabilization and soil bioengineering techniques to control bank erosion (e.g., commercially produced matting and blankets, live plants or cuttings, dead plant material including slash and duff, rock, and other inert structures) R 65. ● Suspend ground-disturbing activity when forecasted rain would saturate soils to the extent that there is potential for movement of sediment from the road to wetlands, floodplains, and waters of the State. Cover or temporarily stabilize exposed soils during work suspension. Upon completion of ground-disturbing activities, immediately stabilize fill material over stream crossing structures. Measures could include but are not limited to erosion control blankets and mats, soil binders, soil tackifiers, or placement of slash (R 66). ● Apply water or approved road surface stabilizers/dust control additives to reduce surfacing material loss and buildup of fine sediment that can enter into wetlands, floodplains, and waters of the State. Prevent entry of road surface stabilizers/dust control additives into waters of the State during application. For dust abatement, limit applications of lignin sulfonate to a maximum rate of 0.5 gal/yd2 of road surface, assuming a 50:50 (lignin sulfonate to water) solution (R 68).	
Road Maintenance	
● Prior to the wet season, provide effective road surface drainage maintenance. Clear ditch lines in sections where there is lowered capacity or is obstructed by dry gravel, sediment wedges, small failures, or fluvial sediment deposition. Remove accumulated sediment and blockages at cross-drain inlets and outlets. Grade natural surface and aggregate roads where the surface is uneven from surface erosion or vehicle rutting. Restore crowning, out sloping or in sloping for the road type for effective runoff. Remove or provide outlets through berms on the road shoulder. After ditch cleaning prior to hauling, allow vegetation to reestablish or use sediment entrapment measures (e.g., Sediment trapping blankets and silt fences) (R 69). ● Retain ground cover in ditch lines, except where sediment deposition or obstructions require maintenance (R 70). ● Maintain water flow conveyance, sediment filtering, and ditch line integrity by limiting ditch line disturbance and groundcover destruction when machine cleaning within 200 feet of road-stream crossings (R 71). ● Avoid undercutting of cut-slopes when cleaning ditch lines (R 72). ● Remove and dispose of slide material when it is obstructing road surface and ditch line drainage. Place material on the stable ground outside of wetlands, Riparian Reserve, floodplains, and waters of the State. Reseed areas with native seed and weed-free mulch (R 73). ● Do not side cast loose ditch or surface material where it can enter wetlands, Riparian Reserve, floodplains, and waters of the State (R 74). ● Retain low-growing vegetation on cut-and-fill slopes (R 75). ● Seed and mulch cleaned ditch lines and bare soils that drain directly to wetlands, floodplains, and waters of the State, with native species and weed-free mulch (R 76).	***Vegetation, Soil, Water, Fish, Invasive Species***
Road Stormproofing	
● Inspect and maintain culvert inlets and outlets, drainage structures and ditches before and during the wet season to diminish the likelihood of plugged culverts and the possibility of washouts (R 77). ● Repair damaged culvert inlets and downspouts to maintain drainage design capacity (R 78). ● Blade and shape roads to conserve existing aggregate surface material, retain or restore the original cross-section, remove berms and other irregularities that impede effective runoff or cause erosion, and ensure that surface runoff is directed into vegetated, stable areas (R 79). ● Stormproof open resource roads receiving infrequent maintenance to reduce road erosion and reduce the risk of washouts by concentrated water flows. Stormproof temporary roads if retained over winter (R 80). ● Suspend storm-proofing/decommissioning operations and cover or otherwise temporarily stabilize all exposed soil if conditions develop that cause a potential for sediment-laden runoff to enter a wetland, floodplain, or waters of the State. Resume operations when conditions allow turbidity standards to be met (R 81).	***Vegetation, Soil, Water, Fish, Invasive Species***

