APPENDIX F.6

Management Indicator Species Report

United States Department of Agriculture
Forest Service

Management Indicator Species Report

Pacific Connector Gas Pipeline Project

Umpqua National Forest
Rogue River-Siskiyou National Forest
Fremont-Winema National Forest

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1.0 INTRODUCTION

The National Forest Management Act of 1976 (NFMA) requires each National Forest to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." Management Indicator Species (MIS) is a concept adopted by Forest Service ("1982 rule" provision in 36 CFR 219.19 (a)(1)) to monitor for species viability at the Forest level. As described in the 1982 Rule, MIS are "*plant and animal species, communities, or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent"* (Forest Service Manual 2620.5). The role of MIS and the criteria to select MIS are described in 36 CFR 219.19 (a)(1) and Forest Service Manual 2600 (1982 Rule):

> *"In order to estimate the effects of each [Forest Plan] alternative on fish and wildlife populations, certain vertebrate and/or invertebrate species present in the area shall be identified and selected as management indicator species and the reasons for their selection will be stated. These species shall be selected because their population changes are believed to indicate the effects of management activities. In the selection of management indicator species, the following categories shall be represented where appropriate: Endangered and threatened plant and animal species identified on State and Federal lists for the planning area; species with special habitat needs that may be influenced significantly by planned management programs; species commonly hunted, fished or trapped; non-game species of special interest; and additional plant or animal species selected because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality."*

As described in the 1982 Rule, important characteristics of MIS include their capability of being effectively monitored and that relationships between species and their habitats and response to the effects of management activities of interest are well understood. MIS and their habitats have been used as part of a strategy to monitor implementation of Forest Plans and the effects to wildlife and plants. By monitoring the habitat changes of these particular indicator species, the effects of management activities on the associated animal communities can theoretically be determined. Since the habitats of MIS cover the majority of the vegetative seral stages on a specific National Forest, it is assumed that meeting the requirements of those species will assure that the needs of associated species will be met (Forest Service, 1990a).

In 2012, 36 CFR 219.19 was revised (2012 Rule). The 2012 Rule adopts an approach that focuses on maintaining and restoring ecological integrity (composition, structure, function, connectivity in order to meet species conservation objectives, and does not employ MIS. Rather, the 2012 Rule identifies Focal Species (species of conservation concern - SCC) for which there exists scientific evidence indicating substantial concern for the species' capability to persist over the longer term in the Forest, and that can be used to monitor the status of ecological integrity. Instead of monitoring trends of MIS, a select set of ecological conditions are monitored.

This assessment examines potential effects to MIS and to concomitant wildlife resources which may result from implementation of activities associated with the Proposed Action which includes both a liquefied natural gas (LNG) terminal in Coos Bay, Oregon (LNG Terminal) and a 229-mile natural gas pipeline (Pipeline); however, only the Pipeline will cross lands managed by the Forest Service. As a result, the LNG terminal will not be discussed further in this document. Portions of the Pipeline will cross the Umpqua, Rogue River-Siskiyou, and Fremont-Winema National Forests. Because the Land Resource Management Plans for these forests have not been amended, potential effects to MIS continue to be assessed included in the 1982 Rule.

This analysis identifies MIS on each National Forest that will be potentially affected by the Pipeline; the management indicators that each MIS represents, including management goals, standards, guidelines, and prescriptions for the management indicators; the status of MIS habitats and populations on National Forests or vicinities, if known; the habitats that will be affected; and the effects in relation to achieving Forest Plan standards. Wherever possible, the analysis in this document includes available information on recent population trends, though in most instances population indices in one form or another have been developed from limited data or used directly, if available, from other sources. Table 1-1 provides a list of MIS considered for each National Forest crossed by the Pipeline.

Proposed Action. The 229-mile Pipeline crosses Coos, Douglas, Jackson, and Klamath Counties in Southwest Oregon. The Umpqua, Rogue River-Siskiyou, and Fremont-Winema National Forests will be crossed.

To construct the Pipeline, PCGP must remove vegetation, including trees, from within the construction right-of-way, temporary extra work areas, and other limited locations (rock disposal sites, hydrostatic test sites, and temporary access roads). In addition, PCGP will also utilize uncleared storage areas (UCSAs) at various locations along the route to store forest slash, stumps, and dead and downed log materials that will eventually be scattered across the right-of-way after construction. UCSAs will mostly be located in dense, mature forested areas, in areas of steep slopes, and in areas where the route follows steep, narrow ridgelines. However, to minimize overall disturbance, UCSAs will not be cleared of trees during construction.

PCGP will be restoring some portions of impacted habitats by revegetating them with native species of grasses and shrubs, and replanting conifers within forested areas crossed by the Pipeline. Restoration of grasslands, shrublands, and early successional forest stages will occur within shorter time spans than restoration of mid-seral forests. In some cases, PCGP will enhance or create habitat features through, for example, girdling trees to create snags, and will be supporting agencies' treatments of forested stands through pre-commercial thinning projects that may enhance forest understories and accelerate development of late successional growth characteristics in treated conifer stands.

PCGP must retain a maintenance corridor 30 feet wide centered on the pipeline. That corridor will be maintained in an herbaceous and/or shrub state during the life of the Pipeline. Direct restoration of late successional-old growth forests >80 years old cannot occur during the life of the Pipeline, assumed to be 50 years. To mitigate for losses of late successional-old growth forests, PCGP is developing a Comprehensive Mitigation Plan (CMP). The CMP previously included funding for implementation of projects proposed by the Forest Service to be carried out within each National Forest crossed by the Pipeline. The Forest Service will be reviewing previously proposed projects to verify their relevance to the current proposed Pipeline and these projects or similar projects will be included in the CMP. Funding of such projects would offset impacts within Northwest Forest Plan (NWFP) Late Successional Reserves (LSRs) – mapped and unmapped, Riparian Reserves, and for species dependent on affected habitats within those land allocations in each forest to at least a neutral level. That is, implementation of the Forest Service's proposed projects will mitigate effects of the Pipeline so that levels of ecological services provided after construction of the Pipeline are the same as those provided before construction of the Pipeline.

Table 1-1
Summary of Management Indicator Species Analyzed for Each National Forest Affected by the Pipeline

Common Species Name / *Scientific Name*	Umpqua NF	Rogue River-Siskiyou NF	Fremont - Winema NF	General Habitat Targeted	Status[1]		
					Federal	State/ODFW	Conservation Status
Northern Spotted Owl *Strix occidentalis caurina*	MIS	MIS	MIS	Mature and old-growth coniferous forest	FT	ST	G3G4T3, S3
Pileated Woodpecker *Dryocopus pileatus*	MIS	MIS	MIS	Mature and old-growth coniferous forest	MBTA		G5, S4
Black-backed Woodpecker *Picoides arcticus* [Three-toed Woodpecker *Picoides tridactylus]*			MIS	Mature and old-growth coniferous forest	MBTA	SEN	G5, S3
American (Pine) Marten *Martes americana*	MIS	MIS	MIS	Mature and old-growth coniferous forest			G5T1
Bald Eagle *Haliaeetus leucocephalus*	MIS		MIS	previously listed as T&E	MBTA, BCC-5, BMC FS - Sensitive		G5, S4BS4N
Peregrine Falcon Falco peregrinus	MIS			previously listed as T&E	MBTA, BCC-5, BMC	SEN	G4, S1
Northern Goshawk *Accipiter gentilis*			MIS	Mature and old-growth coniferous forest	SOC MBTA, BCC-5	SEN	G5, S3
Roosevelt Elk *Cervus elaphus roosevelti*	MIS	MIS		Big game winter range			G4T4
Columbian Black-tail deer *Odocoileus hemionus columbianus*	MIS	MIS		Big game winter range			G5, S5
Mule Deer *Odocoileus hemionus*			MIS	Big game winter range			G5, S5
Acorn Woodpecker *Melanerpes formicivorus*	MIS			Dead and defective tree habitats	SOC MBTA	SEN	G5, S3
Lewis Woodpecker *Melanerpes lewis*	MIS			Dead and defective tree habitats	SOC MBTA, BCC-R9 FS - Sensitive	SC	G4, S2S3B
Yellow-bellied Sapsucker *Sphyrapicus varius*	MIS			Dead and defective tree habitats	MBTA		G5

Common Species Name / *Scientific Name*	Umpqua NF	Rogue River-Siskiyou NF	Fremont - Winema NF	General Habitat Targeted	Status[1]		
					Federal	**State/ODFW**	**Conservation Status**
Williamson Sapsucker *Sphyrapicus thyroideus*	MIS			Dead and defective tree habitats	MBTA, BCC-R9		G5, S4BS3N
Hairy Woodpecker *Picoides villosus*	MIS	MIS		Dead and defective tree habitats	MBTA		G5, S4
Downy Woodpecker *Picoides pubescens*	MIS	MIS		Dead and defective tree habitats	MBTA		G5, S4
Northern (Common) Flicker *Colaptes auratus*		MIS		Dead and defective tree habitats	MBTA		G5, S5
Winter Steelhead *Oncorhynchus mykiss*	MIS			Water quality		SEN	G5T3Q , S2S3
Summer Steelhead *Oncorhynchus mykiss*	MIS			Water quality		SEN	G5T2T3Q,S2S3
Inland Redband Trout *Oncorhynchus mykiss spp.*			MIS	Water quality	FS - Sensitive		G5T4, S3

[1] Status:
- Federal: MBTA = Migratory Bird Treaty Act, SOC = Federal Species of Concern, BCC = Bird of Conservation Concern (R9 = Region 9, R5 = Region 5), BMC = Bird of Management Concern, FS – Sensitive = Forest Service Region 6 sensitive species, FT = Federal Threatened
- State: ST = State Threatened; SC = ODFW sensitive-critical and SEN = ODFW sensitive.
- Conservation Status (NatureServe, 2017): G = Global, S = Oregon State, T = intraspecific taxon, B = Breeding, N = Nesting, Q = Questionable taxonomy; 1 = critical imperiled, 2 = imperiled, 3 = vulnerable, 4 = apparently secure, 5 = secure.

2.0 UMPQUA NATIONAL FOREST

Species. The Umpqua National Forest Plan (1990b) includes the following species as MIS: northern spotted owl, pileated woodpecker, pine marten, bald eagle, peregrine falcon, Roosevelt elk, Columbian black-tailed deer, and primary cavity nesters (acorn woodpecker, Lewis's woodpecker, yellow-bellied sapsucker, Williamson's sapsucker, hairy woodpecker, and downy woodpecker; Table 1-1). Indicator species for water quality in the Forest include summer and winter steelhead runs. The northern spotted owl, pine marten, and pileated woodpecker represent various mature and old growth conifer habitats. Primary cavity excavators represent dead and defective tree habitats. Big game winter range is represented by Roosevelt elk and black-tail deer.

The bald eagle and peregrine falcon were listed as threatened or endangered species requiring special management at the time of the Forest Plan's release, but have since been delisted. However, they are included in this discussion because they still remain indicator species under the current Forest Plan (1990b). The northern spotted owl is now listed under the Endangered Species Act, and its status is covered extensively under separate cover in the Biological Assessment.

Habitats. MIS in the Umpqua National Forest are associated with a variety of habitats found throughout the forest. However, the Pipeline will cross only those habitats included in Table 2-1, below. Table 2-1 summarizes the areas (acres) of habitat affected within the Umpqua National Forest, including forested habitats (Southwest Oregon Mixed Conifer-Hardwood Forest), non-forested habitats, and other affected habitat categories; forested habitat is differentiated by seral stages including clearcut-regenerating forest, mid-seral forest, late successional-old growth forest. Potential effects of the Pipeline have been summarized by component during construction and during operation. Generally, most long-term disturbance is due to a 30-foot wide maintenance corridor, centered on the pipeline that is maintained in an herbaceous and/or shrub state for the life of the Pipeline. Table 2-1 is referenced in discussions for each MIS in the sections, below.

The forest habitat crossed – Southwest Oregon Mixed Conifer-Hardwood Forest (Johnson and O'Neil, 2001) – corresponds to two vegetation categories described by the Oregon Gap Analysis Project (Oregon Gap; Kagan et al., 1999) and mapped generally within 100 meters of the Pipeline project. Those vegetation categories include 1) Douglas-fir-White Fir/Tanoak-Madrone Mixed Forest, and 2) Douglas-fir Dominant-Mixed Conifer Forest (Kagan et al., 1999). In 2015, a large stand-replacing fire (the Stouts Creek fire) burned approximately 26,452 acres on Roseburg BLM District, Umpqua National Forest, and some private landowners (Northwest Interagency Coordination Center 2015), including forest lands crossed by the Pipeline.

