APPENDIX F.3

Late Successional Reserves Crossed by the PCGP Project on National Forest System Land

Jordan Cove Natural Gas Liquefaction and Pacific Connector Gas Pipeline Project Draft EIS

Appendix F3

Late Successional Reserves Crossed by the PCGP Project on National Forest System Lands

Pacific Connector Gas Pipeline

Umpqua and Rogue River National Forests

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1.0 INTRODUCTION

The 1994 Northwest Forest Plan (NWFP) Record of Decision (ROD) created a new land use allocation called Late-Successional Reserves (LSR). LSRs are designed to maintain late-successional (mature or old-growth) forests in a well-distributed pattern across federal lands within the range of the northern spotted owl (NSO) (Mouer et al. 2011). The NWFP contains standards and guidelines for LSRs. As defined in the NWFP ROD, these standards and guidelines constitute the "rules and limits governing actions, and the principles specifying the environmental conditions or levels to be achieved" in each LSR (USDA and USDI 1994, page F-4).[1]

The proposed Pacific Connector Gas Pipeline (PCGP) project would cross three U.S. Forest Service (Forest Service) national forests. The land and resource management plans (LRMPs) of the three national forests (NF) that would be crossed by the PCGP project—Rogue River, Umpqua, and Winema—were amended by the NWFP to include LSR designations and standards and guidelines.

In crossing these federal lands, the PCGP project would traverse portions of two large (mapped) LSRs RO-223 (223) located in the Umpqua NF and RO-227 (227) located in the Rogue River NF. The PCGP project as presently proposed does not affect any LSR on the Winema NF. For development proposals like the PCGP project, the LSR standards and guidelines state that pipelines should be planned to have the least possible adverse impacts on LSRs (USDA and USDI 1994, page C-17). The standards and guidelines also state that these types of proposals will be reviewed on a case-by-case basis and may be approved when adverse effects can be minimized and mitigated.

To meet this direction, the Forest Service has provided input to the applicant regarding project design. First, in routing the proposed PCGP project, LSRs have been avoided where possible. Second, where impacts to LSRs are unavoidable, onsite "Design Features" or "Project Requirements"[2] have been developed to minimize the impacts. Third, in order to ensure that the objectives would continue to be achievable in these LSRs, land reallocations are being proposed as part of a compensatory mitigation plan. These proposed land reallocations would take non-LSR (i.e., matrix) lands and designate them as LSRs. The reallocations will require amendments to the LRMPs for the Umpqua NF and Rogue River NF. Fourth, off-site compensatory mitigation actions have been proposed to aid in off-setting unavoidable adverse impacts. These proposed mitigation actions and related plan amendments for LSRs are the primary focus of this report.

[1] Originally the NWFP covered federal lands managed by the Bureau of Land Management (BLM) and Forest Service within the range of the NSO. However, in August 2016, the BLM issued new Resource Management Plans that replaced the management direction for BLM lands. Therefore, the management direction in the NWFP no longer applies to BLM lands.

[2] The Forest Service uses the term "Design Features" or "Project Requirements" rather than "mitigation" to describe elements of a plan that occur within a project area and are standard requirements of a project. The Forest Service reserves the term "mitigation" to describe measures taken to reduce or compensate for otherwise unavoidable impacts. The term "mitigation" as used elsewhere in this report refers to the full range of activities designed to reduce the adverse effects of the project.

1.1 REPORT FORMAT

1.1.1 Purpose

The purpose of this technical report is to provide the information necessary to support findings by agency decision makers regarding impacts of the proposed PCGP project on the LSRs that the pipeline would cross. The National Forest Management Act (NFMA) of 1976 requires projects or other management activities on Forest Service-managed lands to be consistent with the relevant land management plans. This means that decision makers for the Forest Service must determine whether or not the proposed PCGP project would be consistent with the standard and guidelines for new developments in LSRs.

1.1.2 Approach

Section 1 of this report provides background on the NWFP and the development of the LSR designation as part of the overall strategy to maintain healthy forest ecosystems that will support populations of native species associated with late-successional and old-growth (LSOG) forests. Included are overviews of the LSR components and standards and guidelines, as well as a summary of the content and role of Late-Successional Reserve Assessments (LSRAs).

Section 2 provides an evaluation organized by Forest Service unit of PCGP project impacts and related mitigation actions in individual LSRs. Each LSR evaluation includes a summary of relevant information from the associated LSRA, updated, as appropriate, with any significant new information. This section also includes an evaluation of proposed off-site mitigation actions and related plan amendments for each affected LSR and their impacts, if any, on attainment of LSR objectives. Finally, Section 2 evaluates the consistency of the proposed project and mitigation with the LSR standards and guidelines. Section 3 of this report lists the role and experience of the report preparers, and Section 4 lists the references cited in this report.

1.1.3 Agency Use

As a cooperating agency, the Forest Service will use information in this report to prepare portions of the PCGP Project Environmental Impact Statement (EIS) that are relevant to proposed agency actions.

The Forest Service will also use the information in this report along with other relevant information in the EIS in making its decision to approve or not approve LSR-related amendments to the relevant LRMPs, and in its determination regarding concurrence with BLM's granting of a right-of-way for the project.

1.2 LATE SUCCESSIONAL RESERVES

1.2.1 Background

In the 1980s, public controversy intensified over timber harvesting of LSOG forests; declining populations of LSOG-related species such as the northern spotted owl (NSO) and marbled murrelet (MAMU), which are both listed as threatened under the Endangered Species Act (ESA); and the role of federal forests in regional and local economies. Litigation and court injunctions on harvesting of LSOG forests on federal land resulted in gridlock for federal timber sales and economic impacts to communities dependent on the timber resource. Congress, seeking a permanent solution to the gridlock, commissioned a group of scientists to develop and evaluate

different strategies for protecting LSOG forests on federal lands within the range of the NSO. This scientific team mapped areas of significant LSOG forests and developed several strategies for protecting them (Scientific Panel on Late-Successional Forest Ecosystems 1991). The turmoil ultimately led to President Clinton's convening a Forest Conference in Portland, Oregon, on April 2, 1993, to address the human and environmental needs served by federally managed forests in Washington, Oregon, and northern California (Mouer et al. 2011). Following the conference, an interagency team of scientists, economists, sociologists, and others—the Forest Ecosystem Management Assessment Team or FEMAT—was assembled to develop proposals for the management of over 24 million acres of public land within the range of the NSO.

On July 1, 1993, President Clinton announced his forest plan for a sustainable economy and a sustainable environment (Clinton and Gore 1993). During the same month, FEMAT issued its report, "Forest Ecosystem Management: An Ecological, Economic and Social Assessment" (FEMAT 1993), which provided the framework for subsequent National Environmental Policy Act (NEPA) decision-making. Over the next year, NEPA analyses were completed, and an EIS was developed. The ROD associated with this EIS was signed in 1994, implementing new management direction for the public lands within the range of the NSO (USDA and USDI 1994). The ROD amended existing management plans for 19 national forests and seven BLM districts[3] in California, Oregon, and Washington. The ROD and accompanying standards and guidelines are commonly referred to as the Northwest Forest Plan. The ROD for the Final EIS is available at http://www.reo.gov/library/reports/newroda.pdf, and the standards and guidelines are available at http://www.reo.gov/library/reports/newsandga.pdf.

The NWFP established the following objectives for the land use allocations and standards and guidelines (USDA and USDI 1994, page 3):

- Comply with the requirements of federal law.
- Be based on the best available science and be ecologically sound.
- Protect the long-term health of federal forests.
- Provide for a steady supply of timber and non-timber resources that can be sustained over the long term without degrading forest health or other environmental resources.

The NWFP standards and guidelines created new land use allocations that overlay existing management directions in the relevant land management plans (USDA and USDI 1994). These plans, as amended, are consistent with all management directions in the NWFP regarding the proposed PCGP project. The standards and guidelines in the current FS management plans apply where they are more restrictive or provide greater benefits to late-successional forest related species than other provisions of the standards and guidelines in the NWFP (USDA and USDI 1994, page C-2).

The NWFP allocated a network of LSR reserves to conserve species of concern within the existing configuration of land ownership and the location of remaining LSOG forests within the range of the NSO. The reserve network is embedded in a matrix of "working" forests and was designed to maintain LSOG forests in a well-distributed pattern across these federal lands (Mouer et al. 2011).

[3] As noted in footnote 1 above, the management direction for the BLM lands has since been replaced by new Resource Management Plans approved in August 2016.

The LSR network is composed primarily of areas of large (mapped) reserves, but also includes smaller areas of "unmapped" reserves that are composed of sites occupied by MAMUs or are known northern spotted owl activity centers (known owl activity centers (KOACs). The LSR standards and guidelines are designed to guide management activities occurring within these LSRs to protect and enhance the conditions of the LSOG forest ecosystems contained therein (USDA and USDI 1994). The proposed PCGP project would cross two mapped LSRs (223 and 227). In its present alignment, the PCGP project would not cross any unmapped LSRs.

1.2.2 LSR Objectives/Goals

The overall objective of the LSR network is to protect and enhance conditions of LSOG forest ecosystems that serve as habitat for LSOG-related species, including the listed NSO and marbled murrelet. The reserves are designed to help achieve the following goals (USDA and USDI 1994, page B-4):

- Promote a distribution, quantity, and quality of LSOG forest habitat sufficient to avoid foreclosure of future management options.
- Provide habitat for populations of species associated with LSOG forests.
- Help ensure that LSOG species diversity will be conserved.

The LSR land allocations and standards and guidelines have been specifically designed to help achieve these goals.

1.2.3 LSR Elements

In 1994, the standards and guidelines for the NWFP described five elements that were used to designate LSRs.

> Late-Successional Reserves have been designated based on five elements: (1) areas mapped as part of an interacting reserve system; (2) LS/OG 1 and 2 areas within Marbled Murrelet Zone 1, and certain owl additions, mapped by the Scientific Panel on Late-Successional Forest Ecosystems (1991); (3) sites occupied by marbled murrelets; (4) known owl activity centers; and (5) Protection Buffers for specific endemic species identified by the Scientific Analysis Team (SAT) (1993). (USDA and USDI 1994b, page C-9)

Today, elements (1) and (2) are commonly referred to as "mapped" LSRs, and elements (3) and (4) are commonly referred to as "unmapped" LSRs. Although element (5), protection buffers, was originally part of the LSR network, it was later removed by the 2001 ROD for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines (USDA and USDI 2001b). The 2001 ROD retained the direction to manage known sites of protection buffer species but removed their designation as small, species-specific LSRs.

1.2.4 Mapped LSRs

Most LSR areas are mapped. Several factors were considered in designating these reserves, including key watersheds and significant areas of old-growth forest that had previously been identified (USDA and USDI 1994b). These included LS/OG 1 and 2 areas (most ecologically significant and ecologically significant late-successional and old-growth forests, respectively) identified by the Scientific Panel on Late-Successional Forest Ecosystems (Johnson et al. 1991).

Maps of the LSR network are available at the following website: http://www.reo.gov/gis/data/gisdata/index.htm. Maps of the LSRs that would be crossed by the PCGP project are described in Section 2 of this report.

1.2.5 Unmapped LSRs

Unmapped LSRs include sites occupied by MAMUs and KOACs.[4] For MAMUs, surveys are required for projects that occur within MAMU habitat to determine if there is occupation within the project area. If occupation is documented, all contiguous existing and recruitment habitat within a 0.5-mile radius is to be protected and managed by the standards and guidelines for LSRs. The standards and guidelines for LSRs also apply to KOACs (as of January 1, 1994) located in matrix or Adaptive Management Areas of the NWFP. Activity centers are defined as an area of concentrated activity of either a pair of spotted owls or a territorial single owl. Each KOAC has a 100-acre area identified around or near the activity center, where the standards and guidelines for LSRs apply (USDA and USDI 1994b). The PCGP project as currently proposed would not impact any unmapped LSRs.

1.2.6 LSR Standards and Guidelines

The standards and guidelines for LSRs are contained in Attachment C (pages C-9 through C-21) of the NWFP ROD. They are designed to protect and enhance conditions of LSOG forest ecosystems that serve as habitat for LSOG species. They are written to apply to specific management actions such as silviculture, range management, mining, new developments, etc., and should be interpreted in that context. The standards and guidelines that apply to new developments such as pipelines are addressed on page C-17 of the NWFP standards and guidelines. The standard on page C-17 states;

> Developments of new facilities that may adversely affect Late-Successional Reserves should not be permitted. New development proposals that address public needs or provide significant public benefits, such as powerlines, pipelines, reservoirs, recreation sites, or other public works projects will be reviewed on a case-by-case basis and may be approved when adverse effects can be minimized and mitigated. These will be planned to have the least possible adverse impacts on Late-Successional Reserves. Developments will be located to avoid degradation of habitat and adverse effects on identified late-successional species.

The LSR standards and guidelines provide the framework upon which the proposed LSR mitigation actions and related plan amendments for the PCGP project are evaluated.

1.2.7 LSRAs

The LSR standards and guidelines specify that management assessments be prepared for each large LSR (or groups of smaller LSRs) before habitat-disturbing projects are allowed to occur in these areas. The standards and guidelines (page C-11 of the NWFP ROD, USDA and USDI 1994) directed that these LSRAs include:

[4] It should be noted that the term "unmapped" LSR is being used to distinguish the LSR areas represented by occupied MAMU stands and KOACs from the larger "designated" or "mapped" LSRs in the NWFP. However, with implementation of the NWFP, these areas are mapped and are managed under the standards and guidelines for LSR.

> "(1) a history and inventory of overall vegetative conditions within the reserve, (2) a list of identified late-successional associated species within the reserve, (3) a history and description of current land uses within the reserve, (4) a fire management plan, (5) criteria for developing appropriate treatments, (6) identification of specific areas that could be treated under those criteria, (7) a proposed implementation schedule tiered to higher order (i.e., larger scale) plans, and (8) proposed monitoring and evaluation components to help evaluate if future activities are carried out as intended and achieve desired results."

The Forest Service uses LSRAs to better understand the existing conditions in the LSRs, develop criteria for appropriate treatments, and identify and prioritize actions that would further LSR objectives. The NWFP directed that LSRAs would be subject to review by the Regional Ecosystem Office (REO). The REO provides staff work, support, and recommendations to the Regional Interagency Executives concerning the implementation of the NWFP (USDA and USDI 1994, page E-16). The standards and guidelines for LSRs also require REO review of projects in LSRs, such as thinning of trees, prescribed fire, salvage of dead trees, and others (USDA and USDI 1994, page C-12 through C-19). Once an LSRA has been reviewed by the REO, projects that are determined to be in conformance with relevant project criteria in the LSRA are exempt from further REO review. It is also intended that LSRAs be treated as 'living' assessments that should be updated over time as new data become available, conditions change (e.g., due to fires), and projects are implemented and monitored.

The two LSRAs relevant to the LSRs that would be affected by the PCGP project include the South Cascades LSRA for LSR 227 (April 1998) and the South Umpqua River/Galesville LSRA for LSR 223 (July 1999). These assessments are discussed in further detail in Section 2 of this report and are available at the following website: http://www.reo.gov/lsr/assessments/

1.3 OVERVIEW

1.3.1 Energy Transmission on Federal Lands

By law, energy transmission can be a legitimate use of public land. The U.S. Congress has determined that public lands, including Forest Service lands, play a significant role in energy development and transmission. This intent has been expressed in legislation that dates back to the Mineral Leasing Act of 1920. Because federal lands are so extensive in the Pacific Northwest, it would be practically impossible to avoid them and still construct interstate power transmission lines or natural gas pipelines that connect to distribution hubs. If utility corridors could not cross public lands, the impacts on private lands from easements would increase, and overall costs resulting from longer, more indirect routes would also increase. These costs would be ultimately carried by the public.

While the Forest Service has a mission to manage public lands, the Federal Energy Regulatory Commission (FERC) determines where and when new energy sources and transmission facilities can be developed. FERC is also the federal agency responsible for authorization of natural gas pipelines and certain other types of energy projects. Construction and operation of utilities like the PCGP project are regulated by FERC to ensure that public interests are protected.

When FERC accepts an application from a utility company to cross public land, Congress, through the 2005 Energy Policy Act (EPAct), has directed the responsible agencies to coordinate with

FERC to process applications required to construct the project. The 2005 EPAct reinforced Executive Order (EO) 13212 issued May 18, 2001, which directed federal agencies to take appropriate actions, consistent with applicable law, to expedite reviews of applications for energy-related projects and to take other action necessary to accelerate the completion of such projects while maintaining safety, public health, and environmental protections. To facilitate EO 13212, the Secretaries of Agriculture, Interior, and Energy and other federal agencies have agreed, through a formal Memorandum of Understanding (Interagency MOU, 2002), to coordinate their efforts and to cooperate in the expeditious processing of applications for construction of natural gas pipelines. These policies were further expanded with EO 13766–Expediting Environmental Reviews and Approvals for High Priority Infrastructure Projects issued January 24, 2017, and EO 13807–Presidential Executive Order on Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure, issued August 15, 2017. These Executive Orders established a process for federal agencies to coordinate and track the environmental review and permitting processes for major infrastructure projects.

The underlying need for action of the PCGP project is for FERC to respond to the 2017 application to authorize the Jordan Cove export terminal and PCGP, and for the BLM to respond to a right-of-way grant application originally filed by Pacific Connector on April 17, 2006. The right-of-way grant would allow Pacific Connector to construct, operate, maintain, and eventually decommission a natural gas pipeline that would cross lands and facilities administered by the BLM, Forest Service, and the Bureau of Reclamation. In addition, there is a need for the BLM and Forest Service to consider amending land management plans to make provision for the PCGP right-of-way.

FERC will analyze the environmental consequences of the construction and operation of the proposed PCGP project in its EIS. The BLM and Forest Service have identified the specific sections of their RMPs and LRMPs that would need to be amended to make provision for the proposed project. The BLM and Forest Service will independently evaluate the proposed RMP and LRMP amendments using the NEPA process, as required by the planning regulations of each agency. The BLM and Forest Service will use FERC's consolidated public record for analysis of environmental consequences associated with construction and operation of the PCGP project. The proposed RMP/LRMP amendments will be included and evaluated as part of the FERC EIS. This report evaluates the consistency of the proposed PCGP project and mitigation actions with the standards and guidelines for LSR on national forest system lands.

1.3.2 The Proposed PCGP Project on Forest Service Lands

The proposed pipeline would cross three national forests (Rogue River, Umpqua, and Winema) for a total of approximately 31 miles. The proposed project would affect mapped LSRs on the Rogue River and Umpqua NFs. As presently configured, the proposed PCGP project would not cross any LSRs on the Winema NF. Table 1.3.2-1 and figure 1.3-1 provide an overview of the number of acres that would be directly affected by the PCGP project within LSRs on each affected unit of the Forest Service. The mapped LSR that would be crossed on the Umpqua NF is depicted in figure 2.1-1, and the mapped LSR that would be crossed on the Rogue River NF is depicted in figure 2.2-1.

Direct effects would occur in the areas that would be cleared (i.e., forest vegetation would be removed) for the pipeline right-of-way and the temporary extra work areas (TEWAs). Direct

effects would also occur on acres that would be "modified" by the PCGP project. These acres include uncleared storage areas (UCSAs) that would not be cleared of trees during construction. These areas would be used to store forest slash, stumps, and dead and downed log materials that would be scattered across the right-of-way after construction, which would be considered temporary habitat modifications.

Indirect effects from construction of the pipeline are also expected within LSRs that have interior forest that the NSO rely on for nesting habitat. The conversion of large tracts of LSOG forest to small, isolated forest patches with large edge areas can create changes in microclimate, vegetation species, and predator-prey dynamics. Such edge effects—the magnitude of changes over distance from the edge to forest interior—would depend on the general orientation to the sun. Two main physical factors affecting and creating an edge microclimate are sun and wind (Forman 1995, Chen et al. 1995, Harper et al. 2005). Together, sun and wind: 1) desiccate leaves by increasing evapotranspiration; 2) influence which plant species survive and thrive along the edge, usually favoring shade-intolerant species; and 3) impact the soil, insects, and other animals along the edge. Compared to the forest interior, areas near edges receive more direct solar radiation during the day, lose more long-wave radiation at night, have lower humidity, and receive less short-wave radiation. However, such effects are dependent on such local conditions as orientation of an edge: the magnitudes of change in humidity with distance from an edge are most extreme with south-facing edges compared to east- and west-facing edges (Chen et al. 1995). These effects would vary along the pipeline route as a function of route orientation and the facing direction of each edge. Because the Pacific Connector pipeline generally trends from northwest to southeast, edge effects would be most pronounced on the southwest-facing edges and weakest along the northeast-facing edges. Fundamental changes in the microclimate (moisture, temperature, solar radiation) of a stand have been recorded greater than 700 feet from the forest edge (Chen et al. 1995).