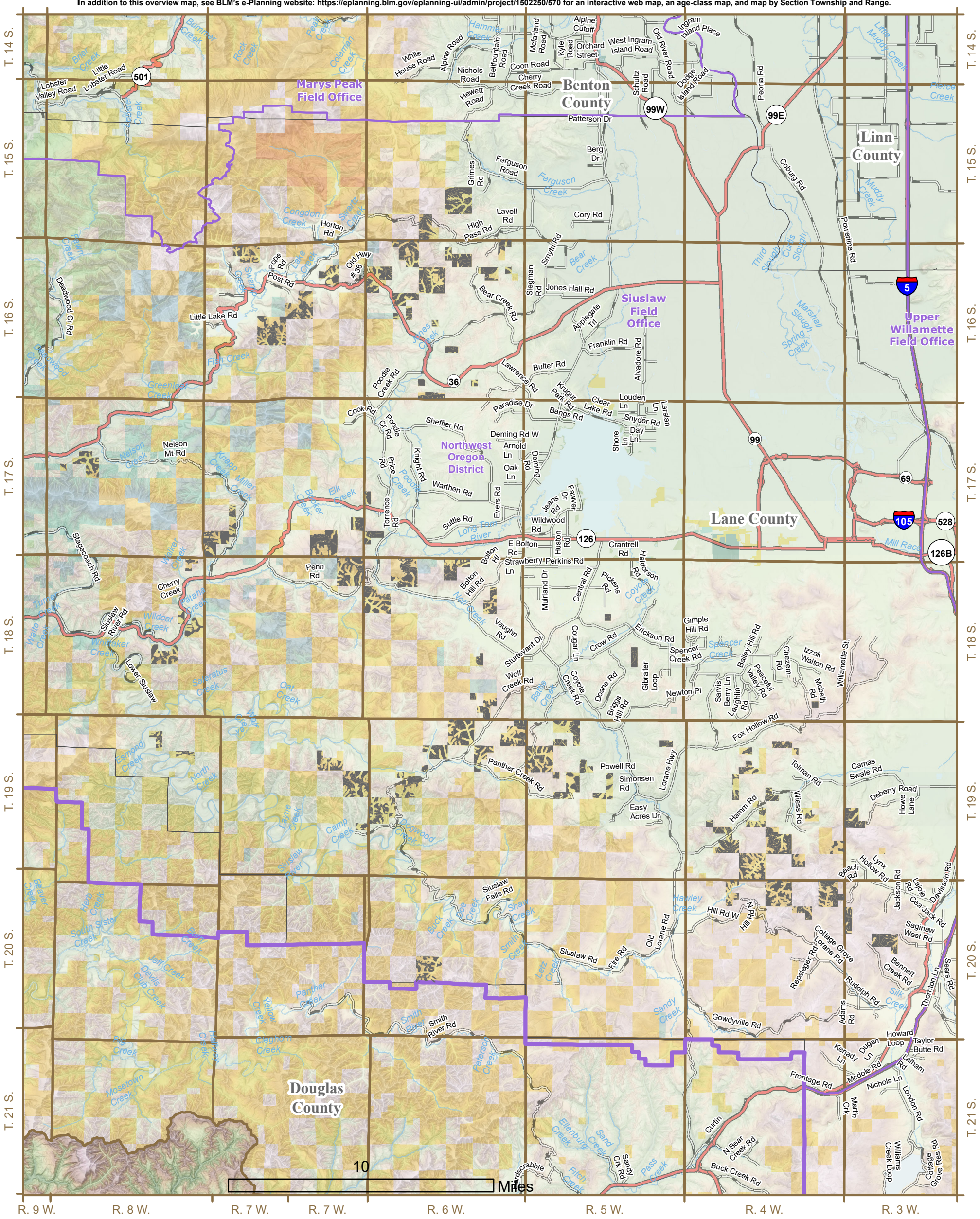
Best Management Practices from ROD/RMP References	*Resources*
Road Closure and Decommissioning	
● Inspect closed roads to ensure that vegetation stabilization measures are operating as planned, drainage structures are operational, and non-native invasive plants, including noxious weeds, are not providing erosion control. Conduct vegetation treatments and drainage structure maintenance as needed (R 82). ● Decommission temporary roads upon completion of use (R 83). ● Prevent use of vehicular traffic utilizing methods such as gates, guard rails, earth/log barricades, to reduce or eliminate erosion and sedimentation due to traffic on roads (R 84). ● Convert existing drainage structures such as ditches and cross drain culverts to a long-term maintenance-free drainage configuration such as an out sloped road surface and waterbars (R 85). ● Place and remove temporary stream crossings during the dry season, without overwintering, unless designed to accommodate a 100-year flood event. See also R 49 (R 86). ● Place excavated material from removed stream crossings on the stable ground outside of wetlands, Riparian Reserve, floodplains, and waters of the State. In some cases, the material could be used for recontouring old road cuts or be spread across roadbed and treated to prevent erosion (R 87). ● Reestablish stream crossings to the natural stream gradient. Excavate side slopes back to the natural bank profile. Reestablish natural channel width and floodplain (R 88). ● Install cross ditches or water bars upslope from stream crossing to direct runoff and potential sediment to the hillslope rather than deliver it to the stream (R 89). ● Following culvert removal and prior to the wet season, apply erosion control and sediment trapping measures (e.g., seeding, mulching, straw bales, jute netting, and native vegetative cuttings) where sediment can be delivered into wetlands, Riparian Reserve, floodplains, and waters of the State (R 90). ● Implement tillage measures, including ripping or subsoiling to an effective depth, when needed. Treat compacted areas including the roadbed, landings, construction areas, and spoils sites (R 91).	***Vegetation, Soil, Water, Fish, Invasive Species***
Wet-season Road Use	