<u>Douglas-fir-White Fir/Tanoak-Madrone Mixed Forest:</u> Multi-layered forest of mixed conifer and mixed deciduous forest makes up this vegetation type. It always contains Douglas-fir, with other co-dominants (i.e., white fir, incense cedar, sugar pine and rarely western white pine). The subcanopy layers contain shade-tolerant trees, including tanoak, madrone, chinquapin, Pacific dogwood, and California laurel. Shrub and herb layers are generally well represented, and this forest type is found in low to mid elevations (Kagan et al., 1999).

<u>Douglas-fir Dominant-Mixed Conifer Forest</u>**:** Single-layer forest canopy is typical, although stand structure can be diverse in undisturbed late seral stands. There is a wide range of canopy closure based on management practice, disturbance history, and microsite. Douglas-fir is dominant, with a variety of coniferous trees including white fir, incense cedar, western white pine, ponderosa pine, and sugar pine. Understory vegetation is usually diverse and rich in species, and this forest type is found at mid elevations (Kagan et al., 1999).

Table 2-1
Summary of Construction and Operation-Related Disturbance (acres [1]) to Corresponding Wildlife Habitat Categories (Johnson and O'Neil, 2001) in the Umpqua National Forest

Component	Forest –Woodland Seral Stage [2]	Southwest Oregon Mixed Conifer-Hardwood Forest	Riparian: Forested Wetland	Riparian: Non-Forested Wetland	Developed: Developed-Urban and Mixed Environs	Developed: Roads	Open Water	Total
CONSTRUCTION DISTURBANCE								
Pipeline Facilities								
Construction Right-of-Way	**L-O** **M-S** **C-R** **Tot**	67.99 19.20 30.02 117.20	0.11	0.01		6.57	0.18	124.07
Hydrostatic Discharge Sites [3]	**L-O** **M-S** **C-R** **Tot**							0
Rock Source/Disposal	**L-O** **M-S** **C-R** **Tot**	0 0.03 0 0.03			4.31	0.02		4.35
Temporary Extra Work Areas	**L-O** **M-S** **C-R** **Tot**	10.08 11.09 5.19 26.36	0.05		7.74	6.34	0.12	40.62
Access Roads	**L-O** **M-S** **C-R** **Tot**	0.17 0.04 0.02 0.24						0.24
Uncleared Storage Areas [4]	**L-O** **M-S** **C-R** **Tot**	34.04 7.59 0.07 41.7				0.41		42.10
Total Construction Disturbance	**L-O** **M-S** **C-R** **Tot**	112.28 37.96 35.29 185.52	0.15	0.01	12.05	13.34	0.30	211.38
OPERATION DISTURBANCE								
Pipeline Facilities								
30-foot Maintenance Corridor	**L-O** **M-S** **C-R** **Tot**	20.43 6.04 10.19 36.66	0.03			2.52	0.08	39.30
Total Operation Disturbance	**L-O** **M-S** **C-R** **Tot**	20.43 6.04 10.19 36.66	0.03	0	0	2.52	0.08	39.30

[1] Acres disturbed were evaluated using GIS; footprints for each component (temporary construction right-of-way, temporary extra work areas, temporary access roads, uncleared storage areas, pipe storage yards, aboveground facilities, permanent easement, and 30-foot maintenance corridor) were overlaid on the digitized vegetation coverage.

[2] Forest-Woodland Seral Stages are L-O, Late Succession/Old Growth assumed to be ≥80 years old; M-S, Mid-Seral assumed to be ≥40 but ≤80 years old; C-R, Clearcut-Regenerating Forest assumed to be ≤40 years old.

[3] Small brush or trees may be cleared by a rubber-tired rotary or flail motor (brush hog) or by hand with machetes/chainsaws. No soil disturbance will occur. A rubber-tired or track hoe will be utilized to lay the discharge line and to remove the saturated hay bales or filter bags upon completion of hydrostatic discharge.

[4] PCGP uncleared storage areas (UCSAs) will not be cleared of trees during construction. These areas will be used to store forest slash, stumps and dead and downed log materials that will be removed and scattered across the right-of-way after construction during restoration and are considered as temporary insignificant habitat modifications.

Other habitat types affected by the Proposed Action within the Umpqua National Forest (Table 2-1) include: forested and non-forested wetlands, developed-urban and mixed Environs, and open water.

Forested Wetlands or Palustrine Forest: This type is typically multi-storied canopy (trees >18 feet tall). Deciduous trees generally dominate in eastern Oregon, including black cottonwood, white alder, quaking aspen, and peach leaf willow. In western Oregon, conifer trees such as western red cedar, western hemlock, Douglas-fir, and grand fir tend to dominate the canopy. This forest type is located in narrow riparian zones along flowing waterbodies (Kagan et al., 1999).

Non-Forested Wetlands or Palustrine Emergent**.** This type is made up of freshwater herbaceous wetlands that contain medium tall (2-4 feet) to tall (>4 feet) grass or grass-like plants. Common herbaceous plants include cattails, bulrush species, and bur reed. Grasses associated with this category are blue wild rye, tufted hair grass, blue joint weed grass, reed canary grass, American slough grass, and northern manna grass (Kagan *et al.* 1999).

Developed-Urban and Mixed Environs: This type can include urban areas located in cities and municipalities (Kagan et al., 1999), areas associated with the sale of products and commercial services (Anderson et al., 1976) and industrial sites, typified by light to heavy manufacturing and buildings associated with mining, including rock quarries (Anderson et al., 1976). It also includes landscaped, vegetated areas surrounding residences and/or commercial buildings.

Roads: This type is made up of non-vegetated, manmade highways and roads, either paved or un-paved. It is often included in the urban category (Johnson and O'Neil, 2001; Kagan et al., 1999; Anderson et al., 1976).

Open Water includes rivers, creeks, and other linear waterbodies. It may also include non-vegetated, smooth and sloping accumulations of sand and gravel along shorelines (Anderson et al., 1976) as well as ditches and canals since they contain excavated drainages or conveyance features that drain agricultural or upland areas.

2.1 Northern Spotted Owl

The northern spotted owl (NSO) was selected as an MIS for mature and old growth habitat, and in the 1990 Umpqua National Forest Plan there was 392,000 acres of modeled suitable NSO nesting, roosting, and foraging (NRF) habitat and 154 inventoried NSO pairs (Forest Service, 1990b). The NSO was proposed for listing under the Endangered Species Act (ESA) when the Umpqua National Forest's Plan was signed in 1990, and was officially listed as Threatened in 1992. The Northwest Forest Plan (1994) amended the Umpqua's Forest Plan (Forest Service, 1990b), and was designed to ensure the population viability of the NSO. Since the NSO is now listed under the Endangered Species Act, it is covered extensively under separate cover in the Biological Assessment prepared for the Proposed Action. A summary of the status of NSOs and its habitat on Umpqua National Forest is included here, including effects to NSO habitat from the Pipeline. Additional information can be reviewed in the Biological Assessment.

Umpqua National Forest occurs within two physiographic provinces within the range of the northern spotted owl: Klamath Mountains and West Cascades. As part of the Northwest Forest Plan Monitoring, a habitat model for NSO has been developed and subsequently revised to track changes in NSO habitat from the inception of the Northwest Forest Plan (BLM and Forest Service, 1994) through 2012 and is included in the 20-year monitoring report for the NSO. This model was peer reviewed and published in a General Technical Report (GTR) in 2016 (Davis et al., 2016).

This model applied to the Umpqua National Forest predicts that there is approximately 584,624 acres of suitable NSO NRF habitat available, which is an increase of 192,624 acres of suitable NSO habitat from what was predicted in the 1990 Forest Plan. Through surveys for spotted owls that have occurred from the early 1990's through 2008 in the Umpqua National Forest, there are 294 pairs of NSO documented to have occurred or are occurring in the Umpqua National Forest, with an additional 51 resident singles (Umpqua National Forest, 2013 GIS data layer). This is an increase of approximately 140 pairs of NSO documented in Umpqua National Forest since the 1990 Forest Plan.

The proposed Pipeline affects NSO habitat (high NRF, NRF, dispersal only, and capable habitat as defined by FWS in the Conservation Framework developed for the Proposed Action; see FWS, 2014) in the Umpqua National Forest within the Klamath Mountains physiographic province. All NSO habitat affected by the Proposed Action in the Umpqua National Forest occurs within NSO home ranges; some of the NSO home ranges analyzed in the Umpqua National Forest are not "known" NSO sites, but sites determined to be a "best location" from survey efforts conducted for the Pipeline or an area that has enough suitable habitat that could be used for nesting by NSO ("assumed"). Twelve known NSO home ranges with a radius of 1.3 miles occur within the Pipeline project area and will have NSO habitat affected, including habitat from four NSO core areas and one nest patch (affected by the 2015 Stouts Creek fire); three best location home ranges and one assumed home range are also analyzed within Umpqua National Forest. Table 2-2, below identifies the amount of NSO habitat removed by the Pipeline in the Umpqua National Forest. Overall, the Pipeline would remove approximately 78.24 acres of NRF habitat (high NRF and NRF, combined), which is approximately 0.01 percent of the 584,624 acres of NRF habitat available within Umpqua National Forest.

Table 2-2
Summary of NSO Habitat Removed (acres) within Umpqua National Forest

NSO Habitat	Construction Right-of-Way	Temporary Extra Work Space	Rock Source /Disposal	Access Roads (TAR)	Total Habitat Removed
High NRF	36.37	4.99			41.36
NRF	31.62	5.09		0.17	36.88
Dispersal Only	19.20	11.09	0.03	0.04	30.37
Capable	30.02	5.19		0.02	35.22
Total NSO Habitat	**117.20**	**26.36**	**0.03**	**0.24**	**143.83**

2.2 Pileated Woodpecker

This large woodpecker was identified as a management indicator species because of the number and size of snags it requires and its need for mature stands of timber for nesting habitat, especially the hemlock / white fir, silver fir / Shasta red fir, and Douglas-fir / ponderosa pine eco-classes. The species may provide information for other cavity excavating species and animal communities associated with late successional forest. The pileated woodpecker requires the largest snags of any of the primary cavity nesters in the Umpqua National Forest (Forest Service, 1990b). The pileated woodpecker is protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712).

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for pileated woodpeckers and their habitat:

<u>Applicable Forest Plan Forest-wide Standards and Guidelines.</u>

- Provide one habitat area for every 12,000 to 13,000 acres of suitable habitat. Habitats will be distributed in such a way that any given habitat unit will be connected to two or more other suitable habitats.
- When possible, wildlife trees (snags and green culls) will be left standing in areas of timber harvest. This habitat will be in addition to that provided by implementing the snag habitat prescriptions.

Management Prescriptions.
Prescription C5-VII, Wildlife – Pileated Woodpecker, Dedicated applies to 600-acre areas with the purpose of providing suitable reproduction habitat for pileated woodpeckers.

- Wildlife and Fish: Vegetation manipulation or structural improvement designed to enhance wildlife permitted. Activities designed to produce the desired number of snags and dead and down material per acre on a continuing basis will be featured and receive high priority. Areas for nonstructural improvement are the priority for this prescription.
- Timber: No timber harvest or salvage in the 300-acre reproduction area. An adjacent 300 acres will be managed to provide snags at the minimum rate of two snags per acre >12 inches dbh. Six green trees per acre will be left to provide for future snags. A minimum of one snag >20 inches dbh per 6 acres will be provided. Commercial and personal-use firewood cutting shall be an incidental secondary product of timber harvest. Firewood cutting and gathering shall be limited to that needed for onsite recreational use.
- Facilities: Generally no construction of new roads or corridors in a 300-acre reproduction area, except where vital to serve adjacent areas. Exceptions will be on a case-by-case basis. Acreage lost to roads or corridors will be compensated by additions to the reproduction areas. Normal maintenance of existing roads is permitted. Corridors may be allowed within the 300-acre area adjacent to the reproduction area, as determined by the NEPA process. Full road activities to meet timber objectives will occur in the 300-acre area adjacent to the reproduction area.
- Protection: No snag removal for pre-suppression purposes. No insect or disease control unless it is catastrophic in nature (threatening 50 percent or more of the stand).

Prescription C5-VIII, Wildlife – Pileated Woodpecker, Managed directs that an area of 2,011 acres be managed with a 130-year rotation. The prescription will be applied to timber stands to proved suitable habitat characteristics for the pileated woodpecker on at least 600 acres properly located at any point in time.