Using recommendations from the ESA Sub-Task Group and Habitat Quality Subtask Group[5], indirect effects are considered to extend for 100 meters from the created edge in LSOG forest. In making their recommendation, the sub-task groups considered the study done by Karen A. Harper et al., which looked at edge influence on forest structure in fragmented landscapes (Harper et al. 2005). The study reviewed the effects caused by forest edges on multiple response variables, including: 1) forest processes of tree mortality/damage, recruitment, growth rate, canopy foliage, understory foliage, and seedling mortality, 2) forest structure by canopy trees, canopy cover, snags and logs, understory tree density, herbaceous cover, and shrub cover, and 3) stand composition by species, exotics, individual species, and species diversity. The study found that the mean distance of edge influence on any single response variable did not exceed 300 feet (100 meters). Therefore, indirect effects for the project are estimated to extend for 100 meters beyond the cleared area on each side of the corridor in LSOG forest habitat. There is no corresponding research for edge effects in younger forest stands (less than 80 years old). There is, however, research that indicates indirect effects extend out approximately two times the average tree height (Morrison et al. 2002). Based on this research, an estimate of 30 meters is used in non-LSOG forest habitat. In non-

[5] These sub-task groups were part of an Interagency Task Force, which included representatives of the U.S. Fish and Wildlife Service and National Marine Fisheries Service, as well as USFS, BLM, Oregon Dept. of Land and Conservation Development, Oregon Dept. of Energy, Oregon Division of State Lands, Army Corps of Engineers, Oregon Dept. of Fish and Wildlife, Environmental Protection Agency, and the Oregon Dept. of Environmental Quality, to obtain specific input, guidance, and technical approach reviews. Agencies participating in the Interagency Task Force reviewed information provided by Jordan Cove Energy and Pacific Connector Gas Pipeline.

forested areas, no indirect effects are estimated since no new edge would be created. Table 1.3.2-2 and figure 1.3-2 provide a summary of the total number of LSR acres that would be directly and indirectly affected on Forest Service lands by the PCGP project.

The construction, operation, and maintenance of the proposed PCGP project would affect LSRs on Forest Service lands in several ways. It would remove and fragment LSOG forest habitat that some vertebrate and invertebrate species depend on. It would directly affect individuals of species listed as threatened under the ESA through removal of suitable nesting, roosting, and foraging habitat for the NSO. The indirect effects discussed above would result in the loss of interior LSOG forest habitat and increased predation. These impacts and others from the proposed construction, operation, and maintenance of the PCGP project on LSRs are discussed in the FERC Draft EIS and will also be discussed in the FERC-prepared biological assessments (BAs). The analysis in this report focuses on how the proposed amendments and mitigation actions would affect the LSR land allocation in terms of the distribution, quantity, and quality of LSOG habitat, and consistency with the LSR standards and guidelines.

TABLE 1.3.2-1

Direct Effectsa of the Proposed PCGP Project on Mapped LSRs (acres)

Forest	Cleared	Modified	Total Direct Effects
Umpqua NF	68	17	84
Rogue River NF	206	70	276
Total	**274**	**87**	**359**

a/ Direct effects include PCGP corridor clearing, TEWAs, and UCSAs
Data source: USFS, GIS layers

Figure 1.3-1. Direct Effects of the Proposed PCGP Project on Mapped LSRs (acres)

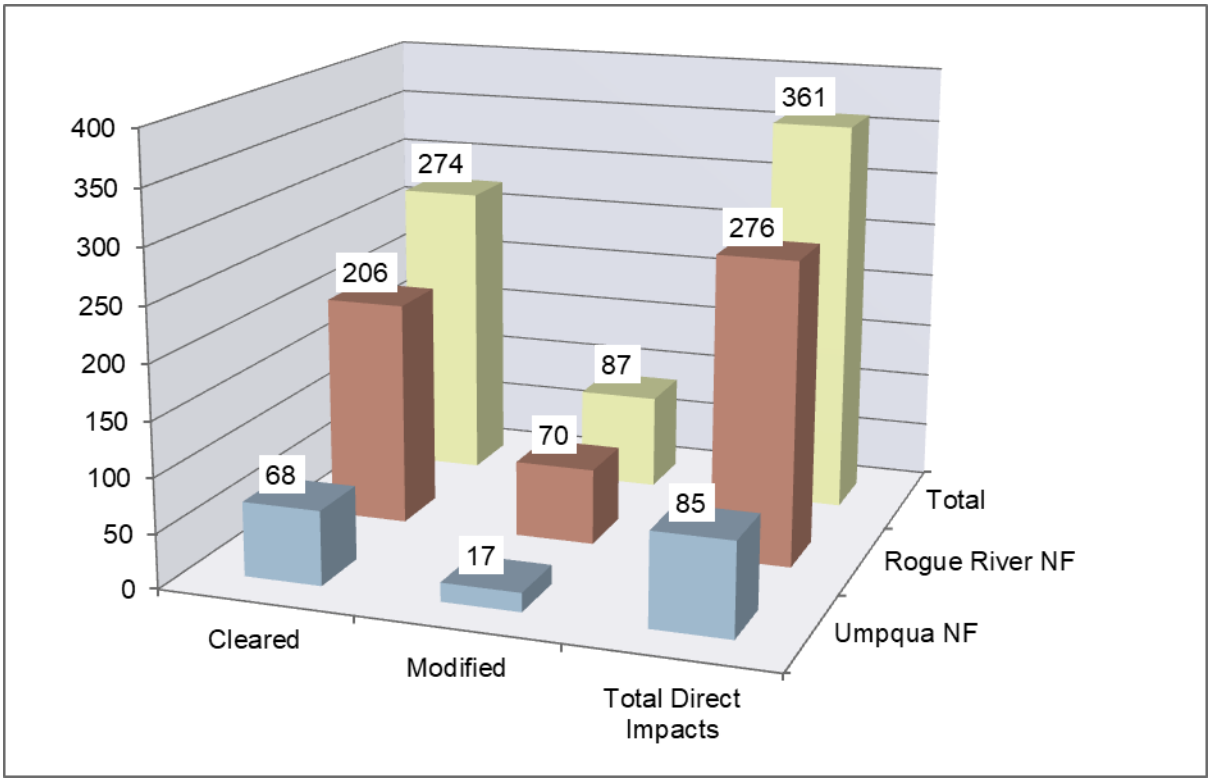


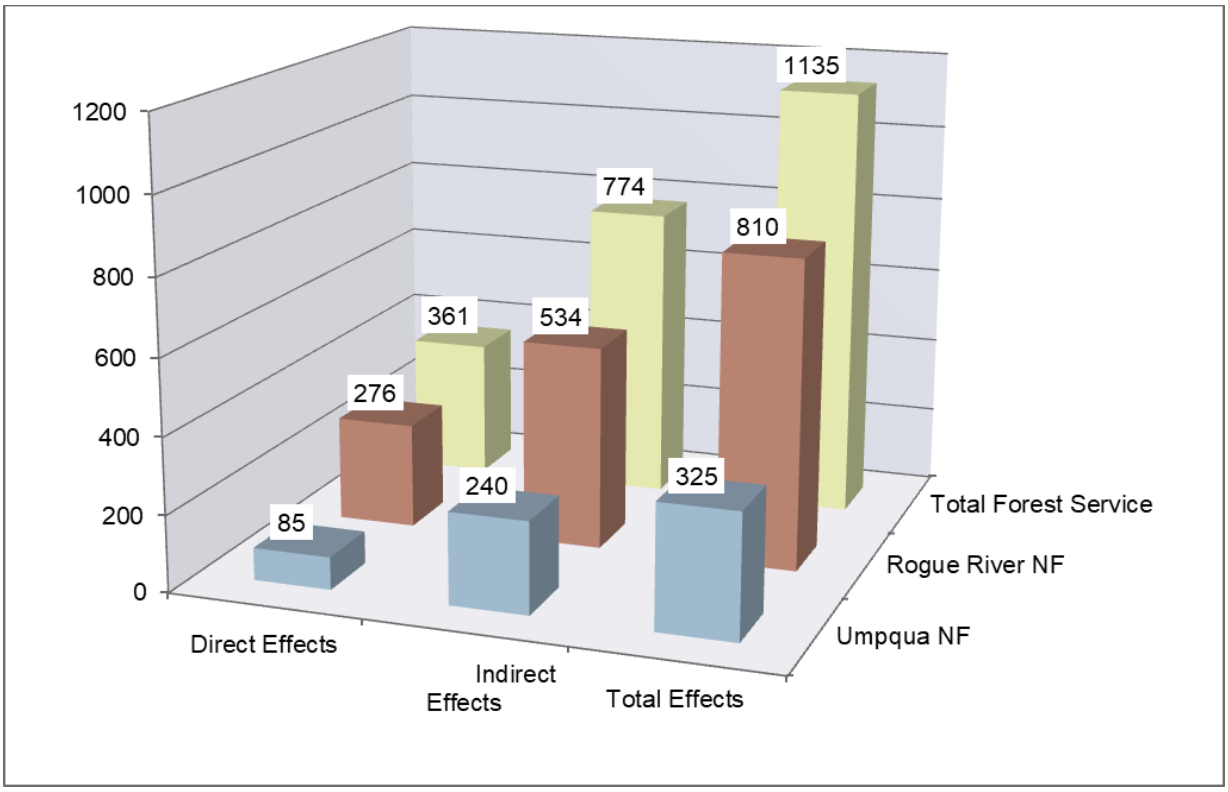
TABLE 1.3.2-2

Summary of Total LSR Acres Directly and Indirectly a/ Affected by the Proposed PCGP Project

Forest	Direct Effects	Indirect Effects	Total Effects
Umpqua	84	241	325
Rogue River	276	534	810
Total Forest Service	**360**	**775**	**1,135**

Data source: USFS GIS data layers
a/ Direct effects include cleared acres (corridor and TEWAs) and modified acres (UCSAs). Indirect effects include 100 meters on each side of the cleared corridor edge in LSOG and 30 meters on each side of the cleared corridor edge in non-LSOG.

Figure 1.3-2. Summary of Total LSR Acres Directly and Indirectly Affected by the PCGP Project



1.3.3 The Need for Plan Amendments and Off-Site Mitigation in LSRs

Under the National Forest Management Act (NFMA), the proposed PCGP project would have to conform to Forest Service land use plans. Those plans incorporate the NWFP standards and guidelines, which allow new developments in LSRs on a case-by-case basis, provided certain considerations are taken. The standard and guideline for new developments in LSRs state;

> "Developments of new facilities that may adversely affect Late-Successional Reserves should not be permitted. New development proposals that address public needs or provide significant public benefits, such as powerlines, pipelines, reservoirs, recreation sites, or other public works projects will be reviewed on a case-by-case basis and may be approved when adverse effects can be minimized and mitigated. These will be planned to have the least possible adverse impacts on Late-Successional Reserves. Developments will be located to avoid degradation of habitat and adverse effects on identified late-successional species." (USDA and USDI 1994, page C-17)

To be consistent with this standard and guideline, the first consideration is to avoid affecting LSRs altogether. When that is not feasible, the second consideration is locating the project to minimize adverse impacts, and the third consideration is to mitigate or compensate for unavoidable adverse impacts. In order to be consistent with the standard and guideline above, considerations two and

three would need to result in overall impacts that are either neutral or beneficial to the creation and maintenance of late-successional habitat in LSRs (USDA and USDI Memorandum 2001).

1.3.3.1 Avoiding LSRs

Alternative routes that would avoid all LSRs were investigated by the applicant, Forest Service, and FERC. These alternatives would require lengthy rerouting both in terms of the overall length of the pipeline and in the amount of private land affected. These alternatives and the reasons why they were not carried further are discussed in section 10.4 of Resource Report 10 and in section 3.4 of FERC Draft EIS. The steps taken to avoid LSRs and how they were incorporated into the proposed route where feasible are also discussed in section 10.4 of Resource Report 10.

In summary, because the proposed project is a linear, large-diameter, high-pressure natural gas pipeline that must be routed to ensure safety, stability, and integrity, it is unreasonable, impractical, and infeasible to entirely avoid all designated LSRs within the project area for the following reasons:

1) The overall extent of the designated LSR land allocation in the project area makes it impractical to completely avoid LSRs;

2) The length of the proposed project, which extends approximately 230 miles from Coos Bay to Malin, Oregon, crosses Coos, Douglas, Jackson, and Klamath counties, and traverses public lands managed by three national forests, makes it impractical to avoid all designated LSRs;

3) Large, contiguous areas of federal lands in the project area make it impractical and infeasible to entirely route around these lands to avoid LSRs; and

4) Where LSRs are encountered along the alignment, the routing requirements of the proposed pipeline to ensure a safe, stable, and constructible alignment to ensure long-term integrity make it infeasible/unreasonable to avoid LSRs by aligning the pipeline on steep side slopes or other potentially unstable areas.

1.3.3.2 Minimizing Adverse Impacts

During the project route selection and construction footprint design process, interdisciplinary teams from the Forest Service worked with FERC and the applicant to develop steps that would minimize impacts to LSRs where avoidance was not feasible. In August 2006, the Forest Service requested that FERC study an alternative route over portions of the Rogue River and Fremont-Winema NFs. This suggested route variation mostly followed existing Forest Service roads. In late September 2006, Pacific Connector met with the Forest Service to discuss the variation, as well as to explain project construction requirements. As a result of consultations with the Forest Service, Pacific Connector modified its original May 2006 route to adopt segments of the USFS suggested variation, and incorporated the modified route into its current proposed route. The following features have been incorporated into the proposed route and construction design:

- Performing routing and geotechnical evaluations to ensure the most stable pipeline alignment for long-term stability. These efforts would minimize the potential need to conduct future maintenance activities, which could require additional impacts to LSRs.

- Where feasible, the proposed alignment was co-located with existing roads and early-seral conifer plantations to reduce impacts to LSOG habitat and to minimize disturbance impacts.
- Areas of side slopes were avoided to minimize the need for additional TEWAs to accommodate the necessary cuts and fill to safely construct the pipeline.
- The number and size of the planned TEWAs in LSRs were minimized to those critical for safe pipeline construction.
- Additional TEWAs were located in previously disturbed areas (i.e., areas that were recently logged) or in young, regenerating forest stands.
- Existing roads would be used to access the construction right-of-way during construction, and the right-of-way would be used as the primary travel-way to move equipment and materials up and down the right-of-way to remove the need for additional roads within LSRs. The existing roads would also be used during operations and maintenance to avoid the need for new access routes.
- Pacific Connector would replant or allow trees to naturally regenerate to within 15 feet of the pipeline centerline within the permanent pipeline easement to minimize the potential long-term effects of the pipeline easement.

Detailed descriptions of the conservation measures proposed by the applicant are included in Resource Report 3 and in the Plans of Development.

1.3.3.3 Mitigation for Unavoidable Adverse Impacts

In addition to avoidance and minimization, off-site mitigation would also be necessary to ensure that unavoidable adverse impacts are mitigated to meet the requirement that the overall impact would be either neutral or beneficial to the creation and maintenance of late-successional habitat in LSRs. A Compensatory Mitigation Plan (CMP) on Forest Service lands has been developed by the agency for the PCGP project. A portion of the CMP was developed specifically to compensate for the unavoidable adverse impacts of the project on LSRs to achieve a neutral or beneficial condition within affected LSRs and to maintain the long-term integrity of the Forest Service land use plans for LSRs. Under the CMP, unavoidable impacts to LSOG forest habitats within LSRs on Forest Service lands would be compensated for by a combination of reallocation of matrix lands to LSR and implementing off-site mitigation projects. The off-site mitigations for stand treatments and fuel breaks are intended to implement the recommendations contained in the LSRAs for LSR 223 and LSR 227. Stand treatments would enhance or accelerate the development of LSOG habitat elements to further offset the effects of the PCGP project on LSRs in the long term (long term is longer than the expected life of the project or greater than 50 years). Fuel breaks would help reduce the risks of LSOG forest loss to catastrophic wildfires. The off-site mitigation actions would also increase the effectiveness of the LSOG forest habitat added to LSRs by improving the quantity, quality, and distribution of high-quality habitat.

The primary mitigation action for the effects of the proposed pipeline on LSRs would add acres to the LSRs. The Forest Service is proposing to accomplish this through reallocation of matrix lands to LSR. Reallocating these acres will require amendments to the Umpqua and Rogue River NF

LRMPs.[6] The analysis in the following sections examines the acres of habitat (by habitat type of LSOG, non-LSOG, and non-forest) that would be cleared by the project, with the amount of habitat that would be reallocated since this would the most direct comparison of acres affected in the LSR system. Table 1.3.3-1 and figure 1.3-3 display a summary comparison between the LSR acres that would be cleared by the construction of the PCGP project and the proposed reallocation of matrix lands to LSR. Amendments concerning LSRs associated with the PCGP project would be coordinated with the Regional Ecosystem Office as required by the Northwest Forest Plan.

TABLE 1.3.3-1

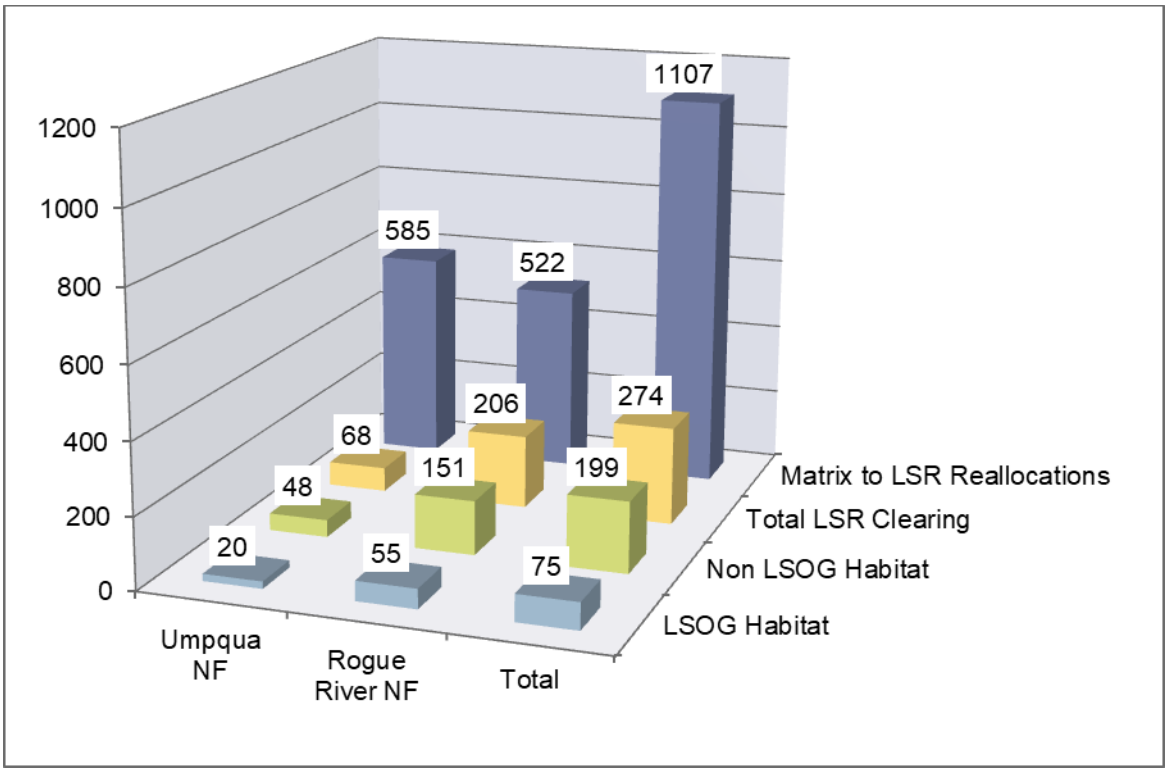
Comparison of Total LSR Acres Cleared a/ by the PCGP Project and the Acres of Matrix Reallocated to LSR

	LSR Habitat Affected by PCGP Construction Clearing			LSR Mitigation
Forest	**LSOG Habitat**	**Non-LSOG Habitat**	**Total LSR Clearing**	**Matrix to LSR Reallocations**
Umpqua NF	20	48	68	585
Rogue River NF	55	151	206	522
Total	**75**	**199**	**274**	**1,107**

Data source: USFS GIS data layers
a/ Clearing includes acres in the PCGP corridor and the TEWAs

[6] Evaluations of these proposed amendments and how they relate to the planning requirements in the Forest Service planning rule at 36 CFR 219 (2012 Version) is discussed in Section 4.7 of the DEIS and in Appendix F2.

Figure 1.3-3. Comparison of Total LSR Acres Cleared by the PCGP Project and Total Acres of Matrix Reallocated to LSR



2.0 LSR CROSSED BY THE PCGP PROJECT

The proposed PCGP project would cross LSRs on two national forests (Umpqua and Rogue River), for a total of approximately 31 miles. Figure 1.3-1 provides an overview of the proposed project and the management units of the Forest Service. Table 1.3.2-2 displays the total acres of LSR that would be affected in each management unit of the Forest Service. The remainder of this section will address the PCGP project in LSR on the Umpqua and Rogue River NFs.