● On active haul roads, during the wet season, use durable rock surfacing and sufficient rock depth to resist rutting or development of sediment on road surfaces that drain directly to wetlands, floodplains, and waters of the State (R 93). ● Prior to winter hauling activities, implement structural road treatments such as: increasing the frequency of cross drains, installing sediment barriers or catch basins, applying gravel lifts or asphalt road surfacing at stream crossing approaches, and armoring ditch lines (R 94). ● Maintain road surface by applying appropriate gradation of aggregate and suitable particle hardness to protect road surfaces from rutting and erosion under active haul where runoff drains to wetlands, Riparian Reserve, floodplains, and waters of the State (R 97). ● To reduce sediment tracking from natural surface roads during active haul, provide a gravel approach before entrance onto surfaced roads (R 98).	***Vegetation, Soil, Water, Fish, Invasive Species***
Fuels Management and Other Operations (*ROD/RMP pp. 162 - 165*)	
Underburn, Jackpot Burn, and Broadcast Burn	
● Locate fire lines so that open meadows associated with streams do not burn, unless prescribed for restoration (F 01). ● Avoid burning of large woody material that is touching the high water mark of a waterbody or that may be affected by high flows (F 02). ● Avoid delivery of chemical retardant foam or additives to waterbodies, and wetlands. Store and dispose of ignition devices/ materials (e.g., flares and plastic spheres) outside Riparian Reserve or a minimum of 150 feet from waterbodies, floodplains, and wetlands. Maintain and refuel equipment (e.g., drip torches and chainsaws) a minimum of 100 feet from waterbodies, floodplains, and wetlands. Portable pumps can be refueled on-site within a spill containment system (F 03). ● Limit fire lines inside Riparian Reserve. Construct fire lines by hand on all slopes > 35 percent and inside the Riparian Reserve inner zone. Use erosion control techniques such as tilling, waterbarring, or debris placement on fire lines when there is potential for soil erosion and delivery to waterbodies, floodplains, and wetlands. Space the waterbars as shown in Table C-6. Avoid placement of fire lines where water would be directed into waterbodies, floodplains, wetlands, headwalls, or areas of instability (F 04). ● In broadcast burning, consume only the upper horizon organic materials and allow no more than 15 percent of the burned area mineral soil surface to change to a reddish color (F 05).	***Vegetation, Soil, Water, Fish, Invasive Species, Fire/Air, Public Safety***