- Wildlife and Fish: Vegetation manipulation or structural improvement designed to enhance wildlife permitted. Activities designed to produce the desired number of snags and dead and down material per acre on a continuing basis will be featured and receive high priority. Areas for nonstructural improvement are priority for this prescription.
- Timber: Timber stands will be managed to maintain at least 300 acres >20 inches dbh at all times. Salvage is not permitted around the 600-acre designated core area. Firewood cutting shall be an incidental secondary product of timber harvest. Firewood cutting and gathering shall be limited to that needed for onsite recreational use.
- Facilities: Replacement areas have no special restrictions for the first 90 years of the rotation period. During the last 40 years of the rotation, only arterial roads will be maintained. All other roads will be obliterated or maintained only to protect soil and water values. For the periphery portion of replacement area, full road management is permitted even during last 40 years of rotation period. Utility/transportation corridors may be allowed pending determination by the NEPA (EA) process.
- Protection: No snag removal for pre-suppression purposes. No insect or disease control unless it is catastrophic in nature (threatening 50 percent or more of the stand).

Also see *Prescription C5-VI, Wildlife – Snag Management Areas* below for Primary Cavity Excavators.

Management Areas.
Two Management Areas, MA 10 and MA 11, in which the above prescriptions are directed toward managing habitats utilized by pileated woodpeckers, will be affected by the Proposed Action:

Management Area 10 Direction. Pileated woodpecker prescriptions (C5-VII and VIII, discussed above) are assigned to locations that meet the distribution requirements set out in the Forest-wide wildlife standards and guidelines. Where these locations overlap other prescription assignments that harvest timber, the managed prescription (C5-VIII) is assigned. Where these locations overlap other prescription assignments that do not harvest timber, the dedicated prescription (C5-VII) is assigned (Forest Service, 1990b).

Management Area 11 Direction. Same as for MA 10.

Habitat. Pileated woodpeckers are found primarily in dense mixed confer forests in late seral stages, or in bottom land deciduous stands (Marshall et al., 2006). The birds require snags 50 feet or greater in height and 20 inches in diameter at a 50-foot height, downed logs, diseased trees, and a fairly high density of snags of all sizes (Forest Service, 1990b). This late seral association indicates the need to utilize large trees for nesting, foraging, roost sites, and cover from predators (Marshall et al., 2006). In the Umpqua National Forest, mature to old growth stands that have not been salvage-logged are generally considered prime habitat for pileated woodpeckers. The hemlock/white fir, silver fir/Shasta red fir, Douglas-fir/ponderosa pine eco-classes are considered capable habitats for the species (Forest Service, 1990b). The Umpqua Forest Plan (Forest Service, 1990b) estimated there was 714,499 acres of capable habitat in those eco-classes, and 485,859 acres of suitable pileated woodpecker habitat in 1990.

To determine current habitat available for pileated woodpeckers in the Umpqua National Forest, the NSO habitat created by Davis et al. (2016) was used as a surrogate for pileated woodpecker habitat since both species are an indicator for the same mature/old-growth habitat. In addition to the NSO habitat, snag habitat has also been identified as an indicator for pileated woodpeckers. To quantify current snag habitat, fire perimeters and documented tree mortality from the Region 6 Aerial Insect and Disease surveys from the past 10 years (2008 - 2017) were counted as suitable snag habitat for pileated woodpeckers to forage in (Table 2-3). Using both the NSO habitat model and snag habitat created by wildfire and insects, there are 619,433 acres of current habitat, an increase of 133,574 acres from the 1990 Forest Plan habitat estimate. Habitat is distributed sufficiently to ensure dispersal of breeding Pileated Woodpecker across the Forest's suitable habitat.

Table 2-3
Acres of Snag Patches Estimated by the Region 6 Aerial Detection Surveys (2007-2016) and Wildlife Perimeters (2007-2016) to Measure Current Functional Snag Habitat in the Umpqua National Forest

Insect & Disease Agent	Acres
Douglas-fir Beetle	9,116
Mountain Pine Beetle-Lodgepole	24,143
Mountain Pine Beetle-Ponderosa	22
Mountain Pine Beetle-Sugar Pine	1,385
Mountain Pine Beetle-Western White Pine	720
Western Pine Beetle	757
Total Acres of Snag Patches Created by Insect & Disease	*36,143*
Fire Year	**Acres**
2008	20,588
2009	21,753
2011	747
2012	24
2013	18,004
2014	323
2015	17,119
Total Acres of Fire Perimeters	*78,558*
Total Acres of Snag Habitat	***114,701***

Pileated woodpeckers are generally associated with Southwest Oregon Mixed Conifer-Hardwood Forests and Westside Riparian Wetlands – both are habitat type associations described by Johnson and O'Neil (2001) – that coincide with the Pipeline (Table 2-1) within Umpqua National Forest. Since they are dependent on downed wood and snags, pileated woodpeckers would be most likely to inhabit the old growth or late successional stands (≥80 years old) of Southwest Oregon Mixed Conifer-Hardwood Forest that are included in Table 2-1. They are, however, closely associated with small, medium, large, and giant tree forested stands that provide structural conditions with decadent wood and snags (Johnson and O'Neil, 2001). A general association of a species with a given habitat applies to an adaptable species that is supported by a number of habitats that provide for its maintenance and viability, while a close association is indication of a species' dependency on a specific habitat for part or all of its life history requirements (feeding and reproduction) implying that the species has an essential need for a particular habitat for its maintenance and viability (Johnson and O'Neil, 2001).

<u>Forest Management Activities.</u> Logging, fire control, and road building activities that reduce the number of snags or potential snags, or convert mature stands to early successional timber stages have the greatest detriment on pileated woodpeckers. Past fire management practices have had a significant impact on their habitat. In the past, all snags within a 200-foot distance around the outside perimeter of harvest units were felled for fire protection purposes. This practice is no longer in use, although snags continue to be felled on a case-by-case basis where fire and safety concerns are high (Forest Service, 1990b).

Current management for the pileated woodpecker is incorporated in Forest and Regional snag management policies. This management is designed to maintain a well-distributed population of all cavity nesting species by providing habitat for 40 percent of potential population capability.

The results of applying snag management practices to timber sale operations have been variable (Forest Service, 1990b)

Species' Status in the Pipeline Project Area. Based on the reductions in suitable habitat in the Umpqua National Forest due to logging and associated activities during the last several decades, it could be expected that populations have been reduced by approximately 25 to 30 percent (Forest Service, 1990b). Even with the current snag management policy, future logging will continue to reduce this species' population. Also, the use of timber rotations of less than 100 years may not produce trees of suitable size to meet the nesting requirements of this species (Forest Service, 1990b).

Data have been collected on 17 National Biological Survey Breeding Bird Survey (BBS) routes (Pardieck et al. 2017) in Bird Conservation Region (BCR) 5 that are within approximately 50 miles of the Umpqua National Forest and the Pipeline, of which three BBS routes occur in the Umpqua National Forest. Numbers of each species that were reported on each route were compiled and averaged (numbers per route) for each year, 1997 through 2016, to develop indices of populations in the vicinity of the Pipeline and Umpqua National Forest. During the 20-year period, an average of 2.05 pileated woodpeckers were observed per BBS route (observed on average of 10.75 routes per year) each year. Over the past 20 years, pileated woodpecker populations appear to be relatively stable (neither increasing nor decreasing) on BBS routes within the Pipeline vicinity (Figure 2-1).

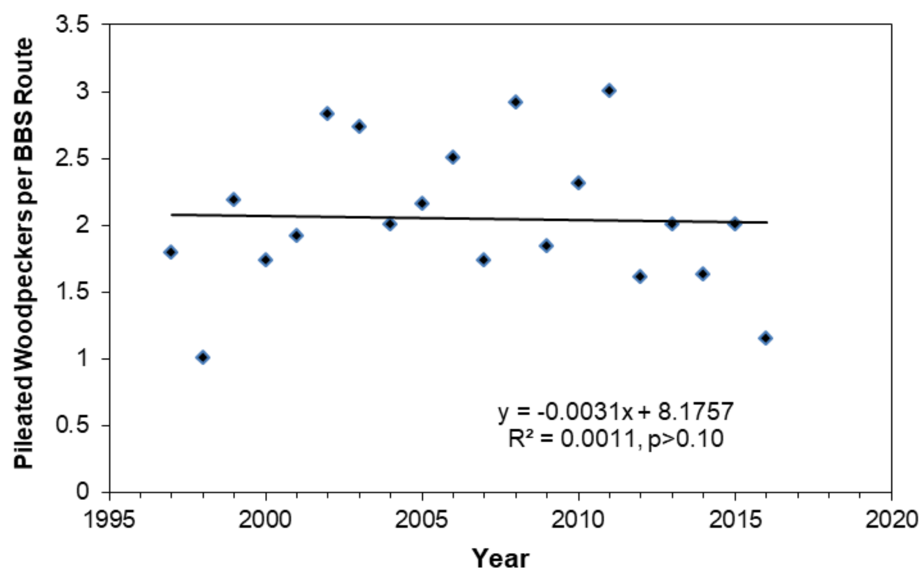

Figure 2-1
20-year Trend in Pileated Woodpeckers Counted per BBS Route in BCR 5 in the Vicinity of the Pipeline

Potential Effects of the Proposed Action. Pileated woodpeckers could be negatively impacted during construction of the Pipeline. Direct mortality of young could occur if nest trees are cleared prior to young fledging. Since nest excavation lasts from late March through early May, eggs are present in May and early June, and nestlings are present from late May through early July (Marshall et al., 2006), tree felling during those periods could directly impact young birds. While adults would be able to escape temporary disturbances, adult birds could abandon nests, leaving eggs and chicks vulnerable to predation and the elements. However, tree felling would not occur between April 1 and July 15 (outside of the migratory bird primary nesting season), which will avoid impacting eggs and nestlings. Additionally, tree felling within 0.25 mile of one known NSO activity center and within 1.5 mile of a known peregrine falcon eyrie in the Umpqua National Forest will occur after the breeding period for northern spotted owls, from October 1 to the end of February and outside the breeding period for peregrine falcons (from August 1 through the end of December), further minimizing potential impacts to nesting pileated woodpeckers in those areas.

Clearing the right-of-way will modify habitat, changing the seral stage and tree species makeup of occupied forests. Construction will remove 78.24 acres of late successional-old growth Southwest Oregon Mixed Conifer-Hardwood Forest and 0.15 acre of Westside Riparian Forest in the Umpqua National Forest (Table 2-1). Also, 34.04 acres of late successional-old growth will be affected within UCSAs, but this is a short-term disturbance. Additional potential long-term effects to pileated woodpeckers will be removal of 37.96 acres of mid-seral conifer-hardwood forest (≥40 years but ≤80 years old), thereby setting back seral development that would be expected to eventually provide suitable habitat elements for pileated woodpeckers, including downed wood and snags.

The amount of late successional-old growth habitat that would be removed by the Pipeline is not expected to have an impact on the local or regional population of pileated woodpeckers which have mean home ranges of 478 hectares or 1,180 acres in western Oregon (Mellen, 1987; Mellen et al., 1992). If all of the impacted late successional-old growth Southwest Oregon Mixed Conifer-Hardwood Forest (112.28 acres, including UCSAs) occurred within a bird's or pair's one home range, less than 10 percent of one home range would be affected. More likely, the Proposed Action would span several home ranges and the overall effect to any single bird or a pair would be less than 10 percent removal. Removal of 78.24 acres of potentially suitable pileated woodpecker habitat represents approximately 0.01 percent of the 619,433 acres of currently available habitat in the Umpqua National Forest. Based on the foregoing, the continued viability of the species is expected.

If pileated woodpecker home ranges are assumed to be circular, the diameter of a 1,180-acre home range would be 8,090 feet. Blasting at one edge of that home range would attenuate to 30 dBA at the far edge of the home range and would attenuate to ambient noise (assumed to be 40 dBA) 4,630 feet away or a distance equal to 57 percent the diameter of a home range. Noise due to construction would be a short term effect (restricted to the period of constriction) to pileated woodpeckers and expected to affect them within only a small portion of their home ranges on a temporary basis to the extent that it is used.

Mitigation. Mitigation measures that would minimize potential impacts to pileated woodpeckers include planting trees within the right-of-way after construction, outside of the 30-foot maintenance corridor (within 15 feet of each side of the centerline). After tree planting, there will be 36.66 acres of former forest (20.43 acres of late successional-old growth, 6.04 acres of mid-seral forest, and 10.19 acres of clear cut-regenerating forest that will remain in an herbaceous and/or shrub state within the 30-foot maintenance corridor during the life of the Pipeline (Table 2-1).

Noise from blasting, if it is required during construction, will be minimized through application of various measures. Mitigation measures commonly applied to blasting of this type include drilling small (2.5-inch) charge holes, stemming the blast holes with sand and placing inert material on top of the blast area (Michael Minor & Associates, 2008).