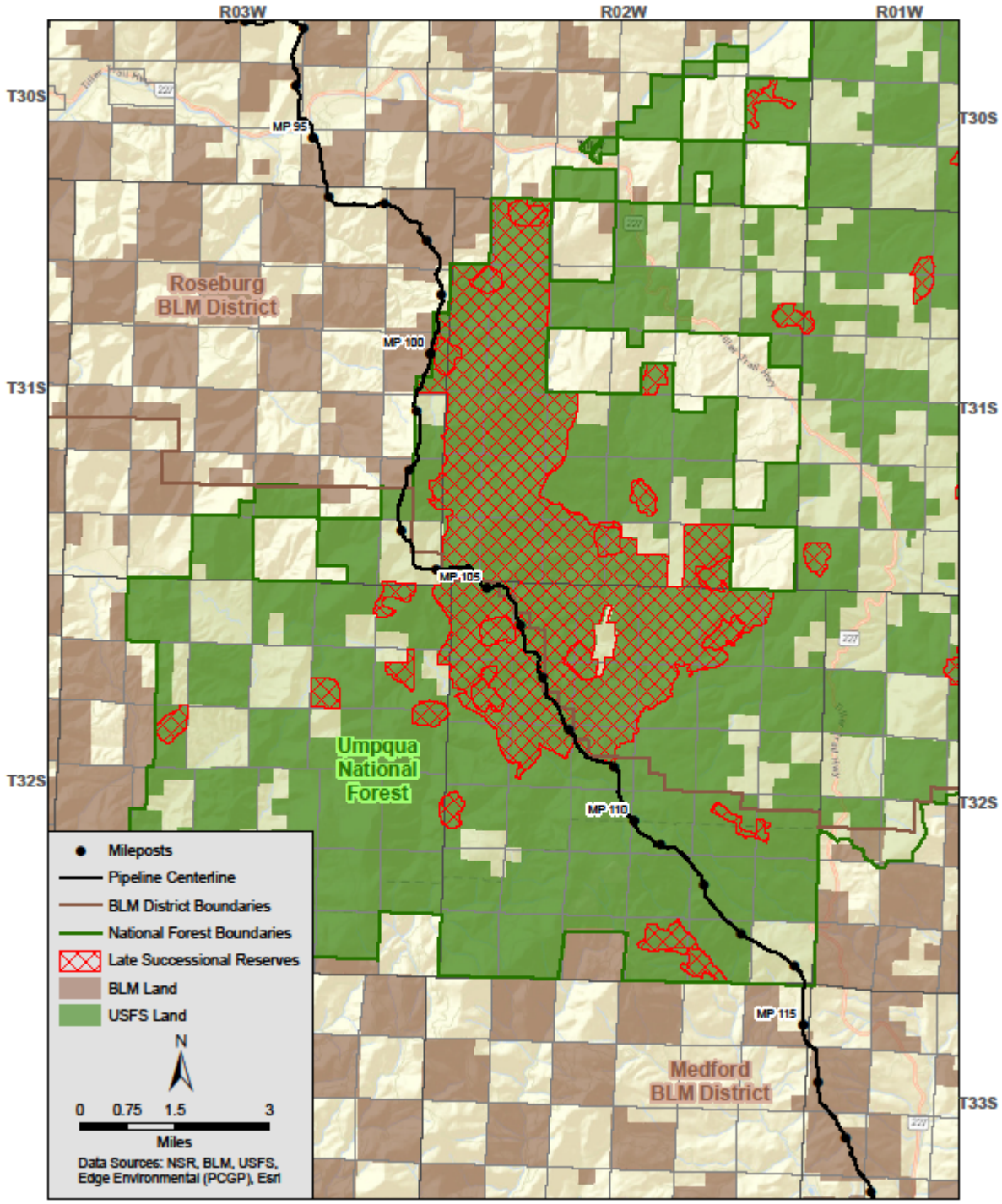
2.1 UMPQUA NF LSR 223

The Umpqua NF LRMP as amended guides all resource management activities, establishes management standards and guidelines, and serves as the primary land management plan for the Umpqua NF. Amendments to the Umpqua NF LRMP include the NWFP and the inclusion of LSRs (see section 1.2.3 above). Goals and Objectives, Standards and Guidelines, and Management Prescriptions are found in Chapter Four. Management direction in Chapter Four may be changed by amending the Forest Plan. The Umpqua NF LRMP is available at http://www.fs.usda.gov/detailfull/umpqua/landmanagement/?cid=fsbdev3_056190&width=full.

In the Umpqua NF, construction of the project would directly affect (acres cleared plus acres modified) approximately 85 acres of LSR 223. A map of the proposed PCGP project and LSRs in the Umpqua NF is displayed in figure 2.1-1. The map in figure 2.1-1 demonstrates that the PCGP project would not affect KOACs in the Umpqua NF.[7] Therefore the proposed PCGP project does not alter any unmapped LSR areas in the Umpqua NF.

[7] There is no MAMU habitat in the Umpqua NF due to its distance from the ocean.

Figure 2.1-1. Map of Proposed PCGP Project and LSRs in the Umpqua NF



2.1.1 Mapped LSR 223 in the Umpqua NF

2.1.1.1 Summary from LSRA

The South Umpqua River/Galesville Late-Successional Reserve Assessment (USDA and USDI 1999) originally addressed one LSR in the Roseburg and Medford Districts of the BLM and the Umpqua NF totaling about 66,900 acres. This LSR is a major habitat link between the Coast Range and Cascade Provinces. The BLM lands are no longer included in this NWFP LSR as a result of the new 2016 Resource Management Plans for western Oregon. The BLM lands, however, are included in similar new land allocations that are dedicated to maintaining and developing habitat for the northern spotted owl and marbled murrelet (USDI 2016). The information and recommendations contained in the LSRA remain relevant in addressing LSR function, proposed LRMP amendments, and compensatory mitigation actions on the Umpqua NF.

This LSR lies in a critical east-west connectivity area between two large valley systems. To the south is the Rogue River valley and to the north is the Umpqua valley. North and south of this LSR, there are essentially no neighboring LSRs. The LSR is located at the south end of the Umpqua valley in a landscape dominated by intermingled BLM and private lands. To the east and southeast of the LSR, there is a block of Forest Service lands. The lack of federal ownership across the I-5 corridor in most of western Oregon makes this area a vital link between major physiographic provinces.

Vegetative conditions, past and present, have been influenced by environmental and human factors. Late-successional stands are estimated to have historically covered from 40 to 75 percent of southwestern Oregon (USDA 1993). The objective for management in this LSR is to attain and maintain 60 percent to 75 percent of the federal lands in late-successional stands.

Three general landscape criteria were identified for setting priorities for the locations of future treatment areas. These included maintaining or enhancing connectivity across the landscape, establishing large blocks of late-successional habitat, and enhancing suitable spotted owl habitat conditions around centers of activity.

The risk of large-scale habitat loss from a wildfire occurring within this LSR is relatively high. The historic fire-return level for the LSR is on the order of 30 to 80 years. The primary objective of fire and fuels management in the LSR is to minimize the loss of late-successional habitat by reducing the risks of high-intensity, stand-replacing wildfires.

The objective of silvicultural systems proposed for this LSR would be to develop old-growth characteristics, including snags, downed logs, large trees, canopy gaps, multiple layers, and diverse species composition. Silviculture treatments, such as reforestation, release, density management, pruning, fertilization, and tree culturing to accelerate the development of desired characteristics, could occur within the LSR

Fire has been a significant if not the dominant factor in maintaining the compositional and structural diversity of the area, as well as fragmenting the late-successional forests. The intensity of fires has varied based on elevation, aspect, and vegetation zones. Forests of all vegetation zones have burned, though the return intervals have been different. The zones in the lower elevations probably had more frequent fires than the Douglas-fir and other conifer-dominated types at higher elevations. Not only were the fuel characteristics more conducive to frequent fires, but the lower

elevations probably experienced more frequent human-caused fires as Native Americans burned the valleys and foothills for their own uses. Fire exclusion and the continued suppression of fires became effective around the 1940s. Fire exclusion has resulted in the development of stands that would not have occurred naturally. In some stands, shade-tolerant understories have seeded in that would have otherwise been kept out by frequent low-intensity fires. This is particularly so at the higher elevation zones where white fir has become a more common understory species.

As stated above, the risk of large-scale habitat loss from a wildfire event occurring within this LSR is relatively high. Fuels and ignition sources are present. The NWFP recognizes that the Oregon Klamath Physiographic Province has an increased fire risk due to lower moisture conditions and rapid accumulation of fuels after insect outbreaks and drought. Fire suppression and exclusion have caused fuels to accumulate to a point that they are outside the range of "historic" variability. Many stands are currently overstocked with conifers, hardwoods, and shrubs.

2.1.1.2 Recent Changes Since the LSRA Was Written

In August and September 2015, the Stouts Creek Fire burned approximately 26,452 acres in the vicinity of the proposed PCGP alignment between MP 95 and MP 109. Approximately 14,251 acres of the burn occurred on the Umpqua NF, of which approximately 10,087 acres occurred within LSR 223. Approximately 9,172 of the acres that were burned on the Umpqua NF were in the low/unburned to low fire intensity class, and approximately 5,079 acres were in the moderate to high fire intensity class (Silva 2015). Field investigations confirmed that the moderate to high fire intensity classes represented a stand-replacement fire (Silva 2015). The amount of moderate to high fire intensity that occurred within LSOG habitat within LSR 223 was approximately 1,190 acres. Although these acres of burned LSOG represented stand-replacement fire it was determined that the acres would continue to function as foraging habitat for the NSO due to the remaining structure within the stands and the mosaic pattern of the burn in this area.[8] In addition to the downgrading of nesting, roosting and foraging (NRF) habitat to foraging habitat, approximately 1,766 acres of non-LSOG habitat were lost to stand-replacement fire in LSR 223. Although this did not affect the amount of LSOG habitat within the LSR, it does represent a loss of recruitment habitat that would have developed into LSOG in the coming years. It will now be 80 or more years before these areas attain LSOG habitat characteristics.

In addition to the effects of the fire, there were also impacts to LSR 223 from fire suppression activities. An approximately 100-foot-wide fire break was created between MP 105.4 and 108.9 of the PCGP project. This fire break occurred along the ridge that corresponds to the location of the pipeline. This constructed fire break removed approximately 29 acres of forest within LSR 223, of which approximately 3 acres was LSOG (see attachment 1 of this report).

It should be noted that not all of the effects of the Stouts Creek Fire were adverse in relation to the creation and maintenance of late successional habitat within LSR 223. At a landscape scale, there is an increase in forest resiliency as a result of understory fuels reduction in areas of low fire severity. As noted in the LSRA, high fuel loadings above historic levels was one of the main contributing factors to the high risk of stand-replacement fire in this area. Low and unburned fire severities composed a larger proportion of the fire than moderate and high levels in LSR 223 on

[8] Personal communication with David Krantz Forest Service PCGP project coordinator and email from Justin Hadwen wildlife biologist

the Umpqua NF. There may also be beneficial effects to late-successional species due to the mosaic burn pattern of the fire which creates canopy openings, edge habitats, and large-diameter snags. The burned area also promotes herbaceous/woody hardwood growth and provides for future large woody debris (LWD) on the forest floor. All of these can be important habitat features for prey base species that late successional species such as the NSO depend on (Bond et al. 2009).

Little other activity has occurred in LSR 223 in the Umpqua NF since the LSRA was written in 1999. Approximately four other small wildfires have occurred, but each was less than 10 acres. There have been several fuels treatments (thinning and pile-burning) on a total of approximately 136 acres. There has also been some precommercial thinning of young stands of timber on approximately 93 acres[9].

2.1.2 Proposed LRMP Amendments and Mitigation Actions Relevant to LSR 223

2.1.2.1 LRMP Amendments

The Forest Service proposes to amend the Umpqua NF LRMP as follows:

UNF-4, Reallocation of Matrix Lands to Late Successional Reserves[10]

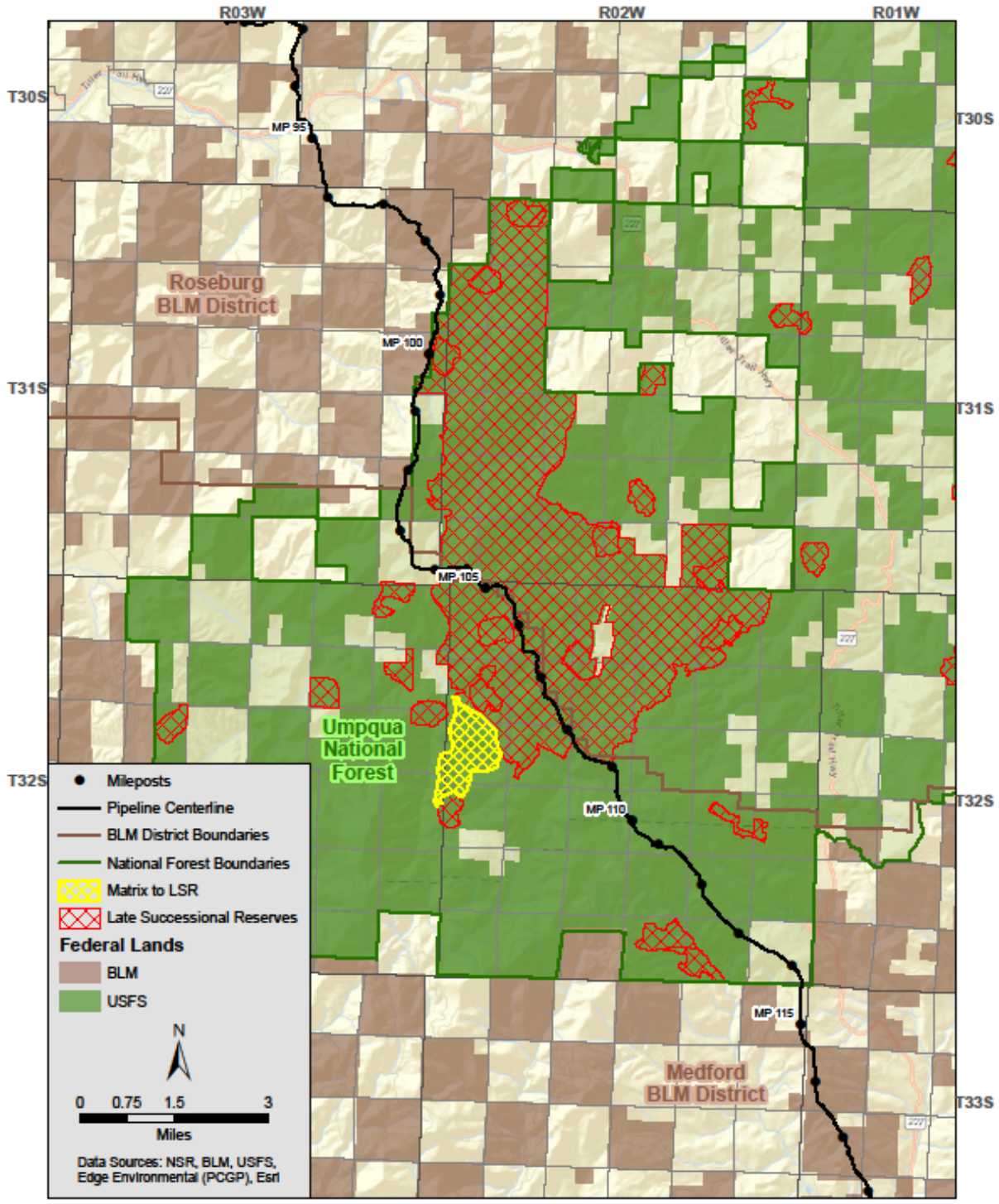
The Umpqua NF LRMP would be amended to change the designation of approximately 585 acres from the matrix land allocation to the LSR land allocation in Sections 7, 18, and 19, T.32 S., R. 2 W., Oregon; and Sections 13 and 24, T. 32 S., R. 3 W., W. M., Oregon.

This change in land allocation is proposed to partially mitigate for the potential adverse impact of the PCGP project on LSR 223 in the Umpqua NF. This amendment would change future management direction for the lands reallocated from matrix to LSR. The proposed reallocation is displayed in figure 2.1-2.

[9] Personal communications with Wes Yamamoto, former Forest Service PCGP project coordinator

[10] Evaluations of this proposed amendment and how it relates to the planning requirements in the Forest Service planning rule at 36 CFR 219 (2012 Version) are discussed in Section 4.7 of the Draft EIS and in Appendix F2.

Figure 2.1-2. Proposed Matrix to LSR Reallocation, Umpqua NF



2.1.2.2 Mitigation Actions

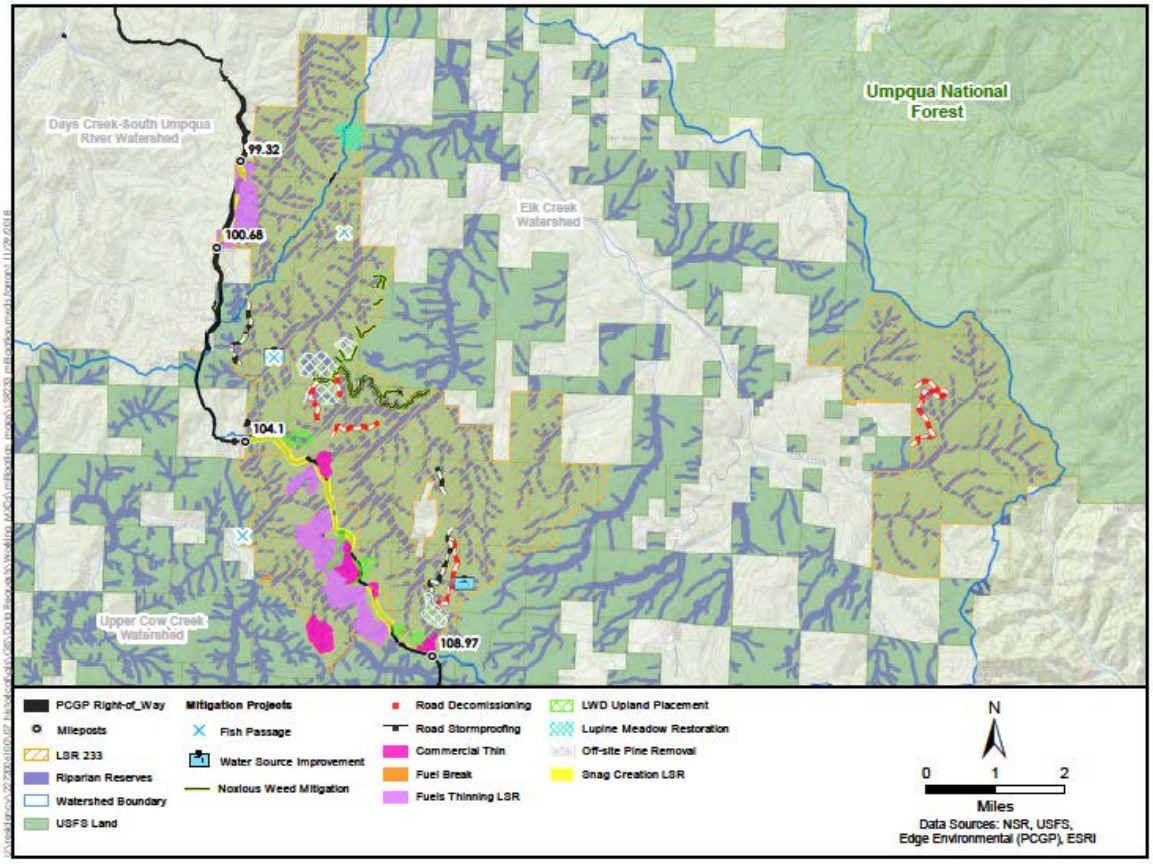
A compensatory mitigation plan[11] has been developed by the Forest Service and submitted to the PCGP project applicant to ensure that the goals and objectives of the LRMP related to LSR would be achieved. Mitigation actions include:

- Creation of snags on 190 acres that are below desired snag densities for LSRs.
- Placing CWD [coarse woody debris] on 164 acres in units that are currently below desired levels for CWD.
- Decommissioning 5 miles of roads to reduce fragmentation and develop interior stand habitat over time.
- Thinning approximately 247 acres of overstocked stands to reduce fire risk and accelerate development of LSR characteristics.
- Integrated stand density and fuel break treatments on 898 acres in LSR 233 to restore stand density, species diversity, and structural diversity and to control the spread and intensity of wildfire within forested stands prone to fire activity.
- Other proposed mitigation actions in LSR 223 include 80 acres of meadow restoration, 301 acres of off-site pine removal, 6 miles of noxious weed treatments, fish passage improvement at two sites, 5 miles of road stormproofing, and one water source improvement.

While the primary mitigation action for the effects of the proposed pipeline on LSR 223 would be to replace affected acres with additional acres of LSOG forest habitat that are currently outside of the LSR, the additional off-site mitigation actions proposed are consistent with the recommendations in the LSRA for LSR 223. These off-site mitigation actions would accelerate the development of LSOG forest habitat elements to further offset the effects of the PCGP project on LSR 223 in the long term. The additional off-site mitigation actions would also increase the effectiveness of the additional LSOG forest habitat added to LSR 223 by improving the quantity, quality, and distribution of high-quality habitat. Figure 2.1-3 displays where the proposed mitigation actions would occur.

[11] This mitigation plan has been modified from the previous plan included in the 2015 FEIS for the PCGP project. In November 2015, representatives of Stantec conducted field surveys of the Stouts Creek Fire and met with interdisciplinary resource teams from the Umpqua NF in 2018 to revise the mitigation actions based on the changed conditions in LSR 223 as a result of the Stouts Creek Fire.

Figure 2.1-3. Proposed Off-Site Mitigation Actions in LSR 223



2.1.3 Impacts Related to the Proposed Amendments and Mitigation Actions Relevant to LSR 223

2.1.3.1 LRMP Amendment

One LRMP amendment related to LSR is proposed for the Umpqua NF.

UNF-4, Reallocation of Matrix Lands to LSR

The primary management objective of the LSR land allocation is to protect and enhance conditions of late-successional and old-growth forest ecosystems that serve as habitat for late-successional and old growth–related species.