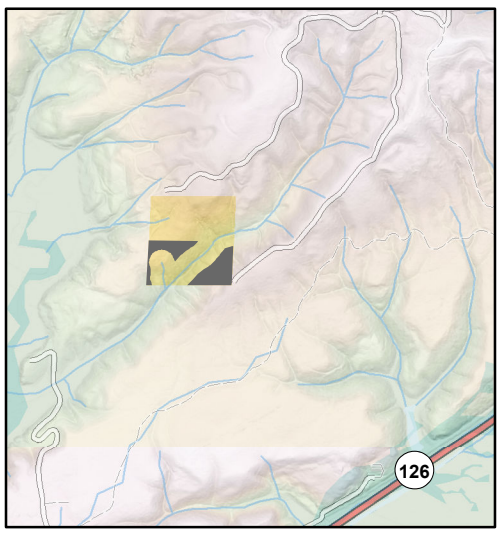
Best Management Practices from ROD/RMP References	*Resources*
Pile and Burn	
● Avoid burning piles within 35 feet of a stream channel (F 06). ● Avoid creating piles > 16 feet in height or diameter. Pile smaller diameter materials and leave pieces > 12" diameter within the unit. Reduce burn time and smoldering of piles by extinguishment with water and tool use (F 07). ● When burning machine-constructed piles, preferably locate and consume organic materials on landings or roads. If piles are within harvested units and more than 15 percent of the burned area mineral soil (the portion beneath the pile) surface changes to a reddish color, then consider that amount of area towards the 20 percent detrimental soil disturbance limit (F 08).	***Vegetation, Soil, Water, Fish, Invasive Species, Fire/Air, Public Safety***
Mechanical and Manual Fuels Treatments	
● Do not operate ground-based machinery for fuels reduction on slopes > 35 percent. Mechanical equipment with tracks may be used on short pitch slopes of > 35 percent but < 45 percent when necessary to access benches of lower gradient (length determined on a site-specific basis, generally < 50 feet (slope distance) F 09. ● Use temporary stream crossings if necessary to access the opposite side with any equipment or vehicles (including OHVs). Follow Temporary Stream Crossing practices under Roads section (F 10). ● Place residual slash on severely burned areas, where there is potential for sediment delivery into waterbodies, floodplains, and wetlands (F 11).	***Vegetation, Soil, Water, Fire/Air***
Spill Prevention and Abatement (*ROD/RMP pp. 174-178*)	
Operations Near Waterbodies	
● Take precautions to prevent leaks or spills of petroleum products (e.g., fuel, motor oil, and hydraulic fluid) from entering the waters of the State (SP 01). ● Take immediate action to stop and contain leaks or spills of chemicals and other petroleum products. Notify the Oregon Emergency Response System, through the District Hazard Materials specialist, of any spill that enters the waters of the State. (SP 02). ● Inspect and clean heavy equipment as necessary prior to moving on to the project site, in order to remove oil and grease, non-native invasive plants, including noxious weeds, and excessive soil (SP 03). ● Inspect hydraulic fluid and fuel lines on heavy-mechanized equipment for proper working condition (SP 03). ● Where practicable, maintain and refuel heavy equipment a minimum of 150 feet away from streams and other waterbodies (SP 03). ● Refuel small equipment (e.g., chainsaws and water pumps) at least 100 feet from waterbodies (or as far as practicable from the waterbody where local site conditions do not allow a 100-foot setback) to prevent direct delivery of contaminants into a waterbody. Refuel small equipment from no more than 5-gallon containers. Use absorbent material or a containment system to prevent spills when re-fueling small equipment within the stream margins or near the edge of waterbodies (SP 03). ● In the event of a spill or release, take all reasonable and safe actions to contain the material. Specific actions are dependent on the nature of the material spilled (SP 03). ● Use spill containment booms or as required by ODEQ. Have access to booms and other absorbent containment materials (SP 03). ● Immediately remove waste or spilled hazardous materials (including but not limited to diesel, oil, hydraulic fluid) and contaminated soils near any stream or other waterbody, and dispose of it/them in accordance with the applicable regulatory standard. Notify Oregon Emergency Response System of any spill over the material reportable quantities, and any spill not totally cleaned up after 24 hours (SP 03). ● Store equipment containing reportable quantities of toxic fluids outside of Riparian Reserve (SP 03).	***Vegetation, Soil, Water, Fish, Wildlife***