In the Umpqua National Forest, trees will be felled before April 1 and after July 15, outside of the migratory bird primary nesting season. Where one known spotted owl activity center is within 0.25 mile of the Pipeline, tree felling will occur outside of the spotted owl breeding season within approximately 0.4 mile of the proposed construction right-of-way beginning October 1 and continuing through February 28. Additionally, approximately 2.10 miles of the proposed construction right-of-way in the Umpqua National Forest will be cleared from August 1 through the end of December within 1.5 miles of a peregrine falcon eyrie outside of the breeding season. Felling trees during these time periods will avoid directly impacting young birds during the nesting season.

To mitigate for loss of cavities and snags within the construction right-of-way, PCGP will create snags in large trees strategically left on the edge of the construction right-of-way by topping and or girdling trees. Previously, PCGP had agreed to fund other projects proposed by the Forest Service in the Umpqua National Forest that would provide benefits to primary cavity excavators within the Umpqua National Forest. The Forest Service will be reviewing these projects to verify their relevance to the current proposed Pipeline and implementation of these previously proposed projects or similar will be included in the CMP. Projects previously agreed to included creating snags and placing large wood in habitats adjacent to the proposed Pipeline that would meet the management objectives of snag densities and enhance areas deficient in coarse woody material. The projects previously proposed would treat approximately 570 acres and would accelerate the development of late successional habitat characteristics of structure and diversity (snags/large wood) including suitable nesting structures for pileated woodpeckers. Creation of snags and placement of large woody debris would also reduce localized fuel loads while improving habitat in deficient stands (large wood) and provide long-term structure in the event of fire since larger logs maintain moisture longer and are less likely to be fully consumed by fire. Additionally, PCGP had agreed to decommission or close 13 miles of roads, thin (commercial and/or pre-commercial) up to 5,650 acres of forest to accelerate development of late successional and old growth habitat characteristic among other objectives, and reallocate 585 acres from matrix to LSR designation so that forested habitat within former Matrix lands that would be managed to obtain late successional forest characteristics. Implementation of these previously proposed projects or similar projects would provide benefits to pileated woodpeckers within the Umpqua National Forest.

During construction, potential impact to nesting pileated woodpeckers and other species by predatory corvids will be addressed by assuring that all contractors practice appropriate and responsible trash disposal.

PCGP has also prepared a Migratory Bird Conservation Plan that identifies additional measures that would benefit pileated woodpeckers.

<u>Forest Plan Consistency.</u> The Proposed Action will affect forested habitat in Management Area 10 and Management Area 11. The location of the Proposed Action relative to designated 300-acre reproduction areas and 300-acre adjacent areas – managed to provide snags – within each Management Area will determine whether or not the Proposed Action is consistent with Management Prescriptions. If the Proposed Action crosses a dedicated 300-acre reproduction area, it would be inconsistent with Prescription C5-VII since no timber harvest or salvage in the 300-acre reproduction area is allowed. However, new corridors within the reproduction area may be allowed on a case-by–case basis, since Prescription C5-VII indicates that new corridors may be allowed within the 300-acre area adjacent to a reproductive area. Removal of snags within either Management Area by the Proposed Action is possible but inconsistent with Prescriptions C5-VII and C5-VIII.

2.3 Primary Cavity Excavators (nesters)

Primary cavity excavators have been identified as indicator species to represent the dead and defective tree (snag) component of conifer forest habitat, as they excavate cavities for nesting that are in turn used by a whole host of avian and mammalian secondary cavity nesters. Primary cavity excavators that are identified in the Forest Plan as MIS are the pileated woodpecker (discussed above), acorn woodpecker, Lewis's woodpecker, yellow-bellied sapsucker, Williamson's sapsucker, hairy woodpecker, and downy woodpecker (Forest Service, 1990b). The yellow-bellied sapsucker is rare to Oregon, with only 19 site records in the state (Marshall et al., 2006). This sapsucker is common east of the Rocky Mountains, but is closely related to the red-breasted sapsucker (*Sphyrapicus ruber*), which is the only sapsucker commonly found in western Oregon (Marshall et al., 2006) and is included in the following discussion and analysis.

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for primary cavity excavators and their habitat:

<u>Applicable Forest Plan Forest-wide Standards and Guidelines:</u>

- When possible, wildlife trees (snags and green culls) will be left standing in areas of timber harvest. This habitat will be in addition to that provided by implementing the snag habitat prescriptions.

<u>Management Prescription.</u>
Prescription C5-VI, Wildlife – Snag Management Areas – applies to any area scheduled for timber harvest where there is a need to provide snags for cavity-nesting birds. This prescription use at a rate of one acre per 100 acres of standard forest management prescription provides 10 percent potential population capability for the 100 acres.

- Wildlife and Fish: Snag densities needed to meet management requirement direction for cavity excavating birds must be provided within land areas that are generally no larger than normal harvest unit size (maximum 60 acres). These densities will be maintained through the full harvest rotation period. Snags provided above the management requirement (MR) level but that are needed to meet plan objectives will be distributed in order to:
    a. reduce likelihood of inter-specific crowding,
    b. increase likelihood of use by pairs,
    c. provide adequate numbers and types of snags throughout the rotation, and
    d. vegetation manipulation or structural improvement designed to enhance wildlife permitted. Activities designed to produce the desired number of snags and dead and down material per acre on a continuing basis will be featured and receive high priority. Areas for nonstructural improvement are priority for this prescription.
- Timber: All snags and dead and down material will be left. Thirty-three percent of the existing volume in green trees will be left standing. Green trees left standing shall represent mix of size classes in the unharvested stand. No salvage permitted. No commercial or personal-use firewood cutting. Gathering of firewood is allowed only for on-site recreational use, but cutting for this use is not allowed.
- Facilities: Utility/Transportation corridors may be allowed pending determination by the NEPA (EA) process.
- Protection: No special restrictions on insect and disease control.

<u>Management Area 10 Direction.</u> Adequate snag habitat must be provided in this management area to meet the 60 percent potential population capability (PPC) for cavity nesters. Other prescription assignments within the management area and immediately adjacent to the MA may

contribute to meeting this objective. Once all contributions to snag habitat have been identified, prescription C5-VI (see below) is assigned and distributed on land suitable for timber production to meet the 60 percent PPC objective.

Management Area 11 Direction. Same as in MA 10.

Species Status in the Pipeline Project Area. Prior to the implementation of the Umpqua National Forest Land Resource Management Plan (Forest Service, 1990b), logging and associated activities resulted in reductions of primary cavity nester suitable habitat and likely reduced populations by 20 to 30 percent. Minimum viable population levels for this group of species are met by providing dead and defective trees at the 20 percent potential population capability as described in *Wildlife Habitats in Managed Forests of the Blue Mountains of Oregon and Washington* and *Management of Wildlife and Fish Habitats in Forests in Western Oregon and Washington* (Thomas, 1979).

Data have been collected on 17 BBS routes (Pardieck et al., 2017) in BCR 5 that are within approximately 50 miles of the Umpqua National Forest and the Pipeline, of which three BBS routes occur in the Umpqua National Forest. Numbers of acorn woodpecker, red-breasted sapsucker, hairy woodpecker, and downy woodpecker that were reported on each route were compiled and averaged (numbers per route) for each year, 1997 through 2016 (Table 2-4) to develop a population index. No Lewis's woodpeckers, yellow-bellied sapsuckers, or Williamson's sapsuckers were reported in any of the BBS routes in BCR 5 within 50 miles of the Proposed Action in the past 20 years.

During the 20-year period, an average of 4.37 acorn woodpeckers and 1.10 hairy woodpeckers each year were observed per BBS route (average of 5.15 routes and 10.45 routes reporting per year, respectively) in BCR 5. Over the past 20 years, acorn woodpecker populations appear to be significantly increasing ($P<0.01$), as do hairy woodpeckers ($P< 0.01$) on BBS routes within BCR 5 in the vicinity of the Umpqua National Forest and the Pipeline (Table 2-4). In addition to pileated woodpeckers discussed above, acorn woodpeckers and hairy woodpeckers are the only other species of cavity nesters included as an MIS with sufficient data to estimate 20-year population trends, indexed as annual counts per route.

Table 2-4
Data Compiled for 20-years and Trends of Population Indices
(Numbers Counted per BBS Route per Year in BCR 5) of Primary
Cavity Excavator MIS in the Vicinity of the Umpqua National Forest and Pipeline

Cavity Nesting Species	Data Compiled for 20 Years, 1988-2007			
	Average Number of Routes per Year with Species[1]	Average Annual Count of Species per Route [1]	Population Index Trend	Comments
Acorn Woodpecker	5.15	4.37	Significantly Increasing ($P< 0.01$)	none
Red-breasted Sapsucker	10.75	1.13	No Trend	none
Hairy Woodpecker	10.45	1.10	Significantly Decreasing ($P< 0.05$)	none
Downy Woodpecker	8.45	0.71	Insufficient data	Too few observations per year

[1] Data from BBS routes in Bird Conservation Region 5 within 50 miles of the Proposed Action.

Habitat. Primary cavity excavators' habitat requirements are dead and decaying trees of the appropriate diameter, height, and decay stage to meet the specific requirements of the various species. Found in both conifer and mixed conifer-deciduous, tree diameters required vary from

6 inches to 20 inches or greater DBH. Dead tree heights vary from 6 feet to 50 feet or more (Forest Service, 1990b and Marshall et al., 2006).

In the 1990 Umpqua Forest Plan EIS, there was estimated to be 803,917 acres of capable cavity nester habitat, with 244,473 acres being altered by timber harvest, for a total of 559,444 acres of suitable cavity nester habitat. The Forest Plan used potential population capacity (PPC), which "provides an indicator of the number of cavity-nesting species likely to be present in the Forest in comparison to the Forest's total potential." Minimum PPC identified for cavity excavators was 60 percent in most management areas (Table 2-5).

To monitor current cavity excavator habitat in the Umpqua, snag habitat was assessed using the data derived from 2006 imagery (Ohmann et al., 2010) for snags per acre greater than or equal to 10-inch diameter-at-breast-height (dbh). This results in 857,196 acres of habitat with one or more snags per acre (to meet the 60 percent PPC for hairy woodpecker of 1.15 snags per acre, which is the highest snag per acre requirement for any of the selected cavity excavators), and 776,970 acres with two or more snags per acre (which exceeds the 100 percent PPC for hairy woodpecker). At one snag per acre this represents 297,752 acre increase from the 559,444 acres of suitable snag habitat documented in the 1990 Umpqua National Forest Plan, and at two snags per acre this represents a 217,526 acre increase of suitable snag habitat. With the current distribution of snag habitat across the Umpqua National Forest increasing as compared to the 1990 Umpqua Forest Plan, primary cavity excavator habitat is being maintained in its amount and distribution to meet the viability requirements of the Umpqua Forest Plan.

Table 2-5
Cavity Excavator Maxim Potential Population Capacity by Snag/Acre as Described in the Umpqua National Forest Plan

	Percent of Maximum Populations (Snags/Acre)				
Cavity Excavators	**100**	**90**	**80**	**70**	**60**
Lewis' woodpecker	0.48	0.43	0.38	0.34	0.29
Acorn Woodpecker	0.7	0.63	0.56	0.49	0.42
Red-Breasted Sapsucker	0.45	0.41	0.36	0.32	0.27
Williamson's Sapsucker	0.33	0.3	0.26	0.23	0.2
Downy Woodpecker	0.16	0.14	0.13	0.11	0.1
Hairy Woodpecker*	1.92	1.73	1.54	1.34	1.15
Pileated Woodpecker	0.06	0.05	0.05	0.04	0.04

*Hairy Woodpecker had the highest snag/acre requirements of the cavity excavating species.

Within the Pipeline route through the Umpqua National Forest, except for Williamson's sapsucker, the four Primary Cavity Excavator MIS included in Table 2-4 are associated with Southwest Oregon Mixed Conifer-Hardwood Forests. The acorn woodpecker has a close association with that habitat, but only when oak trees are present; the others are generally associated with Southwest Oregon Mixed Conifer-Hardwood Forests. A close association of a species with a given habitat indicates that it is known to depend on a specific habitat for part or all of its life history requirements (feeding and reproduction) implying that the species has an essential need for a particular habitat for its maintenance and viability (Johnson and O'Neil, 2001). A general association of a species with a given habitat applies to an adaptable species that is supported by a number of habitats that provide for its maintenance and viability (Johnson and O'Neil, 2001).

Since they are dependent on snags, Primary Cavity Excavator MIS would be most likely to inhabit the old growth or late successional stands (≥80 years old) of Southwest Oregon Mixed Conifer-Hardwood Forest that are included in Table 2-1. Hairy woodpeckers, Williamson's sapsucker, red-breasted sapsuckers, and Lewis's woodpeckers have general associations with Westside Riparian Wetlands and downy woodpeckers are closely associated with that habitat, while acorn woodpeckers have no association with that habitat type.