If constructed, the portion of the PCGP project in the Umpqua NF would be about 10.8 miles long, of which about 5.0 miles would traverse through LSR 223. The PCGP project would clear approximately 68 acres in LSR 223, of which approximately 20 acres are LSOG forest[12]. The area proposed to be reallocated to LSR 223 is approximately 585 acres of matrix lands, of which

[12] Although approximately 2 of the 20 LSOG acres were burned in a stand-replacement fire (2015 Stouts Creek Fire), it was determined that the acres would continue to function as foraging habitat for the NSO. Therefore, the clearing of these burned LSOG acres is considered to be a loss of LSOG habitat in this analysis.

approximately 296 acres are LSOG forest. This change in land allocation is proposed to partially mitigate for the potential adverse impact of the PCGP project on LSR 223 in the Umpqua NF. The proposed reallocation is shown in figure 2.1-2. When acres reallocated from matrix lands to LSR are compared to the acres of LSR that would be cleared by the PCGP project, the proposed amendment would reallocate over eight times more acres to LSR than would be cleared for the project corridor (see table 2.1.3-1 and figure 2.1-4, below).

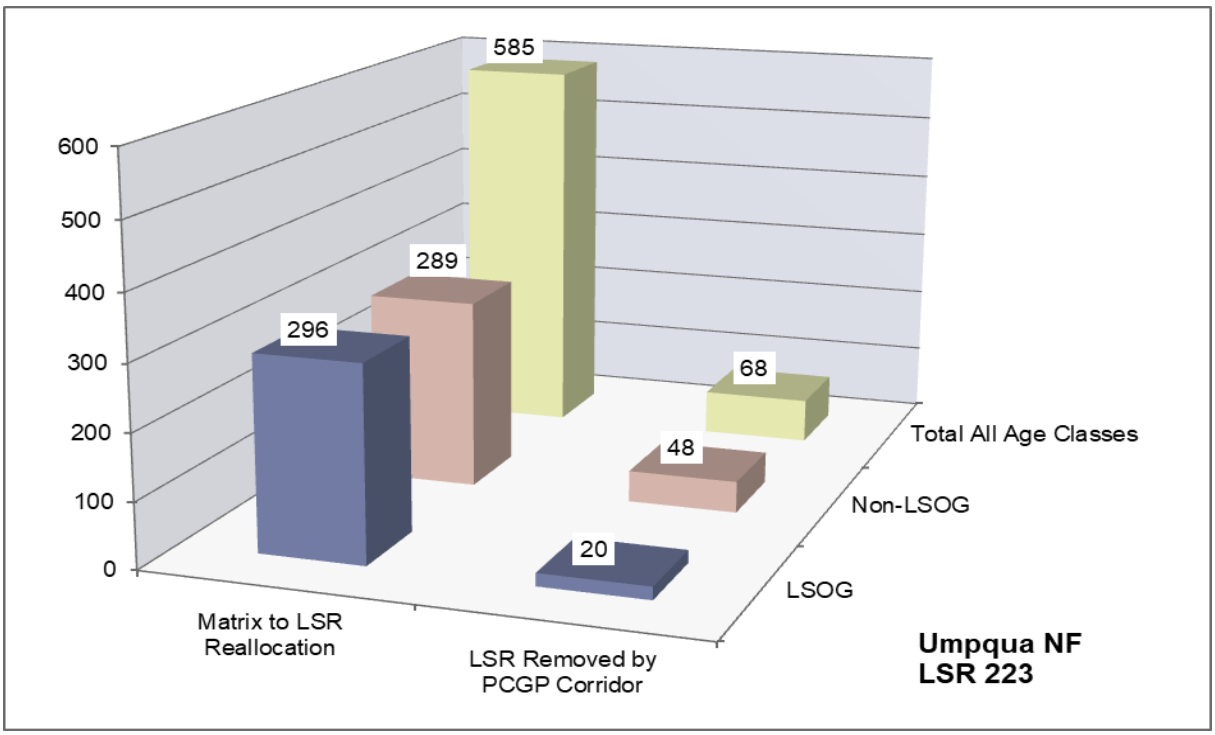
TABLE 2.1.3-1

Comparison of LSR Acres Cleared a/ by the PCGP Project and Acres of Matrix Reallocated to LSR

Umpqua NF LSR 223	LSOG	Non-LSOG	Non-Forest	Total All Age Classes
Matrix to LSR Reallocation	296	289	0	**585**
LSR Cleared by PCGP Corridor	20	48	0	**68**

a/ Acres cleared include corridor clearing and TEWAs.
Data source: BLM, USFS GIS data layers, Cox 2010

Figure 2.1-4. Comparison of Acres of LSR Cleared by the PCGP Project and Acres of Matrix to LSR Reallocation



In addition to the impacts from the removal of forest vegetation in LSR 223, there would be additional impacts from the acres modified by UCSAs and the acres indirectly affected through the creation of new edges and fragmentation of older forest. A comparison of the total acres affected in LSR 223 and the acres of reallocation are displayed in table 2.1.3-2 and figure 2.1-5.

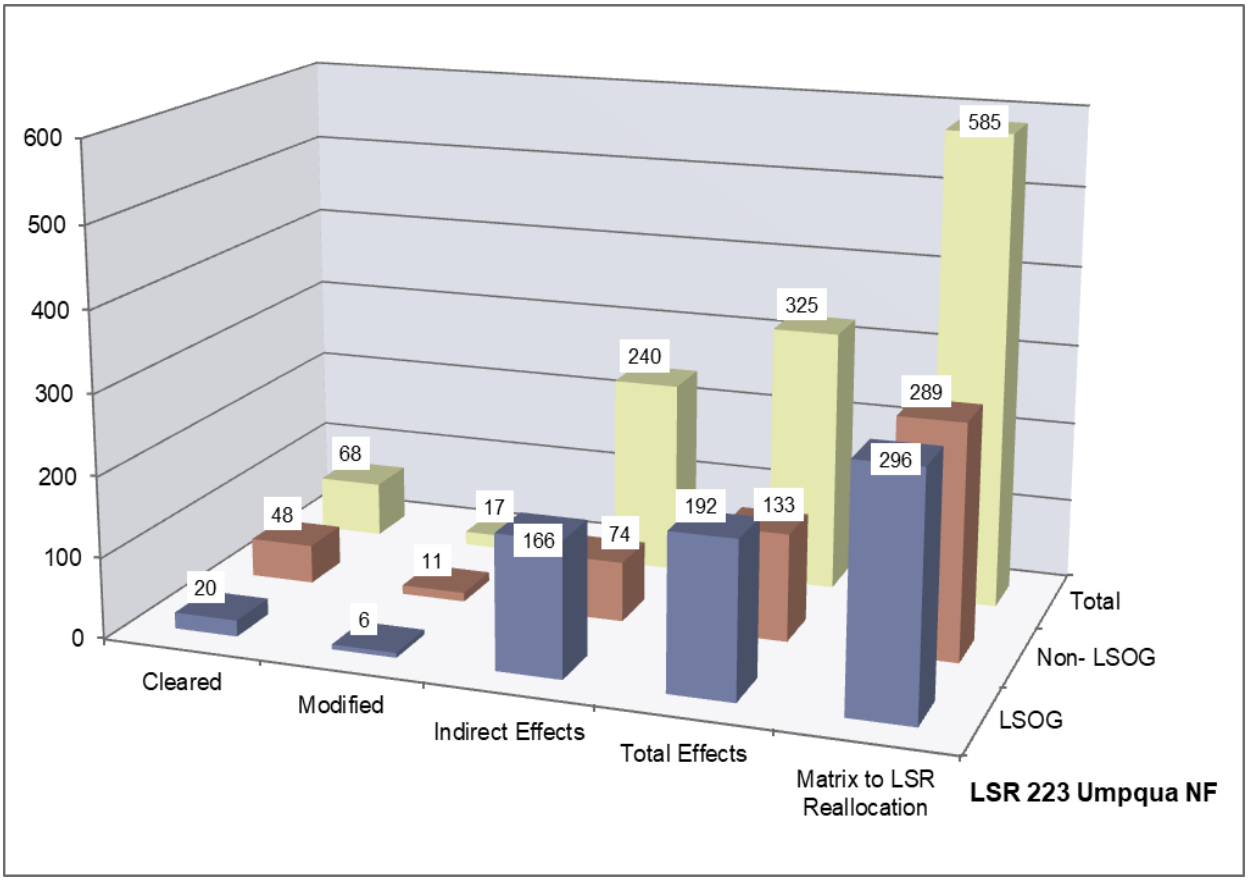
TABLE 2.1.3-2

Comparison of LSR 223 Acres Affected a/ by PCGP Project and Acres of Matrix Reallocated to LSR

Umpqua NF LSR 223	Direct Effects: Cleared	Direct Effects: Modified	Indirect Effects	Total Effects	Matrix to LSR Reallocation
LSOG	20	6	166	192	296
Non-LSOG	48	11	74	133	289
Non-Forest	0	0	0	0	0
Total	**68**	**17**	**240**	**325**	**585**

a/ PCGP total effects include cleared acres (corridor and TEWAs), modified acres (UCSAs), and indirect effect acres (100 meters on each side of the cleared corridor edge in LSOG and 30 meters on each side of the cleared corridor edge in non-LSOG).
Data source: BLM, USFS GIS Data Layers, Cox 2010

Figure 2.1-5. Comparison of Total LSR 223 Acres Affected by PCGP Project and Acres of Matrix Reallocated to LSR



In addition to the impacts of the PCGP corridor on LSR 223 in the Umpqua NF, there are also potential off-site impacts to LSR 223 from road reconstruction that would be necessary to accommodate the trucks that would haul the sections of pipe. These trucks are longer than typical trucks that use forest roads, and some road widening and curve realignment may be necessary to safely allow for this truck traffic. In LSR 223 on the Umpqua NF, it is estimated that

approximately 2.5 acres of road widening would occur. Although this road widening would occur to the extent possible within the existing clearing limits, it is probable that some additional clearing of forest vegetation would be necessary to accommodate the road reconstruction. It is estimated that this would be a maximum of 2.5 acres and would occur along an existing road opening.

2.1.3.2 Mitigation Actions

To compensate for the direct and indirect effects associated with the PCGP project in the LSR land allocation, off-site mitigation actions have been developed by the Forest Service (see figure 2.1-3). These proposed off-site mitigation actions include:

- Accelerating development of larger trees by precommercial thinning of young stands.
- Replacing constituent elements of habitat by placing LWD in units, creating snags, controlling noxious weeds, and restoring meadows.
- Reducing the risk of stand-replacing fire by stand-density management, commercial thinning, and fuels reduction treatments.
- Reducing habitat fragmentation by decommissioning roads and accelerating the development of interior stand conditions by stand-density management.

The off-site mitigation actions would increase the effectiveness of the LSOG forest habitat by improving the quantity, quality, and distribution of LSOG forest habitat. These off-site mitigation actions are consistent with the LSRA for LSR 223.

Road Decommissioning (5 miles)

Although the PCGP project has been routed to avoid LSOG habitat as much as possible, the project would create edge effects that would affect interior stand microclimates and cause habitat fragmentation within LSR 223 that cannot be avoided. Edge is the effect of an opening on the microclimate in adjacent stands (Chen, Franklin et al. 1993). Edge effects introduced by roads (or corridors) are highly variable and depend on aspect, road width, vegetation crossed, and other variables. Edge effects are greatest when there is a high contrast in structure and composition between a newly created opening and the adjacent landscape (Harper, Macdonald et al. 2005). Thus, edge effects are greatest when they affect interior stand habitats of older forests and lowest when the new opening is similar to the surrounding landscape, such as adjacent to an existing road or in a recent clearcut.

Decommissioning roads with appropriate restoration measures would presumably reverse edge effects and habitat fragmentation caused by existing roads and create habitat for a variety of animals (Switalski, Bissonette et al. 2004). The effect of edge reduction by road decommissioning is highly variable for the same reasons described for the edge effects created by constructing a road. Agency field experience has shown that road decommissioning reduces the edge effects over time by revegetating road surfaces and eliminating road corridors. Revegetating selected roads in conjunction with the density management proposed for adjacent plantations would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years as planted trees become pole sized (5 to 9 inches diameter at breast height (dbh) and 20 to 40 feet tall).

Published data on the rate and pattern of edge reduction associated with decommissioning roads is not available (Baker 2011), but a comparison of the predicted beneficial effect of road decommissioning to edge effects that would be associated with the PCGP project is useful, even if based on assumptions[13]. Using an assumed edge reduction over time of 50 feet on each side of the road, decommissioning 5 miles of road would reduce existing road-related edge effects on an estimated 61 acres (5*5280*100/43560)

Linear edge provides another measurement of the edge effect. Approximately 5.0 miles of the proposed PCGP project would be located within LSR 223, creating 10 miles of new edge within LSR 223. Proposed road decommissioning would revegetate 5 miles of roads, removing approximately 10 miles of existing edge over time.

Stand-Density Management

Stand-density management is proposed in early and mid-seral Douglas-fir and ponderosa pine plantations that were planted. The purpose of this mitigation action is to restore stand density, species diversity, and structural diversity to those considered characteristic under a natural disturbance regime by enhancing and accelerating the physical and biological services for associated flora and fauna within LSR 223. Table 2.1.3-3 below displays the acres of density management activities occurring in LSR 223 and matrix.

TABLE 2.1.3-3

Stand-Density Management Activities in LSR 223 and Matrix

Treatment Type	LSR 223 Acres
Off-Site Pine Restoration	301
Commercial Thinning	247
Total	**548**

Source: USFS GIS, Hobson 2010

Managing stand density would increase growth rates, decrease susceptibility to stand-replacing fire, and diversify stand structure in otherwise relatively homogenous stands. This accelerated development would also reduce fragmentation and edge effects and would help maintain the ability of these stands to respond to changed environmental conditions from either natural or human-caused disturbances. The proposed thinning acres are within 1 mile and the off-site pine removal and restoration is within 2 miles of the pipeline right-of-way. Placing the off-site mitigation activities close to the actual pipeline corridor increases their effectiveness by affecting lands within, or near, the home ranges of individual species affected by the pipeline habitat changes. Because the mitigation actions address ecological processes like the edge effect, placing the mitigation action near the edge impacts would increase the effectiveness of the mitigation action by restoring ecosystem structures near the acres that would be affected by the pipeline.

Integrated Stand Density and Fuel Break Treatments (898 acres LSR 223)

Integrated stand density and fuel break treatments are intended to accomplish two outcomes. First, they are intended to enhance LSOG habitat by increasing the growth, health, and vigor of the trees remaining in the stands and restoring stand density, species diversity, and structural diversity to those considered characteristic under a natural disturbance regime. Secondly, they are intended to

[13] This approach is consistent with CEQ Regulations for NEPA, 40 CFR 1508.22

reduce the probability of large-scale loss of LSOG from wildfires. Fuels treatments are decided on a case-by-case basis and rely on fuel loading information as well as proximity to roads and other factors. Slash treatments may be as simple as "lop and scatter" to get the fuels in contact with the ground for more rapid decomposition, or they may involve piling, burning, or removal of fuel from the site for biomass energy or other uses.

Stand-density management over time would reduce existing edge effects. There is no precise way to estimate the reduction in edge effects with available data since stands have many different age classes, perimeters, and canopy closures.

Snag Creation (190 acres LSR 223)

Snag creation is proposed as a mitigation action to replace snags lost in the pipeline right-of-way for habitat for cavity-nesting birds and denning sites for mammals (bats, bears, fishers, etc.). Snags would be lost from the pipeline corridor to facilitate pipeline construction and mitigate safety hazards for construction workers and from the removal of live trees that would have contributed to future snag habitat.

Approximately 3,040 snags within LSR 223 would be created by blasting tops from live trees (preferably trees with existing decay that makes them more suitable for cavity-nesting birds and/or as denning sites) or by inoculating living trees with heart rot decay fungi or other methods. Sites selected for snag creation would be within ½ mile of the pipeline right-of-way to develop snag habitat within (or near) the home ranges of cavity excavators being displaced by the pipeline corridor. Sites would be in mid- and late-seral stands.

The current direction is to manage CWD levels under a landscape perspective and to consider land allocation in determining where levels of CWD may occur overtime. DecAID (a tool for managing snags, partially dead trees, and downed wood for biodiversity in forests in Washington and Oregon) is a summary of the best available data on dead wood in Pacific Northwest ecosystems (Marcot et al. 2002). To use DecAID, planning areas should be large enough to encompass the range of variation in wildlife habitat types and structural conditions; it is suggested that planning areas be at least 20 square miles in size (12,800 acres). A reasonable objective is to manage for a range of conditions within the area, balancing areas with high densities of dead wood with moderate- and low-density areas (Marcot et al. 2002).

Wildlife and inventory data summarized in the DecAID Advisor can be applied to management and planning decisions at a range of spatial scales and geographic extents. The calculated tolerance levels (80, 50, and 30 percent) for wildlife data can be applied to stand-level management. However, it is not advised that a particular tolerance level be applied to all stands across a landscape. The LSRA for LSR 223 indicates that snags are below historic conditions (USDA and USDI 1999). The objectives of the LSR land allocation and the location and size of the project make it appropriate to manage for high and moderate snag densities for this project. Snags should be managed at the 80 percent tolerance level in LSRs. However, most of the proposed pipeline would be located along ridge tops that are prone to fire disturbance. Considering fuels, it would be appropriate to manage at a lower density of small snags and downed wood for both tolerance levels. The LSRA for this area recommended a desired future condition of at least 4 snags per acre >20 inches dbh and 15 feet tall (USDA and USDI 1999, table 8). The target within the LSR

treatment areas would be to manage snags densities at 16 per acre >10.0 inches dbh, of which 8 per acre are >20 inches dbh.

Large Woody Debris Placement (164 acres LSR 223)

One of the components of CWD is LWD, which consists of trees or portions of trees lying on the forest floor. LWD placement is proposed to accelerate the development of LSOG forest characteristics by restoring this habitat component to areas where LWD is lacking.

Large wood would be placed in or near areas that are also receiving stand-density management treatment. The large wood would be from trees cut from the pipeline corridor. Sites selected for LWD placement are within 1/2 mile of the proposed pipeline right-of-way. As with the other off-site mitigation actions, placement of the mitigation activities close to the pipeline corridor can benefit species that would be affected by the vegetation changes within the corridor and would make these mitigation actions more effective. Sites for placement of LWD would be in early successional stands that are currently deficient in downed wood. The LWD placement is expected to vary to account for some of the range in variability found across the landscape. For 11- to 20-inch-diameter logs, densities would vary from 8 to 33 logs/acre. For 20-inch plus-diameter logs, densities would vary from 3 to 12 logs per acre. Logs would be approximately 40 feet in length, and the specified diameter (11 to 20 inches, and 20 inches plus) refers to the stem diameter at the midpoint of the 40-foot log.

Noxious Weed Treatment (6 miles)

Soils disturbed during pipeline construction and proposed mitigation activities would have the potential to disperse and generate potential seedbeds for noxious weeds. The proposed noxious weed treatment along 6 miles of roads within LSR 223 would assist in mitigating potential adverse habitat impacts.

Meadow Restoration (80 acres)

There would be a loss of forest habitat that buffers unique habitats and disruption to soil horizons within those habitats from the construction of the PCGP project. These actions would result in adverse impacts to native flora and fauna and increase the opportunities for invasion by non-native plant species. These impacts cannot be fully mitigated on site; therefore, restoration activities such burning, removal of encroaching conifers, and noxious weed control would be applied to 80 acres of meadow located in LSR 223.

Comparison of Total Adverse Direct and Indirect Effects of the PCGP Project on Edge Effect and Total Beneficial Direct and Indirect Effects of Mitigation Actions on Edge Effect in LSR 223

The acres of direct and indirect effects of the PCGP project and the acres of direct and indirect effects of various mitigation actions as related to the edge effect are shown in table 2.1.3-4 and figure 2.1-6. For the purposes of this comparison, the indirect effects of the corridor are modeled by the age class of vegetation and an associated estimate of edge effects. Since there is no precise method for predicting indirect effects, the following assumptions were used.

- Adverse indirect effects of the PCGP project on LSOG habitat are estimated to extend 100 meters from the cleared edge on each side of the corridor.

- Adverse indirect effects of the PCGP project for non-LSOG habitat are estimated to extend 30 meters from the cleared edge on each side of the corridor.
- No indirect effects are estimated for nonforested areas since there would be no new edge created.
- Direct effects of road decommissioning are estimated from the revegetation of an average road prism of 20 feet.
- The beneficial indirect effects of road decommissioning are estimated to extend 50 feet on each side of the decommissioned road in all vegetation classes.
- The beneficial indirect effect of stand density management treatments is estimated to extend 100 feet from the perimeter of the unit in all vegetation classes.