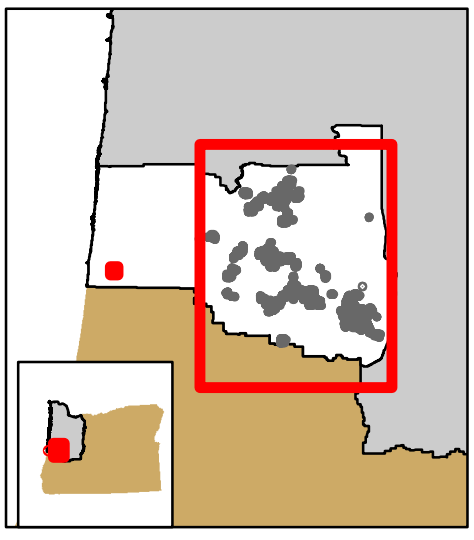
Best Management Practices from ROD/RMP References	*Resources*
● If more than 42 gallons of fuel or combined quantity of petroleum product and chemical substances would be transported to a project site as project materials, implement the following precautions (SP 04): o Plan a safe route and material transfer sites so that all spilled material would be contained easily at that designated location. o Plan an active dispatch system that can relay information to appropriate resources. o Ensure a spill containment kit that can absorb and contain 55 gallons of petroleum product and chemical substances is readily available. o Provide for immediate notification to OERS in the event of a spill. Have a radio-equipped vehicle lead the chemical or fuel truck to the project site. o Assemble a spill notification list that includes the district hazardous materials coordinator, ODEQ, and spill clean-up contractors. o Construct a downstream water user contact list with addresses and phone numbers. o When operating within source water watersheds, pre-estimate water flow travel times through the watershed to predict downstream arrival times. o Be prepared to sample water and carry sample containers. o Be prepared to assist OSP and ODFW to assess wildlife impacts of any material spilled.	***Vegetation, Soil, Water, Fish, Wildlife***
● Spill Prevention, Control, and Countermeasure Plan (SPCC): All operators shall develop a modified SPCC plan prior to initiating project work if there is a potential risk of chemical or petroleum spills near waterbodies. The SPCC plan would include the appropriate containers and design of the material transfer locations. No interim fuel depot or storage location other than a manned transport vehicle would be used (SP 05). ● Spill Containment Kit (SCK): All operators shall have an SCK as described in the SPCC plan on-site during any operation with potential for run-off to adjacent water bodies. The SCK would be appropriate in size and type for the oil or hazardous material carried by the operator (SP 06). ● Operators shall be responsible for the clean-up, removal, and proper disposal of contaminated materials from the site (SP 07).	***Vegetation, Soil, Water, Fish, Wildlife***

Siuslaw HLB Landscape Plan EA

In addition to this overview map, see BLM's e-Planning website: https://eplanning.blm.gov/eplanning-ui/admin/project/1502250/570 for an interactive web map, an age-class map, and map by Section Township and Range.







Potential Harvest Units
Northwest Oregon District
Field Office boundary
County boundary
Highway
County Road
Waterbody
Stream or River

Land Status Dissolved

Bureau of Land Management
U.S. Forest Service
Bureau of Indian Affairs
State
Local Government
Private/Unknown

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

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5.7 Appendix G - References

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