Forest Management Activities. Past fire management practices have reduced the amount of snag habitat. Because snags are more susceptible to fire than green trees and present control problems when accidentally ignited, they were systematically removed through timber sales and to support heavy recreation use areas. In addition, snags are regularly removed from clearcut logging areas because they present a safety hazard to aerial fertilizers, herbicide applicators, and tree planters.

Current management for primary cavity excavators is designed to provide habitat on a continuing basis at the 40 percent potential population capability level or higher. This is accomplished by identifying small, suitable snag management areas throughout commercial forest land at the time of individual timber sale planning. These areas, plus others, are managed to provide suitable snags on a continuing basis (Forest Service, 1990b).

Effects of the Proposed Action. Primary Cavity Excavators could be negatively impacted during construction of the Pipeline. Direct mortality of young could occur if nest trees are cleared prior to young fledging. Young of acorn woodpeckers remain in nest cavities through early September, young Williamson's sapsuckers and red-breasted sapsuckers fledge by late July, downy woodpeckers remain in nest cavities through late July, and fledgling hairy woodpeckers have been observed in late July (Marshall et al., 2006). Tree felling during those periods could directly impact young birds. While adults would be able to escape temporary disturbances, adult birds could abandon nests, leaving eggs and chicks vulnerable to predation and the elements. To minimize any potential impacts, trees will be felled before April 1 and after July 15, outside of the migratory bird primary nesting season. Tree felling within 0.25 mile of one known NSO activity center and within 1.5 mile of a known peregrine falcon eyrie in the Umpqua National Forest will occur after the breeding period for northern spotted owls, from October 1 to the end of February and outside the breeding period for peregrine falcons (from August 1 through the end of December), respectively. Implementation of this provision will avoid impacts to nesting primary cavity excavators in those areas.

Clearing the right-of-way will modify habitat, changing the seral stage and tree species makeup of occupied forests. Construction will remove 78.24 acres of late successional-old growth Southwest Oregon Mixed Conifer-Hardwood Forest and 0.15 acres of Westside Riparian Forest (Table 2-1). Also, 34.04 acres of late successional-old growth will be affected within UCSAs, but any such impacts will be of limited duration. Additional potential long-term effects to Primary Cavity Excavators will be removal of 30.37 acres of mid-seral conifer-hardwood forest (≥40 years but ≤80 years old), thereby setting back seral development that would be expected to eventually provide suitable habitat elements including snags.

Unlike the large home ranges of pileated woodpeckers, those of the other Primary Cavity Excavator MIS are relatively small, ranging from 10 ha (25 acres) for acorn woodpecker, Lewis's woodpecker, red-breasted sapsucker, downy woodpecker, and hairy woodpecker to 50 ha (124 acres) for Williamson's sapsucker (Johnson and O'Neil, 2001). While the amount of late successional-old growth habitat that would be removed by the Pipeline is not expected to impact local or regional populations of Primary Cavity Excavators, home ranges of several individuals or pairs could be affected. Since acorn woodpeckers are colonial breeders, multiple individuals could be affected if the Proposed Action removes occupied nesting habitats. Overall, removal of 78.24 acres of potentially suitable primary cavity nester habitat represents approximately 0.01 percent of the 857,196 acres of available habitat on Umpqua National Forest; therefore, no significant impact to this group of species is expected.

If Primary Cavity Excavator MIS' home ranges are assumed to be circular, the diameter of a 25-acre home range would be 1,170 feet and that of a 124-acre home range would be 2,600 feet. Blasting at one edge of a home range would attenuate to 55 dBA (at 1,170 feet) or 46 dBA (at 2,600 feet) at the far edges of the home range, depending on home range size. Noise due to construction would be a short term effect to Primary Cavity Excavators and expected to affect them through home ranges since noise levels would be above ambient levels (assumed to be 40 dBA) throughout species' home ranges that are adjacent to the construction right-of-way.

Mitigation. Mitigation measures that would minimize impacts to pileated woodpeckers include planting trees within the right-of-way after construction, outside of the 30-foot maintenance corridor (within 15 feet of each side of the centerline). After tree planting, there will be 36.66 acres of former forest (20.43 acres of late successional-old growth, 6.04 acres of mid-seral forest, and 10.19 acres of clear cut-regenerating forest) that will remain in an herbaceous and/or shrub state within the 30-foot maintenance corridor during the life of the Pipeline (Table 2-1).

Noise from blasting, if it is required during construction, will be minimized through application of various measures. Mitigation measures commonly applied to blasting of this type include drilling small (2.5-inch) charge holes, stemming the blast holes with sand and placing inert material on top of the blast area (Michael Minor & Associates, 2008).

In the Umpqua National Forest, trees will be felled before April 1 and after July 15, outside of the migratory bird primary nesting season. Where one known spotted owl activity center is within 0.25 mile of the Proposed Action, tree felling will occur outside of the spotted owl breeding season within an approximate 0.4 mile of the proposed construction right-of-way beginning October 1 and continuing through February 28. Additionally, approximately 2.10 miles of the proposed construction right-of-way on Umpqua National Forest will be cleared from August 1 through the end of December within 1.5 miles of a peregrine falcon eyrie outside of the breeding season. Felling trees during these time periods will avoid directly impacting young birds during the nesting season.

To mitigate for loss of cavities and snags within the construction right-of-way, PCGP will create snags in large trees strategically left on the edge of the construction right-of-way by topping and or girdling trees. Previously, PCGP had agreed to fund other projects proposed by the Forest Service in the Umpqua National Forest that would provide benefits to primary cavity excavators within the Umpqua National Forest. The Forest Service will be reviewing these projects to verify their relevance to the current proposed Pipeline and implementation of these previously proposed projects or similar will be included in the CMP. Projects previously agreed to included creating snags and placing large wood in habitats adjacent to the proposed Pipeline to meet the management objectives of snag densities and enhance areas deficient in coarse woody material. The proposal would treat approximately 570 acres and would accelerate the development of late successional habitat characteristics of structure and diversity (snags/large wood) including suitable nesting structures for pileated woodpeckers. The project would also reduce localized fuel loads while improving habitat in deficient stands (large wood) and provide long-term structure in the event of fire since larger logs maintain moisture longer and are less likely to be fully consumed by fire. Additionally, PCGP agreed to fund or implement other projects proposed by the Forest Service in the Umpqua National Forest such as decommissioning or closing 13 miles of roads, commercial and/or pre-commercial thinning of up to 5,650 acres to accelerate development of late successional and old growth habitat characteristic among other objectives, and reallocating 585 acres from matrix to LSR designation so that forested habitat within former matrix lands will be managed to obtain late successional forest characteristics. Implementation of these or similar projects provide benefits to other primary cavity excavators within the Umpqua National Forest.

PCGP has also prepared a Migratory Bird Conservation Plan that identifies measures that would benefit primary cavity nesters.

Forest Plan Consistency. The Proposed Action will affect forested habitat in Management Area 10 and Management Area 11. PCGP will have to clear snags and downed wood within the construction right-of-way. Removal of snags within either Management Area by the Proposed Action is possible but may be inconsistent with Prescription C5-VI, above.

The Proposed Action is not expected to affect the maintenance of adequate snag habitat within Management Area 10 or 11 and would not limit attaining the 60 percent potential population capability (PPC) for cavity nesters. Prescription C5-VI indicates that new utility corridors may be allowed pending determination by the NEPA process. Removal of snags within either Management Area by the Proposed Action is possible but inconsistent with Prescriptions C5-VII and C5-VIII, above.

2.4 American (Pine) Marten

The pine marten has been identified as an MIS associated with mature or old growth areas in the high elevation (generally greater than 4,500 feet) lodgepole pine and mountain hemlock forest eco-classes.

The following Standards and Guidelines and Management Prescriptions are included in the Forest Plan to conserve and manage for pine martens and their habitat:

Forest Plan Applicable Forest-wide Standards and Guidelines. Broad wildlife coordination guidelines which address leaving snags, down material, unit size, shape, and spatial distribution apply to timber sales and result in the maintenance of habitat (Forest Service, 1990b). Additionally, the direction provides for one habitat area of 160 acres for every 4,000 to 5,000 acres of suitable habitat. Habitat will be distributed in such a way that any given habitat unit will be connected to two or more other suitable habitats.

Management Prescriptions. *Prescription C5-IX, Wildlife – Pine Marten, Dedicated* applies to designated 160-acre areas in the lodgepole pine and mountain hemlock eco-classes. Its purpose is to preserve suitable habitat for pine marten.

- Wildlife and Fish: Vegetation manipulation or structural improvement designed to enhance wildlife is permitted. Activities designed to produce the desired number of snags and dead and down material per acre on a continuing basis will be featured and receive high priority. Areas for nonstructural improvement are the priority for this prescription.
- Timber: No timber harvest or salvage is permitted in the designated 160-acre area. No firewood cutting or gathering is allowed.

- Facilities: Minimal roading to remove trees surplus to those needed to meet habitat requirements is permitted. Roads will be physically closed, scarified, and seeded following use.
- The location of utillty/transportation corridors will not be permitted.
- Protection: No snag removal for pre-suppression purposes. No insect or disease control unless it is catastrophic in nature (threatening 50 percent or more of the stand).

Prescription C5-X, Wildlife – Pine Marten, Managed applies to the same area as C5-X except that for each site identify a 748-acre peripheral area managed on a 175-year rotation. This prescription is applied to timber stands that provide suitable habitat characteristics for the pine martin.

- Wildlife and Fish: Vegetation manipulation or structural improvement designed to enhance wildlife is permitted. Activities designed to produce the desired number of snags and dead and down material per acre on a continuing basis will be featured and receive high priority. Areas for nonstructural improvement are priority for this prescription.
- Timber: Timber stands may be fully managed as long as at least 160 acres at any point in time meets the following criteria: (1) enough mature and old-growth trees will be left to provide >50 percent crown closure, (2) provide two snags, plus six replacement trees, per acre, and (3) maintain an average of six down logs (12' dbh x 20') per acre. Logging and subsequent debris disposal shall not damage more than 30 percent of the minor vegetation, on an area basis.
- Commercial and personal use firewood cutting and gathering are permissible when wildlife management objectives can be met.
- Facilities: Conditions described in C5-IX above apply to selected (160 acres) areas. Replacement areas have no special restrictions during initial 90 years of rotation (50 years for lodgepole). During the remaining rotation period only arterial road will be maintained. Other roads will be obliterated or maintained only to protect soil and water values. No administrative facilities are permitted.
- Utility/transportation corridors may be allowed pending determination by the EA process.
- Protection: No snag removal for pre-suppression purposes. No insect or disease control unless it is catastrophic in nature (threatening 50 percent or more of the stand).

Management Area 10 Direction. Pine marten prescriptions (C5-IX and X) are assigned to locations which meet the distribution requirements set out in the Forest-wide wildlife standards and guidelines. Where these locations overlap other prescription assignments which harvest timber, the managed prescription (C5-X) is assigned. Where these locations overlap other prescription assignments which do not harvest timber, the dedicated prescription (C5-IX) is assigned.

Management Area 11 Direction. Not applicable.

Species Status in the Pipeline Project Area. No systematically collected population data are available for this species (Forest Service, 1990c). However, because little logging activity or other disturbance occurs in its habitat and because annual trapping efforts are moderate to light, it was expected that populations were stable and near habitat capacity (Forest Service, 1990c).

Habitat. The habitat requirement in the Forest is considered to be the mountain hemlock and lodgepole pine types generally above 4,500 feet elevation where ground cover and overhead cover with adequate down trees are available. Large openings (over 100 yards) and areas devoid of overhead cover are not considered suitable habitat (Forest Service, 1990b). There was an estimate of 121,389 acres of mountain hemlock and lodgepole pine suitable available for pine marten habitat in the Umpqua National Forest in 1990 (Forest Service, 1990c).

Current amounts of pine marten habitat are derived from a habitat suitability model created by Davis and Chapman (2008, Appendix A), as well as a query of data on lodgepole pine and mountain hemlock distribution based upon 2006 imagery (Ohmann et al. 2010, Table 2-6). In 2008, modeled pine marten habitat is 133,483 acres, an increase of 12,094 acres of suitable habitat from the 1990 estimate. While the pine marten is an MIS for mountain hemlock and lodgepole pine, the modeled habitat exceeds the current modeled distribution of mountain hemlock and lodgepole pine habitat (Ohmann et al., 2010) as the habitat model is trained upon observations of pine marten, which includes observations of individuals in dispersal habitat of differing ecoclasses like Douglas-fir and white fir forest types. Therefore the modeled habitat exceeds the acres of mountain hemlock and lodgepole pine distribution, which was the only forest types considered in previous models.