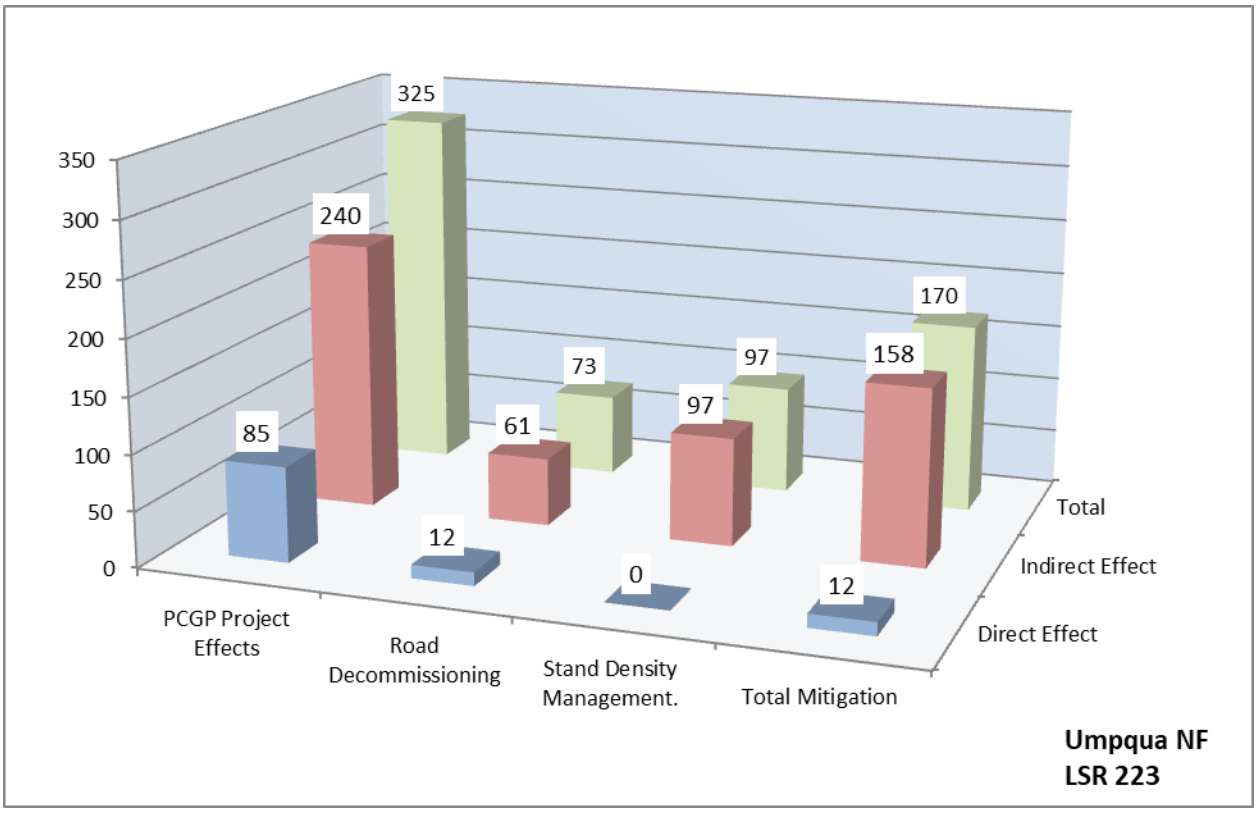
TABLE 2.1.3-4

Comparison of Total PCGP Project Impacts a/ on LSR 223 and Estimated Edge Reduction Effect b/ of Proposed Off-Site Mitigation Actions (Acres)

Umpqua NF (LSR 223)	Direct Effect	Indirect Effect	Total
	Total PCGP Project Impacts on LSR 223		
PCGP Effects	68	240	308
	Proposed Off-Site Mitigation		
Road Decommissioning	12	61	73
Stand-Density Management.	0	97	97
Total Mitigation	**12**	**158**	**170**

a/ PCGP project direct effects include corridor clearing and TEWAs. Indirect effects include 100 meters on each side of corridor edge in LSOG and 30 meters on each side of corridor edge in non-LSOG
b/ Direct edge reduction effects include acres of decommissioned road revegetated (5*5280*20/43560) and indirect effects include 50 feet on each side of decommissioned road and 100 feet along perimeter of stand-density treatments (8 miles).
Data source: BLM, USFS GIS data layers, Hobson 2010

Figure 2.1-6. Comparison of Total PCGP Project Impacts on LSR 223 and Estimated Edge Reduction Effect of Proposed Off-Site Mitigations (acres)



The comparisons displayed are not one-to-one correlations since the adverse impacts on the edge created by construction of the pipeline would occur immediately and the reduction of the edge effect from the off-site mitigation would occur over time. The comparison also does not take into consideration that the edge created by the construction of the pipeline would also be reduced over time as the majority of the corridor (about 70 percent) would be reforested. The comparison does display that some of the mitigation actions proposed would help reduce the amount of fragmentation in LSR 223 by reducing the amount of existing edge. Over time, this would allow for the formation of larger blocks of interior forest habitat.

2.1.4 Impact on the Functionality of LSR 223 on the Umpqua NF and Consistency with LSR Standards and Guidelines

The functionality of LSR 223 relates directly to the goals and objectives for LSRs (see section 1.2) and can be measured by the quantity, quality, and distribution of LSOG forest habitat in the LSR and how the proposed PCGP project would impact these characteristics.

- Quantity: The overall quantity of LSOG habitat within LSR 223 on the Umpqua NF would increase with the proposed LRMP amendment. The PCGP project would remove approximately 20 acres of LSOG habitat but the reallocation would add 296 acres of LSOG habitat, for a net increase of 276 acres.

- Quality: The area proposed for reallocation to LSR 223 contains some large blocks of LSOG habitat and it would also be located immediately adjacent to two KOACs, providing

further consolidation of LSOG habitat and increased protection of NSO habitat. With the reallocation of matrix to LSR and the consolidating of larger blocks of LSOG habitat, the quality of the LSOG habitat within LSR 223 would be slightly improved. There is also the benefit of the 289 acres of younger (less than 80 years old) stands in the reallocated acres being managed for future LSOG habitat, which would provide the potential for larger blocks of LSOG habitat.

- Distribution: The distribution of LSOG habitat within LSR 223 would remain largely unchanged with the proposed PCGP project and the reallocation of matrix to LSR LRMP amendment. To the extent there are minor changes, they would be beneficial due to the location of the proposed reallocation. The reallocation would occur on the southwest edge of the LSR, providing for some additional connectivity with the nearest LSRs to the south and west.

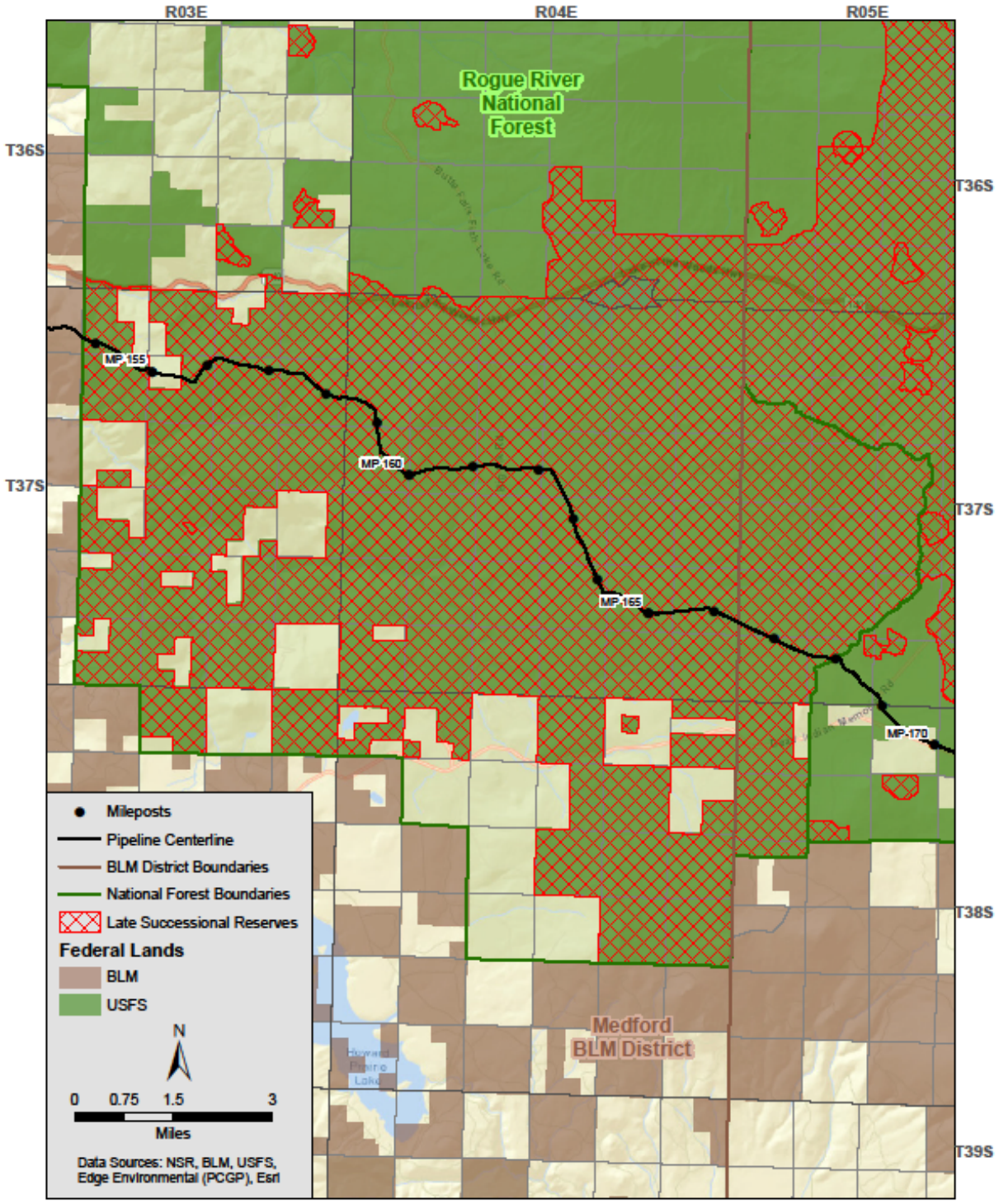
- The off-site mitigation actions would improve the quantity, quality, and distribution of LSOG habitat in LSR 223 by accelerating the development of constituent elements of late-successional habitat, reducing the risk of stand-replacement fire and reducing fragmentation through road decommissioning and stand-density management.

The project design features, the reallocations of matrix to LSR, and the off-site mitigation actions for LSR 223 in the Umpqua NF have been designed with the goal of making the overall impact of the PCGP project either neutral or beneficial to the creation and maintenance of late-successional habitat. These actions combined would maintain or improve the functionality of LSR 223.

2.2 ROGUE RIVER NF LSR 227

The Rogue River NF LRMP, as amended, serves as the single land management plan for the Rogue River NF (USDA Forest Service, Rogue River NF LRMP 1990). Amendments to the Rogue River NF LRMP include the NWFP and the inclusion of LSRs (see section 1.2.3 above). The Rogue River NF LRMP is available at http://www.fs.usda.gov/detail/rogue-siskiyou/landmanagement/?cid=stelprdb5315100. The proposed PCGP project would cross approximately 13.7 miles of the Rogue River NF and, if constructed, would directly affect (corridor plus TEWAs and UCSAs) approximately 276 acres of LSR 227. The proposed project and LSR 227 in the Rogue River NF are displayed on figure 2.2-1.

Figure 2.2-1. Map of Proposed PCGP Project and LSR in the Rogue River NF



2.2.1 Mapped LSR 227 in the Rogue River NF

2.2.1.1 Summary from LSRA

The South Cascades LSRA (USDA and USDI 1998a) area is located in a network of southwest Oregon LSRs. The LSRA originally included lands administered by the Rogue River, Winema, Umpqua, and Willamette NFs and the Butte Falls, Mt. Scott, and South Valley Resource Areas of the Medford, Roseburg, and Eugene Districts of the BLM. The assessment area included about 721,000 acres in the following LSRs: 222, 224, 225, 226, and 227. The BLM lands are no longer included in this NWFP LSR as a result of the 2016 Resource Management Plans for western Oregon. The BLM lands, however, are included in similar new land allocations that are dedicated to maintaining and developing habitat for the NSO and MAMU (USDI 2016). The information and recommendations contained in the LSRA are still relevant in addressing LSR function, proposed LRMP amendments, and compensatory mitigation actions on the Rogue River NF.

The South Cascades LSRs are part of a regional network designed in association with other land allocations (riparian reserves, National Parks, Wildernesses, botanical areas, etc.) to provide functional late-seral habitat, including long-term dispersal and migratory pathways. From a regional perspective, the south Cascades provide a link and are a north-south transition area between the Sierra Nevada of northern California and the northern Cascade Range of Oregon and Washington. The Siskiyou Mountains run generally east-west and provide connectivity between the coastal and inland south Cascade areas. The Columbia and Klamath rivers, the only major rivers that significantly breach the Cascade and Coast ranges, allow mixing of inland and coastal species and genetic varieties. These links allow movement of species and genetic material north and south and east and west in response to changes in climate such as occurred during the ice ages and the xerothermic period. These links are still important in the evolutionary process and health of the Pacific Northwest flora and fauna.

The habitat within the South Cascades LSRs serves as source areas for spotted owls and other late-successional and old growth–dependent species. Since species depend on habitat, a variety of habitats present over time and space provides for a broad range of species, including rare and sensitive species and those associated with late-seral stages. Successional and disturbance processes have provided a varied seral-stage mix and a functional landscape pattern. However, the effects of fire, the most influential process, have been altered and will likely continue to be modified well into the future.

The eastern portion of LSR 227 contains many acres of relatively recent volcanic flows in which the soils are not developed well enough to support late-seral forests. The amount of interior late-seral habitat also decreases as one moves south and east through the LSR network (i.e., fragmentation is greater). Previous work on the Regional Ecological Assessment Program (REAP) suggests that the historical functional range is between 45 and 75 percent late-seral conditions.

2.2.1.2 Changes Since LSRA Was Written

Two wildfires totaling approximately 294 acres—the Little Butte and the Fish Lake fires—have occurred in LSR 227 in the Rogue River NF since the LSRA was written in 1998. Existing roads total approximately 238 miles, with 70 miles of road being decommissioned. Vegetation management has included approximately 540 acres of precommercial thinning, 27 acres of

meadow restoration, aspen restoration, invasive plant treatments, and a 207-acre commercial thinning timber sale (Big Bad Elk).[14]

2.2.2 Proposed LRMP Amendments and Mitigation Actions Relevant to LSR 227

2.2.2.1 LRMP Amendment

The Forest Service proposes to amend the Rogue River NF LRMP as follows:

RRNF-7, Reallocation of Matrix Lands to Late Successional Reserves[15]

The Rogue River NF LRMP would be amended to change the designation of approximately 522 acres from the matrix land allocation to the LSR land allocation in Section 32, T.36 S., R. 4 E., W. M., Oregon.

This change in land allocation is proposed to partially mitigate for the potential adverse impact of the PCGP project on LSR 227 in the Rogue River NF. The amendment would change future management direction for the lands reallocated from matrix to LSR. A map of the proposed reallocation is displayed in figure 2.2-2.

2.2.2.2 Mitigation Actions

The lands in the Rogue River NF that would be affected by the proposed project are all within LSR 227. The primary objectives for the off-site mitigation actions are to accelerate the development of LSOG forest habitat in LSR 227 through snag creation, woody debris placement, and density management, and to reduce LSOG forest habitat fragmentation through road decommissioning.

The primary mitigation action for the effects of the proposed pipeline on LSR 227 would be to replace the acres in LSR 227 that would be affected by the pipeline with additional acres of LSOG forest habitat that are currently outside the LSR. The additional off-site mitigation actions proposed are consistent with the recommendations in the LSRA for LSR 227. These off-site mitigation actions would accelerate the development of LSOG forest habitat elements to further offset the effects of the PCGP project on LSR 227 in the long term. The additional off-site mitigation actions would also increase the effectiveness of the LSOG forest habitat in LSR 227 by improving the quantity, quality, and distribution of high-quality habitat. Figure 2.2-3 displays where the proposed off-site mitigation actions would occur.

[14] Personal communications with Wes Yamamoto, former Forest Service PCGP project coordinator, and Jeff Von Kienast

[15] Evaluations of this proposed amendment and how it relates to planning requirements in the Forest Service planning rule at 36 CFR 219 (2012 Version) is discussed in Section 4.7 of the DEIS and in Appendix F2.

Figure 2.2-2. Map of Proposed Matrix Reallocated to LSR in the Rogue River NF

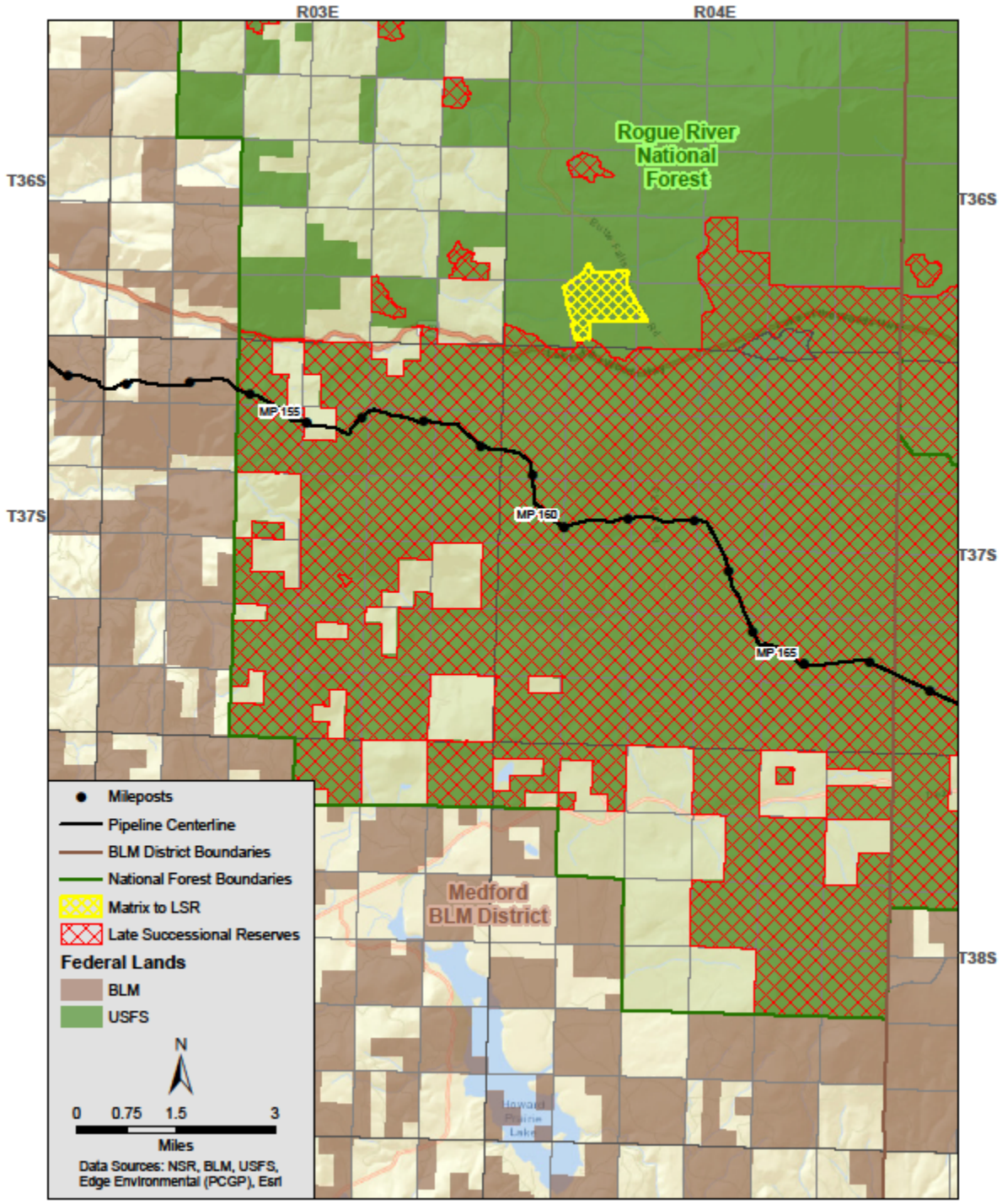
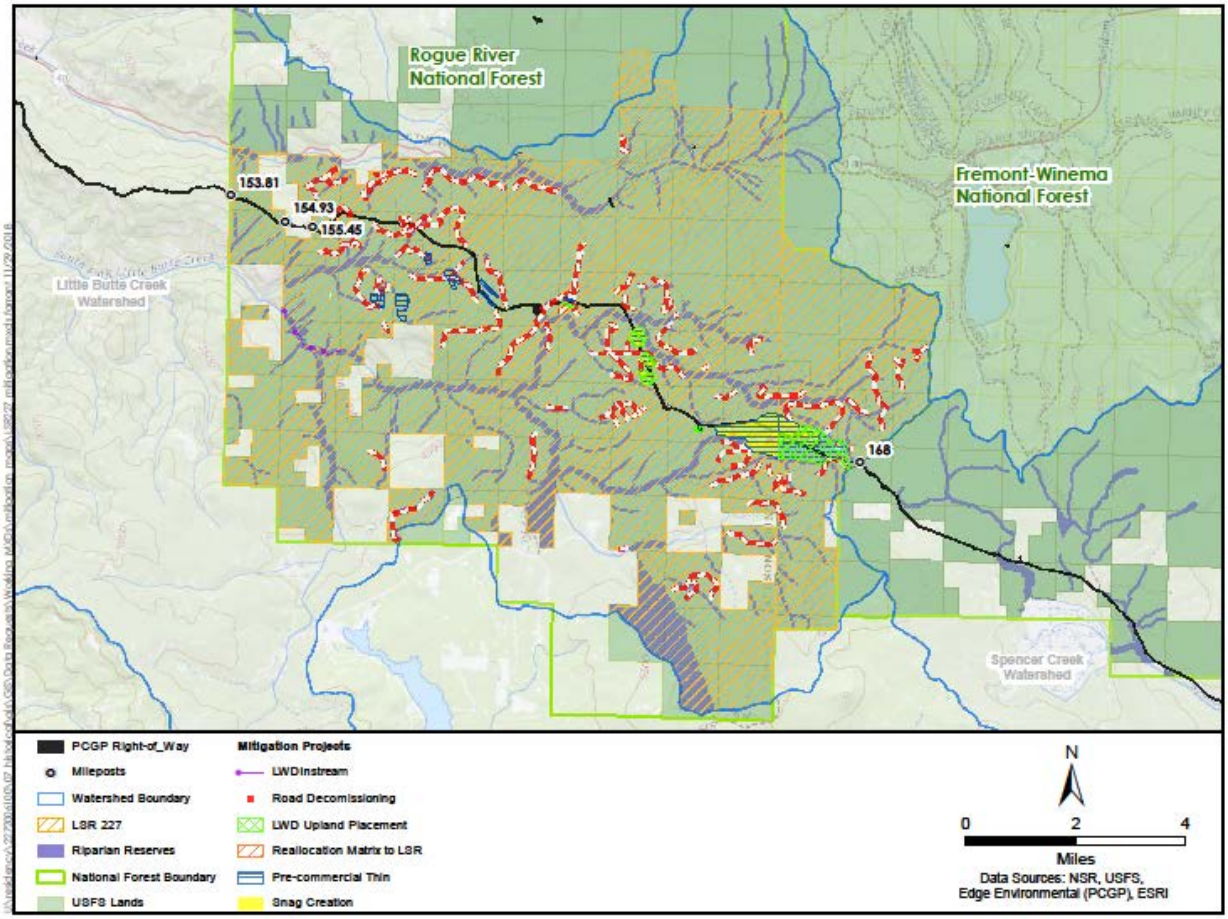


Figure 2.2-3. Proposed Off-Site Mitigation Actions in the Rogue River NF



2.2.3 Impacts Related to the Proposed Amendments and Mitigation Actions Relevant to LSR 227

2.2.3.1 LRMP Amendment

RRNF 7, Reallocation of Matrix Lands to LSR 227

In the Rogue River NF, the proposed project would lie entirely within LSR 227. If constructed, the portion of the project on the Rogue River NF would be about 13.7 miles long and would clear approximately 206 acres of forest vegetation in LSR 227, of which approximately 55 acres are LSOG forest. The matrix area proposed for reallocation to LSR is approximately 522 acres, of which approximately 237 acres are LSOG forest (see figure 2.3-9). This change in land allocation is proposed to partially mitigate for the potential adverse impact of the PCGP project on LSR 227 in the Rogue River NF. When acres reallocated from matrix to LSR are compared to the acres of LSR that would be cleared by the PCGP project, the proposed amendment would reallocate about 2-1/2 more acres to LSR than would be cleared in the project corridor. When comparing acres of LSOG habitat, the proposed amendment would reallocate about 4 times more acres of LSOG habitat than would be cleared by the project (see table 2.2.3-1 and figure 2.2.4 below).

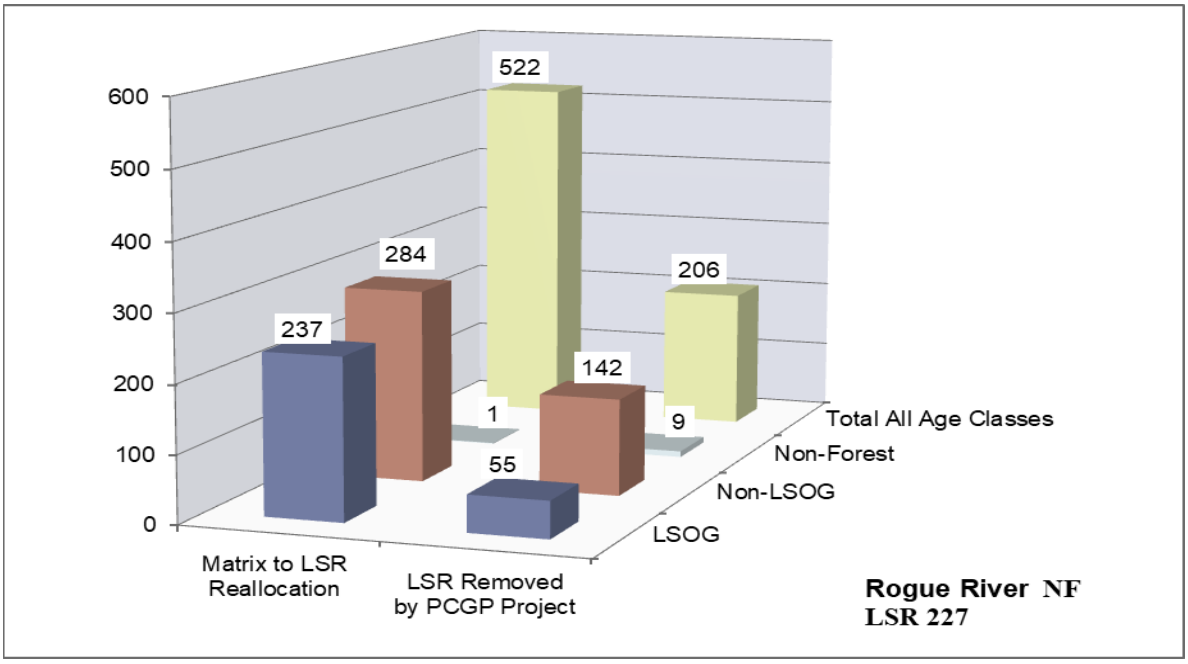
TABLE 2.2.3-1

Comparison of LSR Acres Cleared a/ by PCGP Project and Acres of Matrix Reallocated to LSR

Rogue River NF LSR 227	LSOG	Non-LSOG	Non-Forest	Total All Age Classes
Matrix to LSR Reallocation	237	284	1	**522**
LSR Cleared by PCGP Project	55	142	9	**206**

a/ Acres cleared include corridor clearing and TEWAs.
Data source: BLM, USFS GIS data layers, Cox 2010

Figure 2.2-4. Comparison of LSR Acres Cleared by the PCGP Project and Acres of Matrix Reallocated to LSR



In addition to the impacts from the removal of forest vegetation in LSR 227, there would be additional impacts from the acres modified by UCSAs and the acres indirectly affected through the creation of new edges and fragmentation of older forest. A comparison of the total acres affected in LSR 227 and the acres that would be reallocated are displayed in table 2.2.3-2 and figure 2.2-5 below.

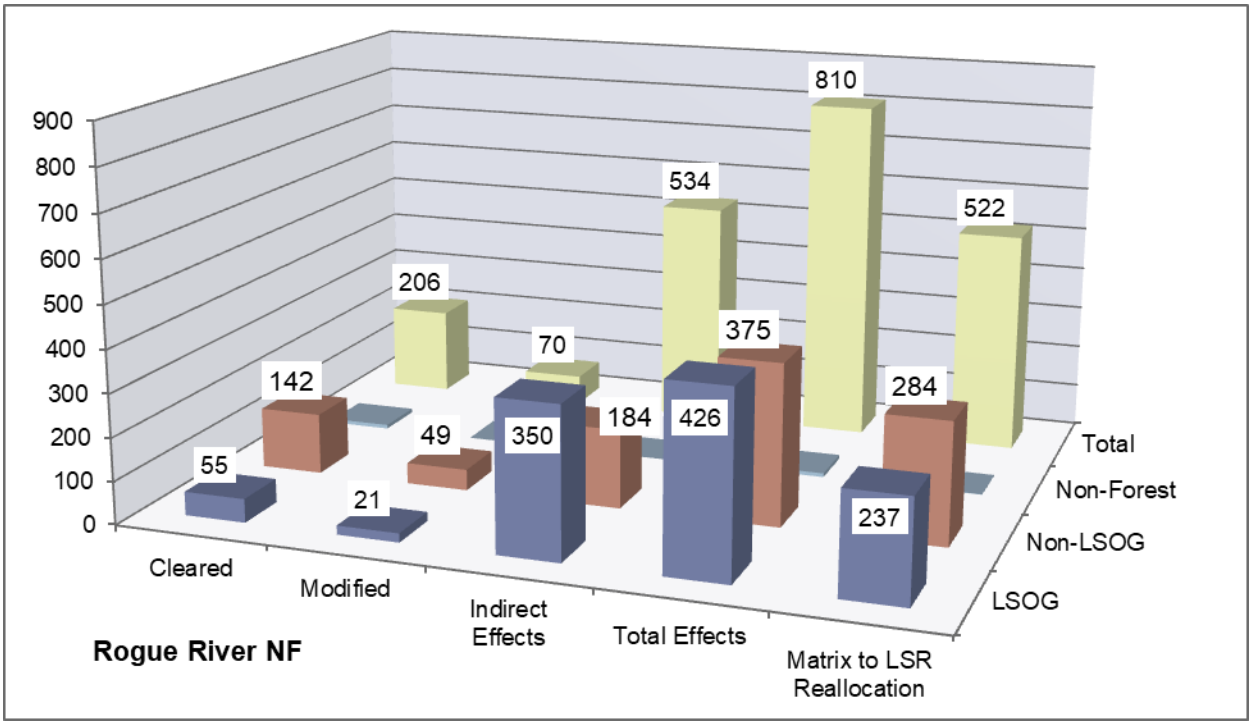
TABLE 2.2.3-2

Comparison of Total LSR Acres Affected a/ by PCGP Project and Acres of Matrix Reallocated to LSR

Rogue River NF LSR 227	Cleared (Direct Effects)	Modified (Direct Effects)	Indirect Effects	Total Effects	Matrix to LSR Reallocation
LSOG	55	21	350	426	237
Non-LSOG	142	49	184	375	284
Non-Forest	9	0	0	9	1
Total	**206**	**70**	**534**	**810**	**522**

a/ PCGP total effects include cleared acres (corridor and TEWAs), modified acres (UCSAs), and indirect effect acres (100 meters on each side of the cleared corridor edge in LSOG and 30 meters on each side of the cleared corridor edge in non-LSOG).
Data source: BLM, USFS GIS Data Layers, Cox 2010

Figure 2.2-5. Comparison of Total LSR Acres Affected by PCGP Project and Acres of Matrix Reallocated to LSR



In addition to the impacts of the PCGP corridor, there are also potential off-site impacts to LSR 227 from road reconstruction that would be necessary to accommodate the trucks that would haul the sections of pipe. These trucks are longer than typical trucks that use forest roads, and some road widening and curve realignment may be necessary to safely allow for this truck traffic. It is estimated that approximately four acres of road widening would occur within LSR 227. Although this road widening would occur to the extent possible within the existing clearing limits, it is probable that some additional clearing of forest vegetation would be necessary to accommodate the road reconstruction. It is estimated that this would be a maximum of four acres and would occur along an existing road opening.

2.2.3.2 Mitigation Actions

Road Decommissioning (57 miles)

Although the proposed PCGP project has been routed to avoid LSOG forest as much as possible, it would create edge effects that may affect interior stand microclimates and cause habitat fragmentation within LSR 227 that cannot be avoided. Edge is the effect of an opening on microclimate in adjacent stands (Chen, Franklin et al. 1993). Edge effects introduced by roads are highly variable and depend on aspect, road width, vegetation crossed, and other variables. Edge effects are greatest when there is a high contrast in structure and composition between a newly created opening and the adjacent landscape (Harper, Macdonald et al. 2005, p. 768). Thus, edge effects are greatest when they affect interior stand habitats of older trees and least when the new opening is similar to the surrounding landscape, such as when it is adjacent to an existing road or in a recent clearcut.

Decommissioning roads with appropriate restoration measures would presumably reverse edge effects and habitat fragmentation caused by existing roads and create habitat for a variety of animals (Switalski, Bissonette et al. 2004). By discouraging vehicular access, road decommissioning also eliminates disturbance (noise, presence, etc.) caused by human intrusion. This potentially benefits nesting behavior, in particular for the NSO. The effect of edge reduction by road decommissioning is highly variable for the same reasons described for the edge effects created by constructing a road. Agency field experience has shown that road decommissioning reduces edge effects over time by revegetating road surfaces and eliminating road corridors. Revegetating selected roads in conjunction with the density management proposed for adjacent plantations would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years as planted trees became pole sized (5 to 9 inches dbh and 20 to 40 feet tall). Published data on the rate and pattern of edge reduction associated with decommissioning roads are not available (Baker 2011), but a comparison of the predicted beneficial effect of road decommissioning on edge effects associated with the PCGP project is useful, even if it is based on assumptions.[16] Using an assumed edge reduction over time of 50 feet on each side of the road, decommissioning roads would reduce existing road-related edge effects on an estimated 691 acres (57*5280*100/43560).

Linear edge provides another measurement of edge effect. Approximately 13.7 miles of the proposed PCGP project would be located within LSR 227, creating 27.4 miles of new edge within LSR 227. Proposed road decommissioning would revegetate 57 miles of roads, removing approximately 113 miles of existing edge over time. Fragmentation in the context of impacts on the LSR land allocation is the process of reducing the size and connectivity of stands that compose a forest. The conversion of large tracts of old-growth forest to small, isolated forest patches with large edge areas can create changes in microclimate, vegetation species, and predator-prey dynamics.

To provide an indication of the effects of the proposed PCPG corridor and proposed road decommissioning on fragmentation, the Forest Service conducted a stand-level analysis, considering stands that fall within 100 meters of the proposed pipeline corridor (USDA Forest Service, Rogue River NF 2010). All stands that overlapped the 100-meter buffer were included in

[16] This approach is consistent with CEQ Regulations for NEPA, 40 CFR 1508.22.

the analysis out to the stand edges beyond the buffer. The only changes examined in this analysis were natural growth and development of trees and the off-site mitigation activities. Natural events, such as wildfire and storms, were not modeled because of their stochastic nature and the relatively limited size of the analysis area. Within the modeled stands, it was assumed that there would be no forest management harvest activities during the 60 years modeled beyond activities already planned. Future management activities would need to be consistent with the LRMP in effect at the time the project is implemented.

Construction of the pipeline would result in the fragmentation of LSOG forest in LSR 227 and would increase the fragmentation index (ratio of edge to acres) in modeled stands (those within 100 meters of the pipeline) by about 1 percent.[17] After 60 years, normal stand growth would reduce this ratio by about 3 percent. With implementation of proposed road decommissioning, the ratio of edge acres would decrease by about 34 percent. A decrease in the ratio of edge to opening means that patch sizes of forested areas have increased. LSR 227 currently has 1,445 patches of mature forest greater than 1 acre in size that lie within 100 meters of the edge of the proposed PCGP project corridor. Project construction would increase fragmentation by passing through and dividing some of these patches, with a net increase of five patches. The current average patch size throughout the LSR is about 7 acres, which is not projected to change within the next 60 years. With the proposed road decommissioning and road closures, the size of patches within 100 meters of the proposed pipeline would increase to an average of 14.5 acres within 60 years. This would be consistent with a reduction in the edge to opening ratio discussed above.

In terms of interior patches (LSOG areas that are at least 1 acre in size and at least 300 feet from a hard edge), there are currently 779 interior patches in LSR 227. Eight of these (about 1 percent of the interior patches) would be fragmented by the pipeline corridor. In 60 years, interior patches are projected to increase to 856 interior patches, a 9 percent increase from the current condition. With the proposed road decommissioning, the number of interior patches would increase by about 16 percent to 927, and the average size of the patches would increase from about 6.5 acres to 13.9 acres, an increase in size of over 100 percent.

There are approximately 233 miles of road in LSR 227. The proposed road decommissioning would create a 23 percent reduction in road mileage in this LSR. Current road density in LSR 227 is about 3.3 miles per square mile. With the proposed road decommissioning, it would be reduced to about 2.5 miles per square mile. Reductions in road density that would occur within ¼, ½, and 1 mile of the pipeline corridor are shown in table 2.2.3-3.

TABLE 2.2.3-3

Reductions in Road Density within 1/4, 1/2, and 1 mile of PCGP Corridor

Road Density	Existing Road Density (miles/square mile)	With Road Decommissioning (miles/square mile)
LSR 227	3.3	2.5
Within 1/4 mile of pipeline	3.9	1.7
Within 1/2 mile of pipeline	4.1	1.7
Within 1 mile of pipeline	4.2	2.5

[17] Changes in edge:area ratios are more meaningful as relative numbers rather than absolute values so percentages are used to express changes in values.

Stand-Density Management (618 Acres)

Precommercial thinning is proposed for overstocked plantations to accelerate the development of late-successional and old-growth forest characteristics in LSR 227. Managing stand density would increase growth rates, decrease susceptibility to stand-replacing fire, and diversify stand structure in otherwise relatively homogenous stands. This accelerated development would also reduce fragmentation and edge effects and would help maintain the ability of these stands to respond to changed environmental conditions from either natural or human-caused disturbances. All 618 acres are within 0.5 mile of the pipeline right-of-way. Placing the off-site mitigation activities close to the actual pipeline corridor would increase their effectiveness by affecting lands within, or near, the home ranges of individual animals and species affected by the pipeline habitat changes. As the mitigation actions address ecological processes like edge effects, placing the mitigation within or near the edge impacts increases the effectiveness of the mitigation by restoring ecosystem structures and processes on some of the acres also affected by the pipeline. Thinning young stands would, over time, reduce existing edge effects. There is no precise way to estimate the edge effect reduction with available data since stands have many different age classes, perimeters, and canopy closures. The estimated perimeter of the units proposed for thinning is approximately 6 miles. Assuming some edge reduction within 100 feet of the edge of these units, density management would reduce edge effects over time by an estimated 73 acres (6*5280*100/43560).

Fuels treatments for the slash generated by stand-density management are decided on a case-by-case basis and rely on slash loading information as well as proximity to roads and other factors. Slash treatments may be as simple as "lop and scatter" (cutting slash into smaller pieces and scattering) to get the fuels in contact with the ground for more rapid decomposition, or they may involve piling and burning, jackpot or underburning, or removal of slash from the site for biomass energy or other uses.

Snag Creation (622 acres)

Snag creation is proposed as a mitigation action to replace snags lost in the pipeline right-of-way for habitat for cavity-nesting birds and denning sites for mammals (bats, bears, fishers, etc.). Snags would be lost from the pipeline corridor to facilitate pipeline construction or to mitigate safety hazards for construction workers.

Approximately 1,244 snags would be created by blasting tops from live trees (preferably trees with existing decay, which makes them more suitable for cavity-nesting birds and/or as denning sites), by inoculating living trees with heart rot decay fungi, or by other methods. Sites selected for snag creation would be within ½ mile of the pipeline right-of-way to develop snag habitat within (or near) the home ranges of cavity excavators that are displaced by the pipeline corridor. Sites would be in mid-successional stands or around the edges of early successional stands that are currently deficient in snags, as defined by the LRSA (USDA and USDI 1998a). Stand data for the plant associations in this area (which is an indication of undisturbed forest snag levels) show these stands have an average of about four snags per acre in the 11- to 20-inch-diameter range and an additional four snags per acre greater than 20 inches in diameter.

If the tree diameters in the stands prevent snag creation in the >20-inch-diameter size class, additional snags in the smaller size class (11- to 20-inch-diameter) would be created to make up

for the deficit. For sites bordering early successional stands, snags would be created within 100 yards of the stand boundary at the same trees per acre levels described above.

Large Woody Debris (LWD) Placement in Plantations (511 acres)

Large wood placement in plantations is proposed to accelerate the development of LSOG forest characteristics by restoring this habitat component to plantations where LWD is lacking. Any wood used in this mitigation would come from the PCGP project corridor. No additional trees outside the corridor would be harvested to provide LWD so this mitigation is necessarily limited by the amount of LWD that can be provided from the corridor. LWD used in this mitigation would be staged at appropriate locations and placed with a helicopter.

The first priority in restoration with respect to LWD would be to ensure that that the PCGP project itself meets LRMP standards after construction is completed. After LWD standards within the corridor have been met, any additional LWD would be available for placement in the adjacent units identified below.

Large wood would be placed in plantations that are also receiving stand-density management treatment. The large wood would be from trees cut from the pipeline corridor. Sites selected for downed woody material placement would be within ½ mile of the pipeline right-of-way. As with the other off-site mitigation actions, placement of the mitigation activities close to the pipeline corridor can benefit species that are affected by the vegetation changes within the corridor and would make these mitigation actions more effective. Sites would be in early successional stands that are currently deficient in downed wood.

The large wood placement piece count per acre is expected to vary to account for some of the range in variability found across the landscape. For 11- to 20-inch-diameter logs, treatments would average about 10 pieces on each treated acre but densities would vary from 8 to 33 logs per acre. For 20-inch plus-diameter logs, an average of 5 pieces would be placed on each treated acre but densities would vary from 3 to 12 logs per acre. Logs would be approximately 40 feet in length, and the specified diameter (11- to 20-inch and 20-inch plus) refers to the stem diameter at the midpoint of a 40-foot log.

<u>Comparison of Total Direct and Indirect Effects of the PCGP Project and the Beneficial Effects of Off-Site Mitigation Actions on Edge</u>

Acres of direct and indirect effects of the PCGP project and the acres of direct and indirect effects of various mitigation actions as related to a reduction in edge effects are shown in table 2.2.3-4. For the purposes of this comparison, indirect effects of the PCGP project are modeled by the age class of vegetation and an associated estimate of edge effects. Since there is no precise method for predicting indirect effects, the following assumptions were used.

- Indirect effects for LSOG habitat are estimated to extend 100 meters from the cleared edge on each side of the corridor.
- Indirect effects for non-LSOG habitat are estimated to extend 30 meters from the cleared edge on each side of the corridor.
- No indirect effects are estimated for nonforested areas since there would be no new edge created.