Table 2-6
Amounts of Pine Marten Habitat Modeled by Davis and Chapman (2008), as well as Lodgepole and Mountain Hemlock Habitat Derived from Ohmann et al. (2010)

Pine Marten Habitat Model Classes	Acres	Acres in Protected Lands	% Habitat in Protected Lands
Marginal	85,081	33,004	39
Suitable	38,610	24,772	64
Highly Suitable	9,792	5,575	57
Total	*133,483*	*63,352*	*47*
Lodgepole and Mountain Hemlock Distribution	**Acres**	**Acres in Protected Lands**	**% Habitat in Protected Lands**
Lodgepole or Mountain Hemlock	87,388	35,305	40
Lodgepole and Mountain Hemlock	29,811	18,072	61
Total	*117,199*	*53,378*	*46*

In the Pipeline project area, pine martens have no association with Southwest Oregon Mixed Conifer-Hardwood Forest habitats although they may be present in Westside Riparian Wetlands at high elevations (Johnson and O'Neil, 2001). The presence of pine martens would depend on appropriate structural conditions including snags, down logs, and rock outcrops. A species noted as present in a habitat type indicates that it occasionally uses a habitat that provides only marginal support for its maintenance and viability (Johnson and O'Neil, 2001). The habitats affected by the Proposed Action are not specifically suitable habitats for pine martens.

Forest Management Activities. Fire can negatively affect marten habitat by destroying ground and overhead cover and consuming dead and down material.

Recreation activity was not considered to be heavy enough to influence this species now or in the foreseeable future, at the time of the Forest Plan completion. Trapping of these fur bearing animals over the last 20 years has been light and localized to small areas.

Broad wildlife coordination guidelines which address leaving snags, down material, unit size, shape, and spatial distribution apply to timber sales and result in the maintenance of habitat.

Effects of the Proposed Action. Dispersing pine marten may utilize habitats within the Pipeline project area on Umpqua National Forest (i.e., Douglas-fir and white-fir; see recent habitat modeling efforts in 2008). However, based on habitats/elevation of habitats that will be affected by the Proposed Action (Southwest Oregon Mixed Conifer-Hardwood Forest) and habitats that are generally utilized by pine martens in the Umpqua National Forest (mountain hemlock and lodgepole pine above 4,500 feet elevation), the Proposed Action is not expected to affect this species in the Umpqua National Forest. Due to the large amount of habitat within protected lands (Table 2-6) and increases in modeling accuracy of suitable pine marten habitat in the Umpqua National Forest, the Umpqua is maintaining a viable amount and distribution of pine marten habitat as described by the 1990 Forest Plan.

2.5 Roosevelt Elk

Roosevelt elk has been identified as an indicator species for their socio-economic importance and as a habitat indicator for big game winter range habitat. This species could be used to evaluate the effects of managed forest conditions and may provide some information for animal communities associated with early successional vegetative stages. Elk also require specific habitat conditions during the winter period (Forest Service, 1990c).

The following Standards and Guidelines and Management Prescriptions are included in the Forest Plan to conserve and manage for Roosevelt elk and their habitat:

Applicable Forest Plan Forest-wide Standards and Guidelines.

- Established big game travel lanes will not have their character altered through precommercial thinning.
- When planning timber sales in important big game areas, a habitat effectiveness model (“A Model to Evaluate Elk Habitat in Western Oregon" or similar model) will be used to compare the impact of various alternatives on big game habitat.

Management Prescriptions.
Prescription C4-I, for Winter Range—Normal, applies to south-facing areas in the Umpqua National Forest. It includes these areas below 3,500 feet elevation with less than 70 percent slope, as well as other mapped areas.

- Wildlife and Fish: Consider projects designed to enhance forage production such as seeding, planting, and fertilizing. Projects to improve habitat for other wildlife and fish are permitted. The use of K-V funding for this type of work is encouraged.
- Timber: Timber harvest within each subunit of the winter range will be scheduled to best provide a stable, even production of forage and cover. Normally, no less than 8 percent or more of lands suitable for timber production will be cut each decade. Vegetation management activities will consider winter range browse and forage objectives. In winter range areas consider minimal acceptable tree stocking levels. In winter range areas, use spot treatment for release.
- Unit size will average 20 acres or less and units will be shaped to optimize edge. Created openings will be separated by areas not classified as created openings. An area will no longer be considered a created opening when tree height averages 15 feet, except in areas of foreground and middleground where tree height averages 20 feet. Salvage is permitted. Clearcut is the preferred regeneration technique. Felling, yarding, hauling, and road construction may be restricted between December 1 and April 30 if unacceptable impacts to big game animals are expected to occur. Precommercial thinning treatments should insure animal access to at least 50 percent of the area treated.
- Facilities: Dead end local roads and roads not needed to access other areas will be closed during the period Dec. 1 - April 30. Closures may be physical or administrative. Through

roads may be closed from December 1 - April 30 if needed. Limited administrative use may be allowed. Utility/transportation corridors may be allowed.
- Protection: Where possible, broadcast burning is the preferred slash disposal technique. Standard insect and disease control is allowed.

The Four-Part Winter Range—Optimum, Prescription C4-II, also applies to south-facing areas below 3,500 feet with less than 70 percent slope and other mapped areas. This prescription provides for an optimum mix of forage and cover through the application of a combination of rotation lengths to specified percentages of each winter range.

- Wildlife and Fish: Encourage projects designed to enhance forage production such as seeding, planting and fertilizing. Projects to improve habitat for other wildlife and fish are permitted. The use of K-V funding for this type of work is encouraged.
- Timber: The area will be managed as four separate parts. Ten percent will be managed for permanent openings (natural or created). These areas will be seeded to a grass and/or shrub mix. Conifers will be removed to maintain value of the permanent opening.
    (a.) Fifty percent of the area will be managed on a short rotation (60 years). Clearcutting is the preferred regeneration technique. Average unit size will be 20 acres. Vegetation management activities will consider winter range forage and browse objectives. Spot treatments are preferred. May delay release up to five years to maintain productive forage. Maintain minimum acceptable stocking through precommercial and commercial thinning. (b.) Twenty percent of the area will be managed as hiding cover and visual protection from roads with an unmanaged 100-year rotation. No release, precommercial, or commercial thinning unless needed to improve cover values. Clearcutting is the preferred harvest technique. Unit size 20-acre average. (c.) Twenty percent of the area will be managed to produce optimum thermal cover (200 year rotation). Release of stand shall be done in a manner that protects hardwoods and provides multi-level stands. Precommercial thinning of stand is encouraged, but commercial thinning is not permitted. Spatial orientation of these different components is an important element of this prescription. Felling, yarding, hauling, and road construction may be restricted between Dec. 1 and April 30 If unacceptable impacts to big game are expected to occur. (d.) In winter range areas consider minimal acceptable tree stocking levels and use spot treatment for release.
- Facilities: Dead end local roads and roads not needed to access other areas will be closed during the period December 1 through April 30. Closures may be physical or administrative. Through roads may be closed from December 1 through April 30 if needed.
- New utility and transportation corridors will be discouraged, but where no reasonable alternatives exist, corridors will be located to impose the least impact.
- Protection: Where possible, broadcast burning is the preferred slash disposal technique. Appropriate suppression responses will be utilized for all wildfires. Precommercial thinning slash treatment should insure animal access to at least 50 percent of the area treated. Standard insect and disease control is allowed. These are high priority areas for law enforcement.

The Prescription C4-III, Winter Range – Meadow, applies to the Thorn Prairie/Mountain Meadows area of the Diamond Lake Ranger District and is not applicable to the Proposed Action.

<u>Management Areas 10 Direction</u>. Not applicable.

Management Areas 11 Direction. This Management Area includes forest and meadow lands inventoried as suitable winter range. Big game habitat objectives are best met through the management of Prescription C4-II, which is located in the better winter range areas with at least 25 percent of the of the inventoried winter range in each resource scheduling area (RSA) assigned to it. Prescription C4-I is assigned to lands suitable for timber production which are not needed for other wildlife habitat objectives. At least 20 percent of the land in this prescription assignment needs to be in Stage 5 or Stage 6 vegetation.

Species Status in the Project Area. Big game inventories in the Umpqua National Forest are conducted by the Oregon Department of Fish and Wildlife (ODFW). Inventory methods include spotlight sampling, aerial counts of wintering elk, analysis of harvest data, and population modeling. Forest population (as determined by the ODFW at the time of the Forest Plan release) varies annually, but the numbers center around 2,000 Roosevelt elk. The following ODFW wildlife management units occur in the Umpqua National Forest: Dixon, Indigo, and Evans Creek.

ODFW's Evans Creek Wildlife Management Unit 29 coincides with the portion of the Umpqua National Forest within which the Proposed Action is located (MPs 99.32 to 113.23). ODFW (2018a) has compiled harvest data on Roosevelt elk within Wildlife Management Unit 29 through 2016 (ODFW, 2018a). In the 2012 harvest, hunters had about twice the success rate as during the previous four years in Management Unit 29 (Table 2-7).

Table 2-7
Harvest Statistics for Roosevelt Elk within the
Evans Creek Wildlife Management Unit 29, 2003-2016

Year	Total Hunters	Total Hunter Days	Harvest			Days per Harvest	Percent Hunter Success
			Total Males (antlered)	Total Non-Males (non-antlered)	Total		
2016	151	not reported	10	20	30	not available	20
2015	521	not reported	27	15	42	not available	8
2014	502	2992	33	18	51	59	10
2013	557	2948	39	28	67	44	12
2012	577	3294	37	13	50	66	9
2011	474	2656	28	49	77	34	16
2010	444	2807	16	32	48	58	11
2009	552	2845	49	34	83	34	15
2008	377	2632	23	4	27	97	7
2007	579	3162	26	5	31	102	5
2006	267	1723	26	4	30	57	11
2005	304	1500	43	1	44	34	14
2004	428	2276	36	16	52	44	12
2003	426	3049	21	27	48	64	11

The population data for Roosevelt elk in Wildlife Management Unit 29 are limited (ODFW, 2018b); however, the recent numbers of calves per adult cow (young per adult female) appear to have declined from 2000-2001 when the highest calf production was documented since 1998 (Figure 2-2). Using data from 1998 through 2016, the declining trend is significant ($p<0.05$; see Figure 2-2).

Decreasing productivity appears to be consistent with an overall declining rate of population growth of Roosevelt elk in Evans Creek Wildlife Management Unit 29. In the past, ODFW has conducted population trend counts of elk along a fixed route near the end of winter but no count data are available since 2006 (ODFW, 2018b).

In other ODFW wildlife management units in the Umpqua National Forest (Dixon and Indigo Unit) not crossed by the Pipeline, elk are meeting the ODFW management objectives; therefore, populations of Roosevelt elk in the Umpqua National Forest are being maintained at viable levels to ensure their continued existence in the Forest.