- Direct effects of road decommissioning are estimated from the revegetation of an average road prism of 20 feet.
- Indirect effects of road decommissioning are estimated to extend 50 feet on each side of the decommissioned road in all vegetation classes.
- The indirect effect of stand-density management is estimated to extend 100 feet from the perimeter of the unit in all vegetation classes.
- Indirect effects of other mitigation actions are not considered to reduce edge in this comparison.

Using these assumptions, combined direct and indirect effects of the project and proposed mitigation actions are shown in table 2.2.3-4 and figure 2.2-6 below.

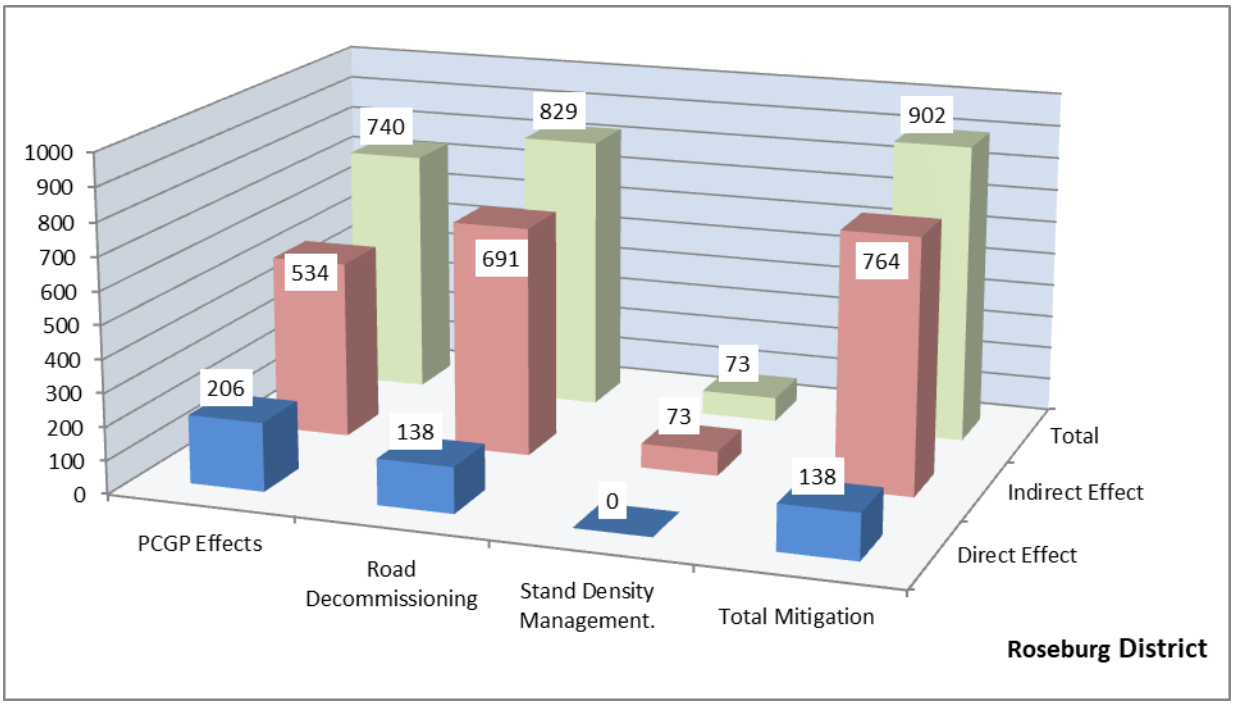
TABLE 2.2.3-4

Comparison of Total PCGP Project Impacts a/ on LSR 227 and Estimated Edge Reduction Effect b/ of Proposed Off-Site Mitigation Actions (acres)

Rogue River NF (LSR 227)	Direct Effect	Indirect Effect	Total
	Total PCGP Project Impacts on LSR 227		
PCGP Effects	206	534	740
	Proposed Off-Site Mitigation		
Road Decommissioning	138	691	829
Stand-Density Management.	0	73	73
Total Mitigation	138	764	902

a/ PCGP project direct effects include corridor clearing and TEWAs. Indirect effects include 100 meters on each side of corridor edge in LSOG and 30 meters on each side of corridor edge in non-LSOG
b/ Direct edge reduction effects include acres of decommissioned road revegetated (53.2*5280*20/43560) and indirect effects include 50 feet on each side of decommissioned roads and 100 feet along the perimeter of stand-density treatments.
Data source: BLM, USFS GIS data layers, Hobson 2010

Figure 2.2-6. Comparison of Total PCGP Project Impacts on LSR 227 and Estimated Edge Reduction Effect of Proposed Off-Site Mitigation Actions (acres)



The comparisons displayed are not one-to-one correlations, since the adverse impacts on edge would occur immediately with the construction of the pipeline and the reduction of edge effect from the off-site mitigation would occur over time. The comparison also does not take into consideration that the edge created by the construction of the pipeline would also reduce over time as the majority of the corridor (about 70 percent) would be reforested. The comparison does display that some of the mitigation actions proposed would help reduce the amount of fragmentation in LSR 227 by reducing the amount of existing edge. Over time, this would allow for the formation of larger blocks of interior forest habitat.

2.2.4 Impact on the Functionality of LSR 227 on the Rogue River NF and Consistency with LSR Standards and Guidelines

The functionality of LSR 227 relates directly to the goals and objectives for LSRs (see section 1.2) and can be measured by the quantity, quality, and distribution of LSOG forest habitat in the LSR and how the proposed PCGP project would impact these characteristics.

- Quantity: The overall quantity of LSOG habitat within LSR 227 on the Rogue River NF would increase with the proposed LRMP amendment. The PCGP project would remove approximately 55 acres of LSOG habitat but the reallocation would add 237 acres of LSOG habitat for a net increase of 182 acres.

- Quality: The area proposed for reallocation to LSR 227 contains some large blocks of LSOG habitat. With the reallocation of matrix to LSR and the consolidating of larger blocks of LSOG habitat, the quality of the LSOG habitat within LSR 227 would be slightly improved. There is also the benefit of the 284 acres of younger (less than 80 years old)

stands in the reallocated acres being managed for future LSOG habitat that would provide the potential for larger blocks of LSOG habitat.

- Distribution: The distribution of LSOG habitat within LSR 227 would remain largely unchanged with the proposed PCGP project and the reallocation of matrix to LSR LRMP amendment. To the extent there are minor changes, they would be beneficial due to the location of the proposed reallocation. The reallocation would occur on the north end of the LSR, providing for some additional connectivity with the nearest LSRs to the north.

- The off-site mitigation would improve the quantity, quality and distribution of LSOG habitat in LSR 227 by accelerating the development of constituent elements of late-successional habitat, reducing the risk of stand-replacing fire, and reducing fragmentation through road decommissioning and stand-density management.

The project design features, the reallocation of matrix to LSR, and the off-site mitigation actions for LSR 227 in the Rogue River NF have been designed with the goal that the overall impact of the PCGP project would be either neutral or beneficial to the creation and maintenance of late-successional habitat. These actions combined would maintain or improve the functionality of LSR 227.

3.0 LIST OF REPORT PREPARERS AND CONTRIBUTORS

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Paul Uncapher	Stantec	Program Manager	36 years	Project Manager
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Shannon Farrant	Stantec	GIS Specialist	10 years	Contributor GIS
Sylvia Langford	Stantec	Desktop Publisher	37 years	Document Formatting

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Jordan Cove Natural Gas Liquefaction and Pacific Connector Gas Pipeline Project Draft EIS

Attachment 1 to Appendix F3

Late Successional Reserves Crossed by PCGP Project

Revised Stouts Creek Fire Report

Pacific Connector Gas Pipeline

Umpqua National Forest

Prepared for:

USDA Forest Service

Prepared by:

Stantec

January 2019

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1.0 INTRODUCTION

The proposed Pacific Connector Gas Pipeline (PCGP) would cross National Forest (NF) system lands in portions of Late Successional Reserve (LSR).[1] The Standards and Guidelines in the Northwest Forest Plan (NWFP) guide management activities in LSR. This revised report is specific to mapped LSR 223 on the Umpqua NF that was impacted by the Stouts Creek Fire (the fire) in August 2015.[2] The fire continued to burn as the 2015 Final Environmental Impact (FEIS) for the PCGP project was being sent to the printer by the Federal Energy Regulatory Commission (FERC). The September 2015 FERC FEIS acknowledged the fire was a landscape-level change that was not specifically addressed at the time the 2015 FEIS was prepared.

The fire started on July 30th 2015 in Douglas County Oregon, near the small town of Milo. The fire continued to burn throughout August and into September. The proposed PCGP project lies within the fire perimeter approximately between mile post (MP) 95.5 and MP 108.9 (see figure 1.0-1). The discussion in this report will focus on the changed conditions in LSR 223 as a result of the fire with an emphasis on how the fire and suppression activities affected the late-successional and old growth (LSOG) forests and non-LSOG forests within the proposed pipeline corridor. This supplement will also address the effect of the fire on the proposed off-site mitigation actions related to LSR 223.

Impacts of the fire on LSR vegetation were determined by utilizing BARC (Burned Area Reflectance Classification) data. This satellite-derived layer of post-fire vegetation condition classifies data into four categories of fire severity including low/unburned, low, moderate, and high. These data were then used as an input for burn severity mapping produced by Burned Area Emergency Response (BAER) teams (Silva 2015). Using GIS, the acreages of fire severity were calculated to obtain acreage estimates for the amount of LSOG and non-LSOG habitat burned within LSR 223 (see table 1.0-1).

Table 1.0-1

Acres of LSR 223 Impacted by the Stouts Creek Fire

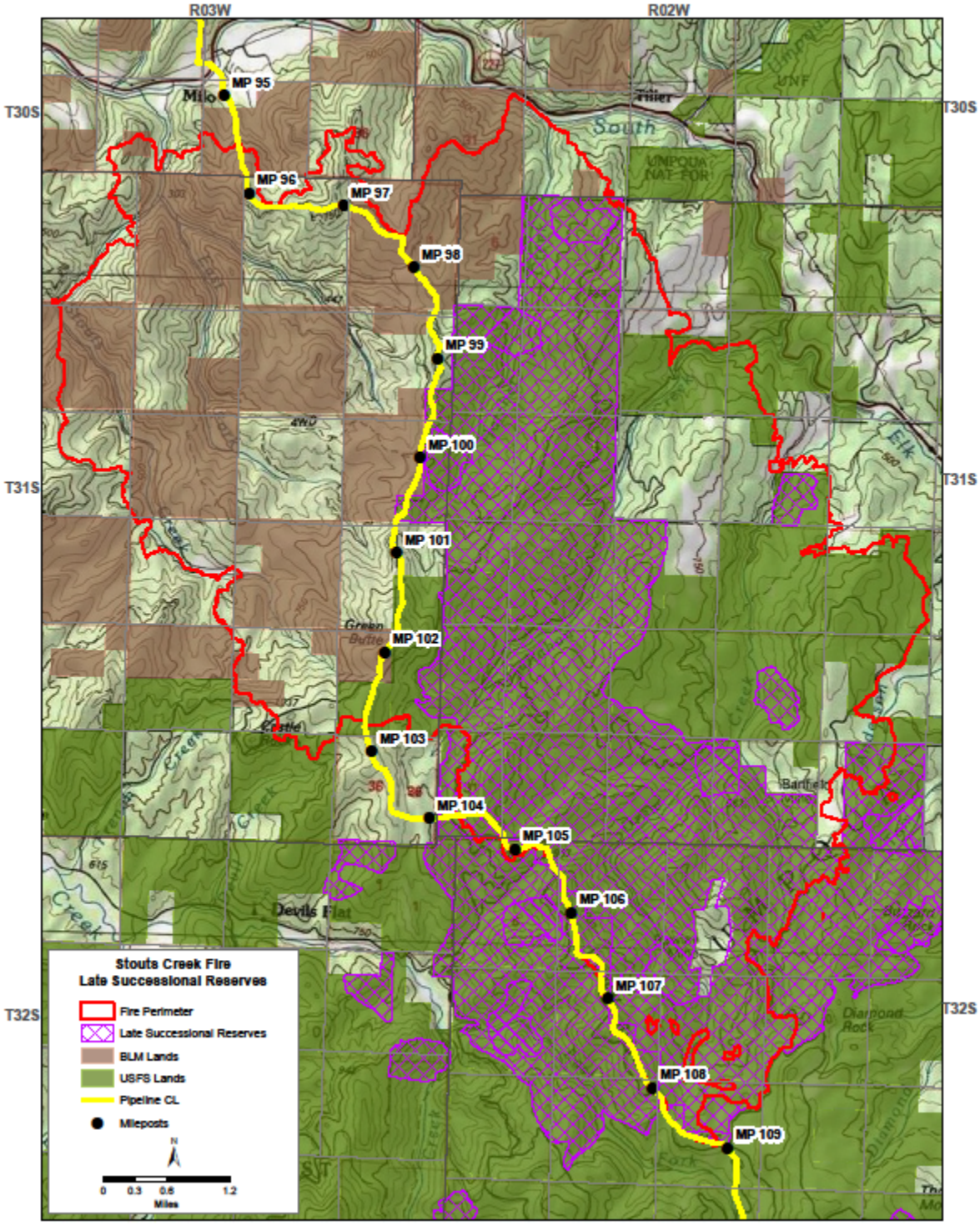
	Vegetation Type		
Fire Severity	**LSOG**	**Non-LSOG**	**Total LSR Acres**
Unburned/Low	3,298	3,813	7,111
Moderate/High	1,190	1,766	2,956
Total Acres	**4,488**	**5,579**	**10,067a**

a) This figure does not include the approximate 19 acres of non-forest land that burned within this portion of LSR 223

[1] In 2015 BLM lands were also included in LSRs under the NWFP. However since that time the BLM issued new Resource Management Plans for western Oregon in August 2016 and the BLM lands crossed by the PCGP Project are no longer under the direction of the NWFP.

[2] This report revises an earlier draft version that was prepared in 2016 by North State Resources (now Stantec). That draft report addressed both BLM and Forest Service lands. The report has been revised since BLM lands are no longer included in the NWFP.

Figure 1.0-1. Map of LSR in Relation to the Stouts Creek Fire.



For this analysis, the LSOG and non-LSOG layers were overlaid with the BARC data to estimate habitat losses in terms of canopy cover modification. Field surveys[3], discussions with Forest Service natural resource specialists, and BAER Reports, confirmed that the moderate and high severity classification represented a stand replacement fire event. Areas classified as low severity generally did not burn the canopy (see figures 1.0-2 thru 1.0-4).

The amount of moderate to high fire intensity that occurred within LSOG habitat within LSR 223 was approximately 1,190 acres. Although these acres of burned LSOG represented stand replacement fire it was determined that the acres would continue to function as foraging habitat for the northern spotted owl (NSO) due to the remaining structure within the stands and the mosaic pattern of the burn in this area.[4] In addition to the downgrading of nesting, roosting, foraging (NRF) habitat to just foraging habitat in the burned LSOG, approximately 1,766 acres of non-LSOG habitat was lost to stand replacement fire in LSR 223. Although this did not affect the amount of LSOG habitat within the LSR it does represent a loss of recruitment habitat that would have developed into LSOG in the coming years. It will now be 80 or more years before these areas attain LSOG habitat characteristics. The habitat conditions in areas of low fire intensity are expected to be largely unchanged as a result of the fire.

It should be noted that not all of the effects of the Stouts Creek Fire were adverse in relation to the creation and maintenance of late successional habitat within LSR 223 on the Umpqua NF. At a landscape scale there is an increase in forest resiliency as a result of understory fuels reduction in areas of lower fire severity. As noted in the Late Successional Reserve Assessment for LSR 223 (USDA, USDI 1999), high fuel loadings above historic levels was one of the main contributing factors to the high risk of stand replacement fire in this area. Low and unburned fire severities composed a larger proportion of the fire than moderate and high levels in LSR 223 on the Umpqua NF (see table 1.0-1). There may also be beneficial effects to late-successional species due to the mosaic burn pattern of the fire which creates canopy openings, edge habitats, large diameter snags, promotes herbaceous/woody hardwood growth, and provides for future large woody debris on the forest floor. All of these can be important habitat features for prey base species that late successional species such as the Northern spotted owl depend on (Bond et al 2009).

[3] From November 16 thru 19, 2015, personnel from North State Resources (now Stantec) surveyed the fire area including the pipeline route between MP 96 and 109 to assess changed conditions.

[4] Personal communication with David Krantz Forest Service PCGP project coordinator and email with Justin Hadwen wildlife biologist

Figure 1.0-2. Stouts Creek Fire Intensity Map

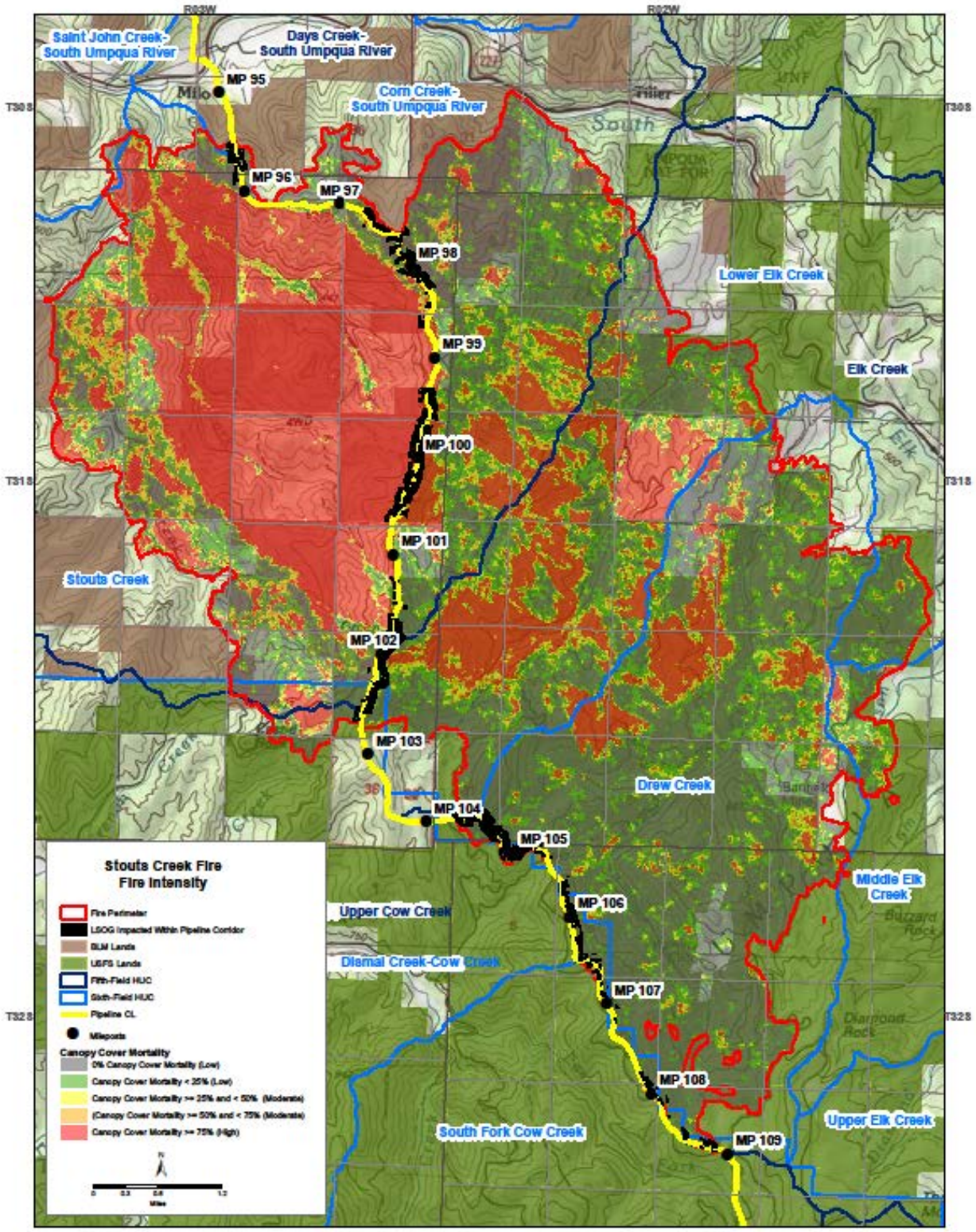


Figure 1.0-3. PCGP Corridor at MP 95.8 Showing an Area of Low Intensity Fire.

Figure 1.0-4. PCGP Corridor at MP 100.1 Showing Area of Moderate and High Intensity Fire

2.0 CHANGED CONDITIONS WITHIN LSR 223 AND THE PROPOSED PCGP CORRIDOR

The Stouts Creek Fire affected portions of the proposed PCGP project on the Umpqua NF within LSR 223 between approximate MP 99.3 to MP 100.7, MP 101.2 to MP 101.9, MP 102.3 to MP 102.7 and from MP 104.2 to MP 108.9. Between MP 99.3 and MP 100.7 the PCGP project is on or near the border between the BLM Roseburg District and the Umpqua NF. Most of the high intensity fire in these areas of the PCGP project occurred between MP 99.3 to MP 100.7 (see figure 1.0-1 and figure 1.0-2).