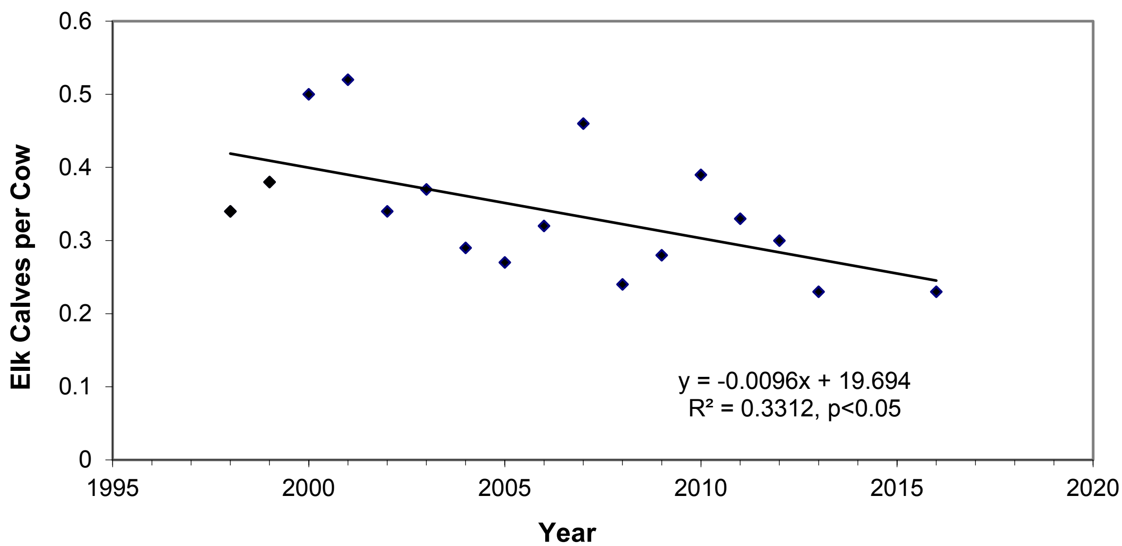

Figure 2-2
Trend in Productivity (Calf per Adult Cow) of Roosevelt Elk in the Evans Creek Wildlife Management Unit 29 Which Coincides with the PCGP Route in the Umpqua National Forest (data from ODFW, 2018b)

Habitat. Elk depend on a mosaic of early forage-producing and later cover-forming stages of forest in close proximity. Clearcuts can be primary foraging areas, with peak production and use about five to eight years after logging (Verts and Carraway, 1998). Approximately 90 percent of use of foraging areas by elk occurs within about 400 feet of cover sufficient to hide 90 percent of a standing elk at 200 feet. This cover may be provided by later stages of shrub and open sapling stand stages, and later stages of forest. For thermal cover, forested areas with trees about 40 feet or taller with about 70 percent canopy closure are preferred in both summer and winter. Nearly all thermal cover habitat is within about 1,200 feet of foraging areas (Verts and Carraway, 1998). Winter range for elk occurs at elevations less than 3,500 feet and usually on slopes with southerly aspect. An exception occurs in the Diamond Lake Ranger District where animals winter at somewhat higher elevations. Elk wintering occurs almost entirely on Umpqua National Forest land. In 1990, the Umpqua National Forest Plan estimated that there were approximately 202,371 acres of areas having conditions capable of providing winter habitat for elk. Early successional stages are considered prime forage producing areas, the mid-stages can provide hiding cover and thermal cover, and the late stages provide optimum thermal cover (Forest Service, 1990c).

Roosevelt elk have general associations with Southwest Oregon Mixed Conifer-Hardwood Forest and Westside Riparian Wetlands habitats (Johnson and O'Neil, 2001), both of which are present within the Pipeline project area. Summer elk forage consists of a combination of lush forbs, grasses, and shrubs, which is usually attained at higher elevations within wet meadows, springs, and riparian areas in close proximity to forested stands. Forage becomes less abundant and accessible in winter and the nutritional quality declines. Winter range is usually within forested sites which provide protection against weather, as well as lichens and other plants used as forage (ODFW, 2003a). The Proposed Action will cross 0.62 mile of big game winter range in the Umpqua National Forest.

Nearly the entire Umpqua National Forest has the potential to be suitable elk habitat, either as summer range or winter range. Summering occurs on most areas of the Forest, although habitat quality and animal distribution vary considerably. The highest use occurs in areas where forage-producing openings are in proximity with suitable cover. Summer range forage is not limiting current or future population growth. Adequate usable winter forage is considered to be the limiting factor to deer and elk populations (Forest Service, 1990c).

Forest Management Activities. Historically, elk populations and their distribution were dependent on naturally occurring fires, wind storms, or insect infestations that created openings in the more or less uniform timber stands. Early fire protection efforts, until the early 1950s, appear to have resulted in depressed elk numbers. Available evidence indicates that low numbers of elk did occur within the Forest, mostly at high elevations in the Diamond Lake District and in the Rogue-Umpqua Divide area. With increased logging and the resulting openings, fire suppression efforts are no longer a significant factor in suppressing elk numbers and may be beneficial from the standpoint of protecting and maintaining cover areas.

Herbicides can affect big game animals in several ways; if extensive, continuous areas are treated at one time, a shortage of forage can occur. However, if herbicide use is timed to occur when target brush species have grown out of reach of the animals, the resprouting that results can be beneficial.

Other human influences can be considered in three broad areas: (1) mortality, (2) harassment, and (3) habitat impacts. Mortality occurs during the hunting season, through poaching, and by accidents with vehicles. Harassment is a significant factor during winter months when animal energy reserves are low. In areas where activities such as recreation or logging take place, unintentional harassment may occur.

The objective is to provide maximum forage utility while maintaining suitable cover in close proximity to foraging areas. In addition, winter range management involves scheduling timber harvest activities to ensure adequate forage and cover through time, controlling disturbance and harassment during critical periods, and identifying enhancement opportunities.

Effects of the Proposed Action. Direct mortality of Roosevelt elk due to the Proposed Action is possible if vehicles collide with animals traveling to and from construction sites. Numerous studies have shown that both Rocky Mountain elk and Roosevelt elk are sensitive to human disturbances such as motorized travel on and off roads (Rowland et al., 2000). Roads are generally avoided by elk when they are open, but are heavily utilized by elk as travel corridors when closed. Several herds of elk are known to winter on the western slopes of the Cascades (ODFW, 2003a). In general, deer and elk return to habitats from which they have vacated within a relatively short period of time which would likely depend on the time of year, available hiding cover, and duration of local disturbances.

Construction of the Pipeline will remove 143.82 acres of forested habitat (Table 2-1) including approximately 78.24 acres of late successional-old growth, 30.37 acres of mid-seral forest, and 35.22 acres of clearcut-regenerating forest within the Umpqua National Forest. This includes approximately 9.24 acres of big game winter range in the Umpqua National Forest. Roosevelt elk are likely to be generally associated with the Southwest Oregon Mixed Conifer-Hardwood Forest type affected and all structural conditions of affected forest (shrub-seedling, small tree, medium tree, large tree, giant tree; single and multi-story forests; open, moderate, and closed canopy forests). An additional 41.70 acres of forested habitat would be affected in the short-term within UCSAs. The Pipeline will also remove 0.15 acre of Forested Wetland and 12.05 acres of developed urban environs. Roosevelt elk are generally associated with a variety of Westside Riparian Wetland structural conditions and low density urban conditions (Johnson and O'Neil, 2001). Given that Roosevelt elk are such generalists, effects to any one type of structural habitat condition with replacement by another structural stage (e.g. shrub-seedling, grass-forb) will not adversely affect the species.

A study conducted in Alberta (Brusnyk and Westworth, 1985) focused on forage and browse production on a 17-year old pipeline right-of-way and on a 2-year old pipeline right-of-way. They compared big game use (moose, deer, and elk) of forage on the two rights-of-way to use in adjacent undisturbed forest ecotones and undisturbed forest. Browse production was most extensive on the 17-year old corridor which was utilized most by moose (though they are not present in the Pipeline project area).

Elk utilized forage on the 2-year old right-of-way primarily where portions were adjacent to forested habitats. The principal conclusion of this study was that pipeline corridors increased local habitat diversity and that diversity – juxtapositions of browse or forage to undisturbed forested habitat – influenced use of the corridors by ungulates, not necessarily due to increased vegetative production, *per se,* within pipeline rights-of-way (Brusnyk and Westworth, 1985). Following reclamation of the pipeline corridor, Roosevelt elk may utilize the corridor for travel and for foraging, depending on vegetation species planted and rapidity of successful revegetation.

After construction of the Pipeline, there will possibly be a secondary impact (Comer, 1982) on harvest rates with upgraded access to previously inaccessible areas; hunters are expected to achieve greater success, at least temporarily, with increased access. Big game species utilizing a cleared right-of-way, vegetated with herbaceous species, are more likely to be harvested than animals in forested habitat. Increased public recreation along the right-of-way in the fall hunting season, especially along access points, has been documented elsewhere (Crabtree, 1984).

Access could increase poaching of game animals and nongame wildlife on a local level. Enforcement of wildlife regulations is the responsibility of the Oregon State Police, Fish and Wildlife Division. There is no information to relate poaching effects to wildlife population status.

Mitigation. Timber felling will occur before April 1 and after July 15, outside of the migratory bird primary nesting season and would occur concurrent, but prior to construction, with the exception of approximately 3.7 miles of timber that will be cleared in the fall / winter in areas within 0.25 mile of NSO activity centers and within 1.5 mile of peregrine falcon eyries (beginning in fall 2015). However, this area with NSO and peregrine presence is outside of big game winter range on Umpqua National Forest and should not affect use of winter range by elk. Construction and timber felling activities are scheduled to reduce impact to migratory birds nesting in standing trees, take advantage of the drier periods of the year to minimize winter construction, to reduce potential environmental impacts and construction safety risks, and ultimately reducing disturbance to elk utilizing big game winter range. Restoration of construction disturbance is expected to begin once construction is completed. Restoration would start in the fall and would be completed by the end of the winter season when forest, wetland, and riparian plantings would be installed. Depending on site-specific conditions, it may be necessary to continue restoration through the spring. As required by FERC's Upland Plan, PCGP consulted with the NRCS, the BLM, and the Forest Service regarding specific seeding dates and recommended seed mixtures for the Pipeline project. The recommendations have been incorporated into the Pipeline-specific ECRP. The ECRP describes the procedures that will be implemented to minimize erosion and enhance revegetation success, the procedures that will be utilized to minimize the spread of noxious weeds as a result of construction, and the silvicultural prescriptions that will be implemented in areas that are outside the permanent easement. Seeding mixtures and inhibition of noxious weeds will enhance forage production.

To minimize potential entrapment of deer and elk within the open trenches during construction within delineated big-game winter and summer range, PCGP will leave trench segments (>5 feet wide) of the proposed alignment untrenched and herbaceously vegetated (every 0.5 mile and at visible wildlife game trails) to serve as a route (i.e., green bridge or landscape connector) for big game across the construction right-of-way until pipe is ready to be installed (Forman et al., 2003). Alternatively, PCGP will install soft plugs (backfilled trench materials) in the trench after excavation at these distances to provide wildlife passage. Additionally, 20-foot gaps will be left in spoil and topsoil stockpiles at all hard or soft plug locations and a corresponding gap in the welded pipe string will be left in these locations. Suitable ramps will be installed from the bottom of the trench to the top to prevent potential wildlife entrapment within the trench.

Vegetation management over the long-term will benefit winter range browse and forage for Roosevelt elk. Approximately 36.66 acres of vegetation within the 30-foot maintenance corridor will be periodically maintained by mowing, cutting, and trimming (either by mechanical or hand methods). In upland areas, the permanent easement will be maintained in a condition where trees or shrubs greater than 6 feet tall will be controlled (cut or trimmed) within 15 feet on either side of the centerline (for a total of 30 cleared feet). Maintenance activities are expected to occur approximately every 3-5 years depending on the growth rate of vegetation. During maintenance, vegetation will be cut/trimmed in 4 to 6-foot lengths and scattered across the permanent easement to naturally decompose and to discourage OHV traffic, as well as benefit wildlife habitat. Vegetation management over the long-term will benefit winter range forage for Roosevelt elk.

Approximately 9.24 acres of forested habitat within sensitive big game winter range will be affected within the Umpqua National Forest. However, PCGP will revegetate 6.99 acres of the affected area with trees, to eventually provide a similar vegetative community as was present prior to timber clearing. The remaining 2.25 acres of affected forest will be converted to an herbaceous/shrub vegetative cover for the long-term within the 30-foot maintenance corridor during Pipeline operation, increasing the amount of forage available to big game adjacent to forested stands potentially used for thermal cover.

Forest Plan Consistency. In the Umpqua National Forest, big game winter range timing limitations are from December 1 through April 30. Construction activities would occur within approximately 0.62 mile of designated big game winter range in the Umpqua National Forest and could occur during those timing limitations. However, PCGP would target the drier periods of the year to construct, where possible, which would minimize disturbance to Roosevelt elk within designated habitat during that period. Big game travel lanes will not be blocked by construction or operation of the Proposed Action. Roosevelt elk are expected to utilize the pipeline right-of-way for travel and foraging. Prescription C4-II allows for the possibility of new utility and transportation corridors, although discouraged, if no reasonable alternatives exist. The Proposed Action would be consistent with the Forest Plan.

2.6 Columbian Black-tailed Deer

The Columbian black-tailed deer has been identified as an indicator species for its socio economic importance and as a habitat indicator for big game winter range habitat. This species has a high level of public interest associated with hunting and requires specific habitat conditions during the winter period.

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for Columbian black-tailed deer and their habitat:

Applicable Forest Plan Forest-wide Standards and Guidelines.

- Established big game travel lanes will not have their character altered through precommercial thinning.
- When planning timber sales in important big game areas, a habitat effectiveness model ("A Model to Evaluate Elk Habitat in Western Oregon" or similar model) will be used to compare the impact of various alternatives on big game habitat.

Management Prescriptions. Management prescriptions for big game described above for Roosevelt elk also apply to Columbian black-tailed deer.

Management Areas Direction. Management area direction for big game described above for Roosevelt elk also apply to Columbian black-tailed deer.