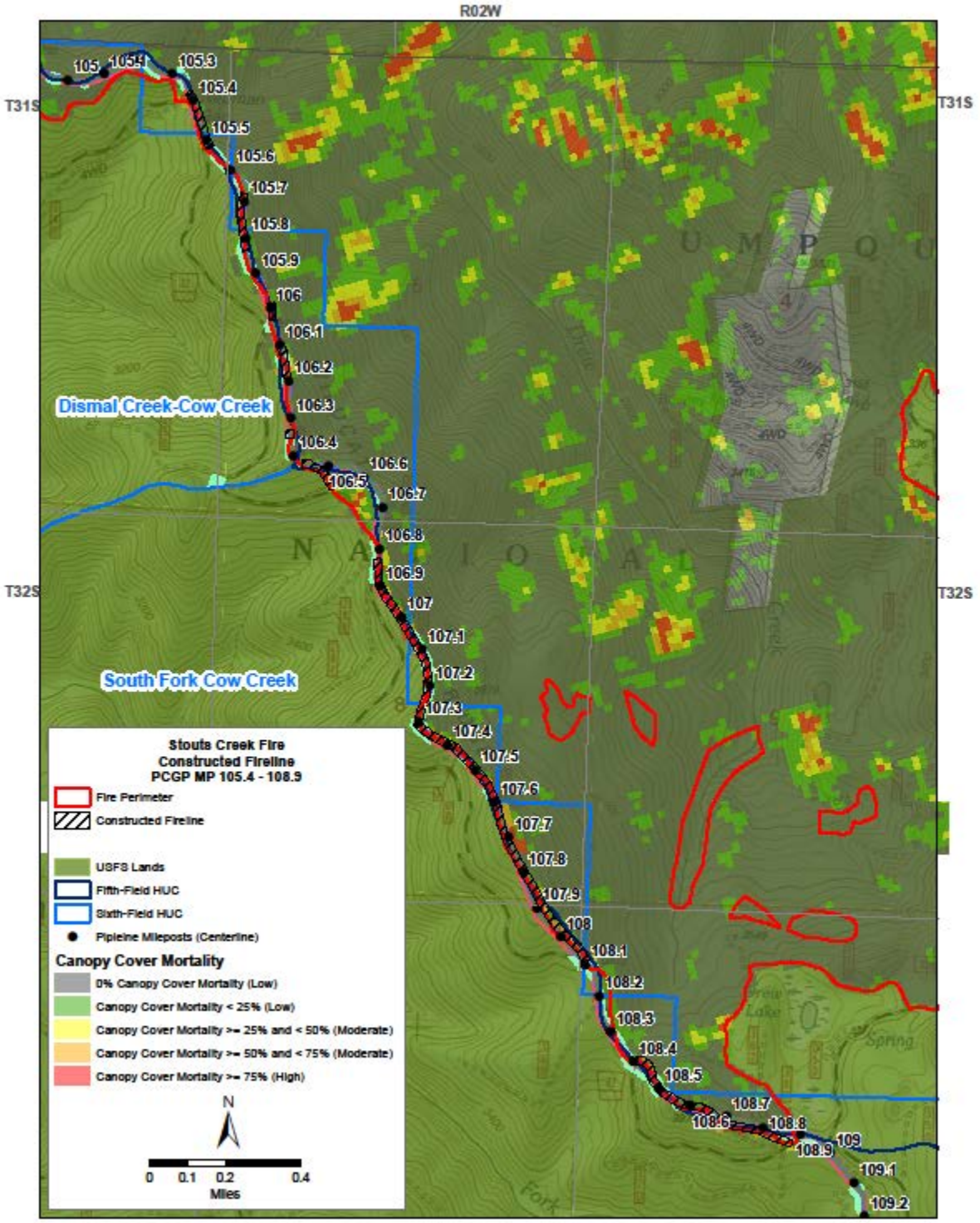
In addition to the impacts of the fire, forest vegetation was also impacted by fire suppression efforts. Along portions of the fire perimeter between MP 105.4 and 108.9 a fireline was constructed for a total of approximately 2.4 miles. The fireline, constructed with bull dozers and timber removal, resulted in a cleared corridor averaging approximately 100 feet wide (see figures 2.0-1 through 2.0-3). The fireline was then utilized as a backfire operation as part of the suppression effort. Since both the proposed PCGP corridor and the fireline utilized the ridgetop in this area, the fireline corridor and the proposed PCGP corridor overlap. Figure 2.0-4 displays the location of the fireline and the PCGP corridor. The breaks between areas of the fireline are either areas where an existing road was used or are areas where only understory trees were removed with most of the forest canopy remaining.

Figure 2.0-1. Constructed Fireline at MP 107.8 of the PCGP Project

Figure 2.0-2. Constructed Fireline at MP 107.4 of the PCGP Project Showing Area Where a Backfire was Ignited as Part of the Suppression Effort

Figure 2.0-3. Constructed Fireline at MP 108.7 of the PCGP Project

Figure 2.0-4. Map of Constructed Fireline between MP 105.4 and MP 108.9 of the PCGP Project



The constructed firebreak lies mostly within the Proposed PCGP corridor but not entirely. There are some areas where the firebreak diverges from the PCGP corridor. Of the approximate 28 acres that were cleared for the construction of the fireline approximately 19 acres overlap with the proposed PCGP corridor. Approximately 3 acres of LSOG habitat were included within these 19 acres. Cumulatively the end result would be a larger corridor than planned (by approximately 9 acres) between MP 105.4 and 108.9 if the PCGP project is approved and constructed.

Although the Stouts Creek Fire did affect habitat conditions in LSR 223 on the Umpqua NF (see section 1.0), the effects the PCGP project would have on LSOG habitat in this area are essentially the same as before the fire. This is because of the 20 acres of LSOG habitat in LSR 223 that would be cleared during construction only 2 acres are in moderate/high fire severity. Since the burned LSOG in this area is still considered to function as foraging habitat, all 20 acres would represent a loss of habitat. There is a small difference in the total amount of LSOG habitat the PCGP would affect since approximately 3 acres of LSOG habitat within the construction right-of-way were removed as part of the suppression efforts.

2.1 COMPENSATORY MITIGATION ACTIONS IN LSR 223 IN THE 2015 PCGP FEIS

A compensatory mitigation plan (CMP) was developed by the Forest Service to address unavoidable adverse impacts that would result from the construction of the PCGP Project (see Section 2.1.4 and Appendix F of the 2015 PCGP FEIS). The proposed off-site mitigation actions for impacts to LSR on the Umpqua NF were discussed in Appendix H and section 4.1.3.6 of the 2015 PCGP FEIS. The primary mitigation for the impacts of the PCGP project on LSR 223 in the 2015 PCGP EIS was the reallocation of approximately 588 acres of Matrix lands to LSR 223. These acres are located on the Umpqua NF and were not affected by the fire.

Figure 2.1-1 displays the proposed off-site mitigation actions related to LSR 223 from the 2015 PCGP FEIS that fall within the fire perimeter. Initial assessment of these proposed actions indicated that several or portions of several were no longer be viable as a result of the fire (see table 2.1-1).

Figure 2.1-1. Map of Off-site mitigation actions in the 2015 PCGP FEIS within the Stouts Creek Fire on the Umpqua NF.

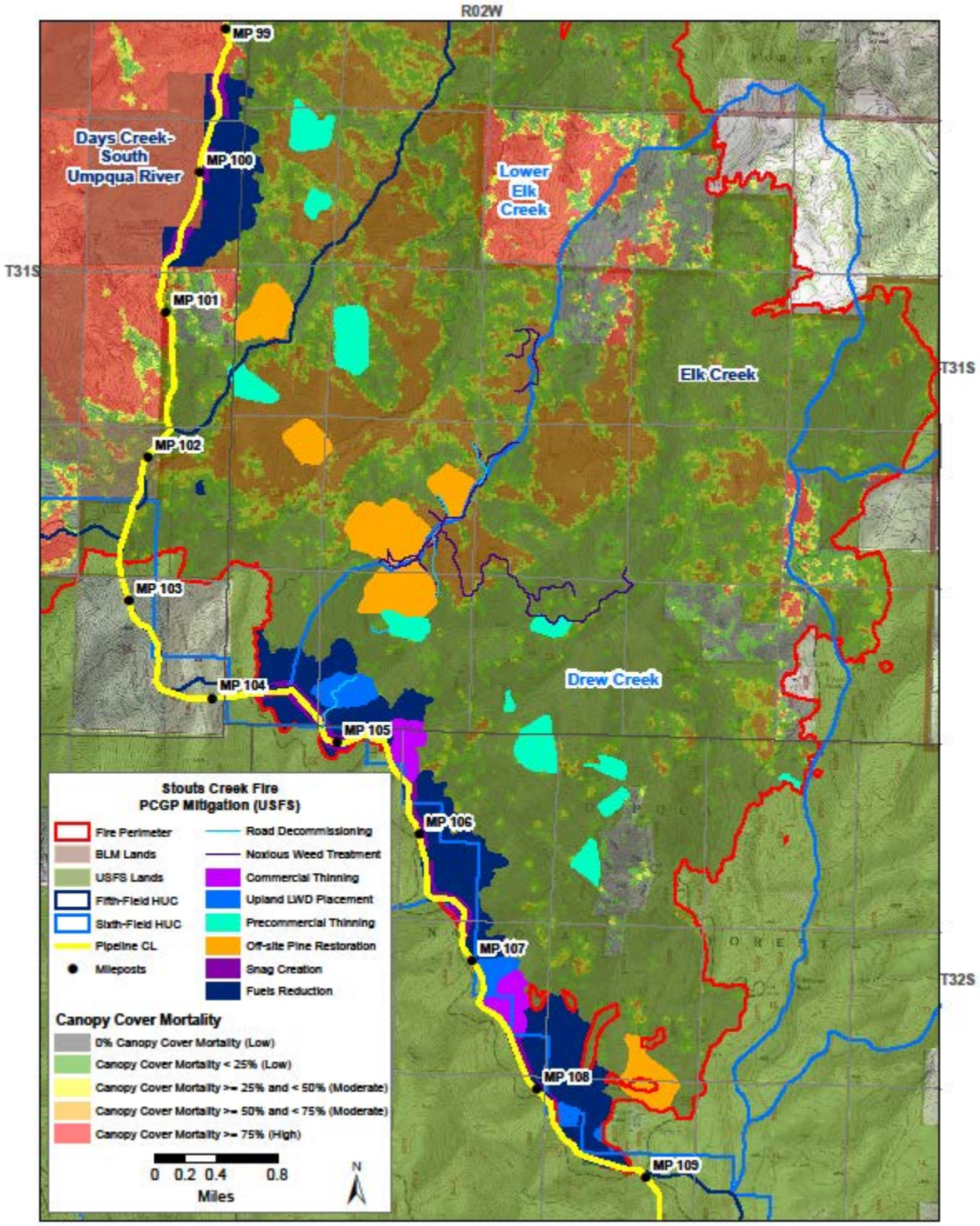


Table 2.1-1

Mitigation project viability within the 2015 Stouts Creek Fire on the Umpqua NF

Mitigation Group	Project Type	Total	Unit	Viable	Unviable	Verify/ Revise
Stand Density, Fuel Reduction and Fuel Break	Integrated Stand Density and Fuel Reduction	717	acres	274	126	317
Stand Density, Fuel Reduction and Fuel Break	Off-site Pine Restoration	397	acres	66	37	294
Stand Density, Fuel Reduction and Fuel Break	Pre-commercial Thinning	329	acres	12	170	147
Terrestrial/Upland Habitat Improvement	Snag Creation	146	acres	40	32	74
Road Sediment and Reduction	Road Decommissioning	3	miles	1	0	2
Stand Density, Fuel Reduction and Fuel Break	Commercial Thinning	94	acres	28	0	66
Terrestrial/Upland Habitat Improvement	LWD Upland Replacement	92	acres	31	0	61

Integrated Stand Density and Fuel Reduction: The objective of this mitigation action is to reduce the risk of loss of LSOG habitat to stand replacement fire. As illustrated in Figure 2.1-1 a portion (approximately 126 acres) of this proposed treatment occurs within areas of high fire intensity. As a result of the fire the treatment prescriptions in these areas may no longer be applicable. A portion of this proposed treatment (approximately 274 acres) occurs within areas of unburned or low fire intensity. In these areas the prescriptions would remain viable. The remaining 317 acres occurs in areas of mixed fire intensity and additional analysis is needed to determine if treatment is still viable or if the fire reduced fuel loadings to meet the objective.

Off-site Pine Restoration: The objective of this mitigation action is to accelerate the development of LSOG habitat within LSR. As shown in Figure 2.1-1 a portion (approximately 32 acres) of this proposed treatment occurs within areas of high fire intensity. As a result of the fire the treatment prescriptions in these areas would no longer be applicable A portion of this proposed treatment (approximately 66 acres) occurs within areas of unburned or low fire intensity. In these areas the prescriptions would remain viable. The remaining 294 acres occurs in areas of mixed fire intensity and additional analysis is needed to determine if treatment is still viable or needs to be revised to meet the objective.

Pre-commercial Thinning: The objective of this mitigation action is to accelerate the development of LSOG habitat within LSR. As shown in Figure 2.1-1 a portion (approximately 170 acres) of this proposed treatment occurs within areas of high fire intensity. As a result of the fire the treatment prescriptions in these areas would no longer be applicable. A portion of this proposed treatment (approximately 12 acres) occurs within areas of unburned or low fire intensity. In these areas the prescriptions would remain viable. The remaining 147 acres occurs in areas of mixed fire intensity and additional analysis is needed to determine if treatment is still viable or needs to be revised to meet the objective.

Snag Creation: The objective of this mitigation action is to compensate for the loss of snags within LSR that would occur from construction of the pipeline. As shown in Figure 2.1-1 a portion (approximately 32 acres) of this proposed treatment occurs within areas of high fire intensity. As a result of the fire, the treatment prescriptions in these areas may no longer be applicable. The areas of high intensity fire resulted in standing dead trees providing numerous snags in these areas. A portion of this proposed treatment (approximately 40 acres) occurs within areas of unburned or low fire intensity. In these areas the prescriptions would remain viable. The remaining 74 acres occurs in areas of mixed fire intensity and additional analysis is needed to determine if treatment is still viable or if the fire in these areas created enough snags to meet the objective.

Road Decommissioning: The objective of this mitigation action as it relates to LSR is to compensate for the fragmentation of LSOG habitat that would occur from pipeline construction. By decommissioning roads and allowing forest vegetation to reclaim the cleared road corridor, fragmentation over time is reduced as the new vegetation matures. As shown in Figure 2.1-1 a portion of the road decommissioning (approximately 1 mile) is in areas of unburned or low intensity wildfire. In these areas this objective could still be met. The remaining 2 miles are in areas of mixed fire intensity and additional analysis would be needed to determine if the objective could still be met in these areas. Road decommissioning can also accomplishes other objectives related to watershed conditions and wildlife habitat. For these reasons road decommissioning may remain a viable mitigation action even if the objective related to LSR was no longer viable.

Commercial Thinning: This mitigation action is part of the integrated stand density fuels reduction treatment. The objectives are both to reduce the risk of stand replacement fire and accelerate the development of LSOG habitat. This treatment continues to appear viable since it occurs mostly in areas of unburned or low intensity fire but additional analysis should be conducted to verify or revise the treatment prescriptions.

LWD Upland Replacement: The objective of this treatment is to mitigate for the loss of recruitment of large down wood within the pipeline construction clearing zone and adjacent stands. This treatment continues to appear viable since it occurs mostly in areas of unburned or low intensity fire but additional analysis should be conducted to verify or revise the treatment prescriptions.

2.2 REVISED COMPENSATORY MITIGATION ACTIONS IN LSR 223 ON THE UMPQUA NF

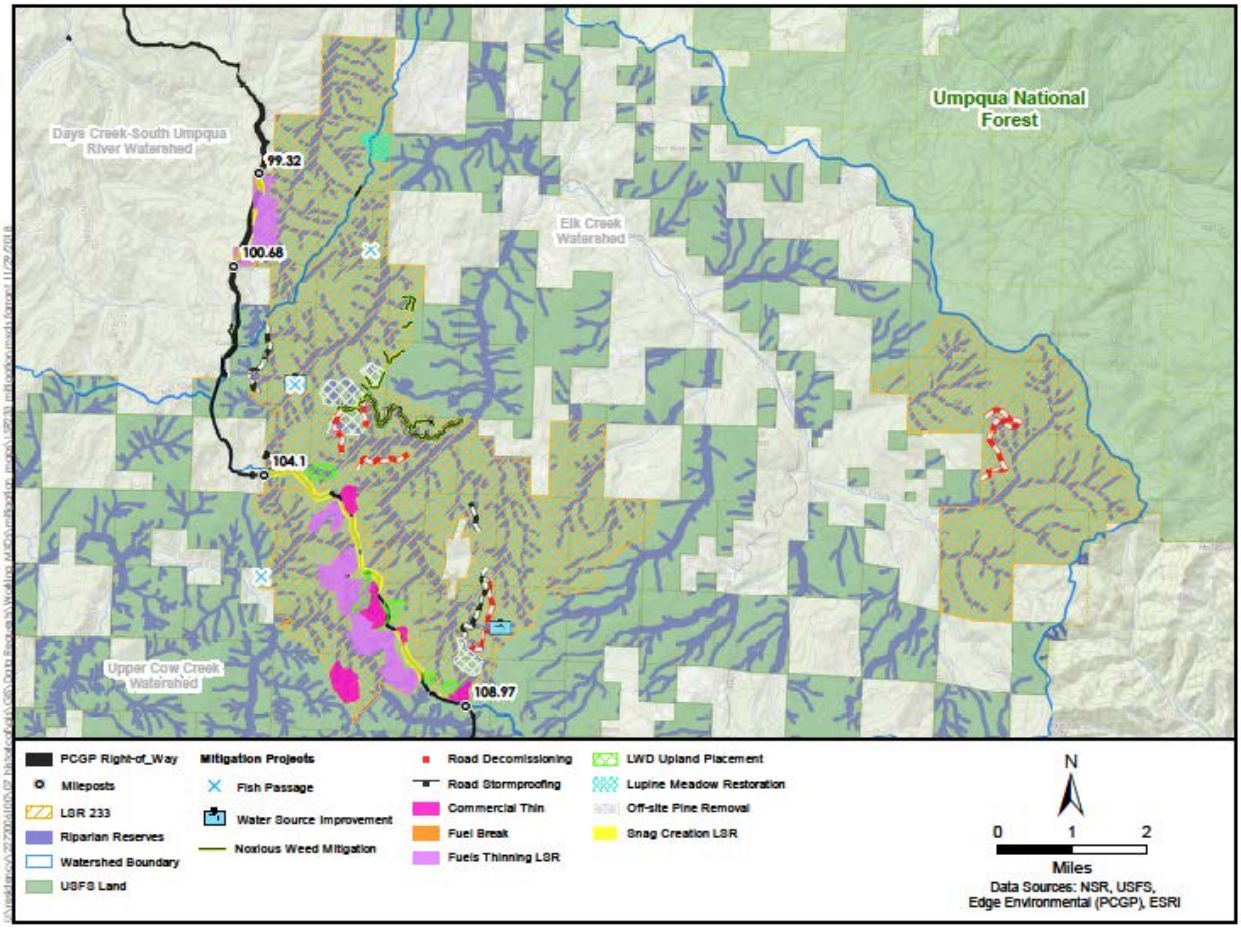
One of the foundations of the CMP was that the proposed mitigation actions remain adaptable to changed conditions or new information as it becomes available. A Forest Service interdisciplinary team of resource professionals including representatives from wildlife, hydrology, fire/fuels, silviculture and others met in 2018 to review the mitigation actions within the Stouts Creek Fire. In April of 2018 the interdisciplinary team met with members from Stantec to review the data on the Stouts Creek fire. At this meeting it was determined that mitigation projects would need to be field reviewed and revised as appropriate as a result of the changed landscape. Stantec staff and the Forest Service interdisciplinary team carried out these field reviews during the spring and summer of 2018. A new proposed mitigation package, based on the results of the field review, was finalized in October 2018. Table 2.2-1 and Figure 2.2-1 display the revised mitigation actions in LSR 223 on the Umpqua NF. These revised mitigation actions will be included in the CMP for the Umpqua NF in the 2019 FERC PCGP DEIS.

Table 2.2-1

Revised Mitigation Actions in LSR 223 on the Umpqua NF

Mitigation Group	Project Type	Total	Unit
Stand Density, Fuel Reduction and Fuel Break	Fuels Thinning	890	acres
Stand Density, Fuel Reduction and Fuel Break	Fuel Break	8	acres
Stand Density, Fuel Reduction and Fuel Break	Pre-commercial Thinning	329	acres
Terrestrial/Upland Habitat Improvement	Snag Creation	190	acres
Road Sediment and Reduction	Road Decommissioning/Storm-proofing	10	miles
Stand Density, Fuel Reduction and Fuel Break	Commercial Thinning	247	acres
Terrestrial/Upland Habitat Improvement	LWD Upland Replacement	164	acres
Stand Density, Fuel Reduction and Fuel Break	Off-site Pine Removal	301	acres
Terrestrial/Upland Habitat Improvement	Lupine Meadow Restoration	80	acres
Terrestrial/Upland Habitat Improvement	Noxious Weed Mitigation	6	miles
Aquatic and Riparian Habitat	Fish Passage	2	sites
Fire Suppression	Water Source Improvement	1	sites

Figure 2.2-1 Map of Revised Mitigations Actions in LSR 223



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Shannon Farrant	Stantec	GIS Specialist	10 years	Contributor GIS
Sylvia Langford	Stantec	Desktop Publisher	37 years	Document Formatting

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