Species Status in the Pipeline Project Area. Long-term, systematically collected data are available for this species, collected annually by the Oregon Department of Fish and Wildlife. Data are collected on population trends, sex ratios, winter mortality, and harvest. Forest-wide populations are estimated by the ODFW to be between 8,000 and 14,000 animals. The following ODFW wildlife management units occur in the Umpqua National Forest: Dixon, Indigo, and Evans Creek.

ODFW's Evans Creek Wildlife Management Unit 29 coincides with the portion of the Umpqua National Forest within which the Proposed Action is located (MPs 94.69-122.61). ODFW (2018a) has compiled harvest data on black-tailed deer within Wildlife Management Unit 29 through the 2016 harvest season (ODFW, 2018a). From 2003 through 2016, percent hunter success has been relatively consistent (Table 2-8).

Table 2-8
Harvest Statistics for Black-Tailed Deer within the Evans Creek Wildlife Management Unit 29, 2003-2011

Year	Total Hunters	Total Hunter Days	Harvest: Total Males (antlered)	Harvest: Total Non-Males (non-antlered)	Harvest: Total	Days per Harvest	Percent Hunter Success
2016	2,693	not reported	809	32	841	not available	31
2015	2,736	not reported	788	40	828	not available	30
2014	2,697	18,935	789	35	824	23	31
2013	2,836	19,180	722	23	745	26	26

Year	Total Hunters	Total Hunter Days	Harvest			Days per Harvest	Percent Hunter Success
			Total Males (antlered)	Total Non-Males (non-antlered)	Total		
2012	2,616	18,591	699	3	702	26	27
2011	2391	15844	758	31	789	20	33
2010	2922	19252	795	52	847	23	29
2009	3223	21504	851	39	890	24	28
2008	3158	20685	953	30	983	21	31
2007	2916	18488	842	41	883	21	30
2006	2709	16827	735	29	764	22	28
2005	2234	14801	791	25	816	18	37
2004	2429	14980	674	31	705	21	29
2003	2673	18006	749	28	777	23	29

Similar to Roosevelt elk in Wildlife Management Unit 29, the black-tailed deer population appears to be decreasing during the period 1998 to 2012. There is no significant trend in fawns per doe (young per adult female) but there is a significant decreasing trend ($p<0.01$) in ODFW's Trend Count Index for deer in the Hunt Area which is conducted along a fixed route each year, usually at the end of winter (Table 2-9). In addition to fall composition count surveys, ODFW (2018b) has also conducted annual spring composition counts that provided ratios of young per adult deer (adult bucks and does). The two ratios of young per adult (fall Ratio A and spring Ratio B in Table 2-9) allow estimation of young overwinter survival relative to adult overwinter survival. Those estimates are included in Table 2-9 and indicate that juvenile black-tailed deer in the Evans Creek Wildlife Management Unit 29 have had very high overwinter survival rates relative to adult deer - estimates near or greater than 1 - since 1998. ODFW has not provided any similar, additional data for black-tailed deer since 2012 and more recent trends in population growth, productivity, and overwinter survival are unknown.

In other ODFW wildlife management units in the Umpqua National Forest (Dixon and Indigo Unit) not crossed by the Pipeline, black-tailed deer are meeting the ODFW management objectives; therefore, overall populations of black-tailed deer in the Umpqua National Forest are being maintained at viable levels to ensure their continued existence in the Forest.

Table 2-9
Population Trends, Annual Productivity, and Estimated Overwinter Survival for Juvenile Black-tailed Deer within the Evans Creek Wildlife Management Unit 29, 1998-2012

Year	Population Index [1]	Young per Adult Female [2]	Young per Adult – Fall (Ratio A) [3]	Young per Adult – Spring (Ratio B) [4]	Maximum Overwinter Juvenile Survival Rate [5]
2012	3.8	0.60	0.47	0.67	1.76
2011	2.5	0.47	0.38	0.38	1.01
2010	4.1	0.46	0.37	0.60	1.38
2009	5.5	0.55	0.43	0.58	1.26
2008	5.1	0.58	0.46	0.63	1.32
2007	-	0.61	0.48	-	-
2006	5.0	0.68	0.54	0.59	1.21

Year	Population Index [1]	Young per Adult Female [2]	Young per Adult – Fall (Ratio A) [3]	Young per Adult – Spring (Ratio B) [4]	Maximum Overwinter Juvenile Survival Rate [5]
2005	5.1	0.60	0.49	0.71	1.81
2004	-	0.52	0.39	0.30	0.92
2003	6.3	0.41	0.33	0.48	0.96
2002	0.0	0.62	0.50	0.67	1.27
2001	3.0	0.60	0.53	0.37	0.97
2000	3.6	0.48	0.38	0.53	0.94
1999	3.8	0.70	0.57	0.70	1.64
1998	2.7	0.53	0.43	0.42	-

[1] **Population Index** is ODFW's Trend Count for the Hunt Area which is conducted along a fixed route each year, usually at the end of winter (ODFW, 2018b).
[2] **Productivity** data is young per female from ODFW's Composition Count data reported as Young per 100 Females counted in December (ODFW, 2018b).
[3] **Ratio A** (White et al., 1996) is the ratio of Young per Adult, derived from Composition Count data (Males per 100 Females and Young per 100 Females) counted in December (ODFW, 2018b).
[4] **Ratio B** (White et al., 1996) is the ratio of Young per Adult (Young per 100 Adults) counted in March (ODFW, 2018b).
[5] **Maximum Overwinter Juvenile Survival** is related to ratios ***A*** and ***B*** and to the following relationship of adult over-winter survival rate ($\hat{S}_a$) and juvenile over-winter survival rate ($\hat{S}_j$) by the formula (see equation 9 in Paulik and Robson, 1969): $\hat{S}_j / \hat{S}_a = \boldsymbol{B / A}$ or $\hat{S}_j = \hat{S}_a (\boldsymbol{B / A})$. Since many of the estimates of maximum juvenile survival rates are greater than 1, they indicate survival of adults was less than juveniles over winter which is highly unlikely.

Habitat. Black-tailed deer prefer early successional stages created by clearcuts or burns, providing grasses, forbs, and shrubs (ODFW, 2003b; Csuti et al, 2001). Most black-tails summering in the high Cascades winter at lower elevations on the west slope, although some wintering may occur east of the Cascade crest (ODFW, 2003b). Winter range for black-tail deer occurs at elevations less than 3,500 feet and usually on slopes with southerly aspect. An exception occurs in the Diamond Lake Ranger District where animals winter at somewhat higher elevations. Some wintering of black-tail deer occurs on private land, but the number of animals doing so is not large enough to justify detailed analysis. In 1990, the Umpqua National Forest Plan estimated that there are approximately 202,371 acres of areas having conditions capable of providing winter habitat for black-tail deer. Early successional stages are considered prime forage producing areas, the mid-stages can provide hiding cover and thermal cover, and the late stages provide optimum thermal cover (Forest Service, 1990c).

Black-tailed deer have general associations with all habitats that are present in the Pipeline project area including Southwest Oregon Mixed Conifer-Hardwood Forest and Westside Riparian Wetlands habitats (Johnson and O'Neil, 2001). Most black-tails that summer in the high Cascades winter at lower elevations on the west slope, although some wintering may occur east of the Cascade crest (ODFW, 2003b). Winter loss of black-tailed deer is generally far less than for mule deer, because the snow does not remain on the valley floors for extended periods and a crust does not form on the surface as it does on the east side of the Cascades (ODFW, 2003b). The Proposed Action will cross 0.62 mile of big game winter range in the Umpqua National Forest.

Forest Management Activities. Historically, black-tailed deer follow patterns similar to those of the Roosevelt elk. Historic populations were highest in areas of naturally occurring fires, windstorms, and insect infestations that created openings in fairly uniform timber stands. In addition, low numbers of deer could be found in old growth forests. The effects of controlling naturally occurring wildfire can be considered as limiting the amount of optimal habitat available for black-tailed deer, although under the current management, this shortfall in habitat has been compensated for by openings created through logging. The burning of debris following logging is considered positive black-tail management.

In 2015, a large stand-replacing fire (the Stouts Creek fire) burned approximately 26,452 acres on Roseburg BLM District, Umpqua National Forest, and some private landowners (Northwest Interagency Coordination Center 2015). Umpqua National Forest created a fire break within the fire boundary on 0.7 mile (7.90 acres) of the Proposed Route in clearcut/regenerating forest from approximately MP 106.8 to MP 108.8. The fire and related management activities likely increased acreage of suitable forest for the black-tailed deer.

The influence of humans on black-tailed deer are similar to those discussed for Roosevelt elk and involve (1) direct mortality, (2) harassment, and (3) habitat modification. Mortality occurs through legal and illegal hunting and by accidents with motor vehicles. Harassment of deer during the winter months when energy reserves are low is not as much of a concern as with elk because they do not tend to herd and are generally less visible.

Winter weather and habitat conditions appear to be the main factor controlling overall population numbers. Extreme winter weather can significantly reduce populations.

Timber harvesting in low elevation areas (below 3,500 feet) creates considerable acreage of suitable forage. After timber harvest there is an initial surge of productive forage followed by declines in forage production once stands have reached pole-sapling size.

Current deer management is keyed to the harvest and management of timber stands and emphasizes the production of suitable forage and cover on a sustained basis. Most of the Forest's winter range areas have been identified and general management guidelines are applied to them. The objective is to provide available forage and suitable cover in close proximity. In addition, the management of winter ranges involves scheduling timber harvest activities to insure adequate forage and cover through time, controlling disturbance and harassment during critical periods, and identifying habitat enhancement opportunities.

Effects of the Proposed Action. Direct mortality of black-tailed deer due to the Proposed Action is possible if vehicles collide with animals traveling to and from construction sites. Similar to mule deer, vehicle collisions with black-tailed deer may increase with traffic volume, particularly during winter (Arnold, 1978; Reed, 1981; Romin and Bissonette, 1996). Black-tailed deer are likely to avoid access roads and construction areas similar to mule deer which generally avoid roads (Rost and Baily, 1979). In general, deer and elk return to habitats from which they have vacated within a relatively short period of time which would likely depend on the time of year, available hiding cover, and duration of local disturbances.

Potential impact to black-tailed deer from noises generated from construction activities may be similar to mule deer and can be evaluated to an extent, such as noise from vehicles and/or increased road traffic, blasting, and aerial fly-overs. For example, effects of short-duration seismic exploration (blasting) have been documented. Mule deer respond with alert postures, occasionally running for short distances, but did not shift home ranges or otherwise avoid seismic blast 2 miles away (Ihsle, 1982). Mule deer did avoid areas of seismic exploration that were closer (0.6 mile away) but whether avoidance was due to human presence, noise, or a combination was not distinguishable (Horejsi, 1979).

Construction of the Pipeline will remove 143.82 acres of forested habitat (Table 2-1) including approximately 78.24 acres of late successional-old growth, 30.37 acres of mid-seral forest, and 35.22 acres of clearcut-regenerating forest. This includes approximately 9.24 acres of big game winter range in the Umpqua National Forest. Black-tailed deer are likely to be generally associated with the Southwest Oregon Mixed Conifer-Hardwood Forest type affected and all structural conditions of affected forest (shrub-seedling, small tree, medium tree, large tree, giant tree, single and multi-story forests, open, moderate, and closed canopy forests). An additional 41.70 acres of forested habitat would be affected in the short-term within UCSAs. The Pipeline will also remove 0.15 acre of Forested Wetland and 12.05 acres of developed urban environs. Black-tailed deer are generally associated with a variety of Westside Riparian Wetland structural conditions and low density urban conditions (Johnson and O'Neil, 2001). Given that black-tailed deer are such generalists, effects to any one type of structural habitat condition with replacement by another structural stage (e.g. shrub-seedling, grass-forb) will not adversely affect the species.

A study conducted in Alberta (Brusnyk and Westworth, 1985) focused on forage and browse production on a 17-year old pipeline right-of-way and on a 2-year old pipeline right-of-way. They compared big game use (moose, deer and elk) of forage on the two rights-of-way to use in adjacent undisturbed forest ecotones and undisturbed forest. Browse production was most extensive on the 17-year old corridor which was utilized most by moose (though they are not present in the Pipeline project area).

Deer appeared to utilize browse in the 17-year old corridor but returned to adjacent undisturbed forest, probably utilizing available hiding or thermal cover. Deer utilized the corridors for travel in early winter prior to limiting snow depths. The principal conclusion of this study was that pipeline corridors increased local habitat diversity and that diversity – juxtapositions of browse or forage to undisturbed forested habitat – influenced use of the corridors by ungulates, not necessarily due to increased vegetative production, *per se,* within pipeline rights-of-way (Brusnyk and Westworth, 1985). Following reclamation of the pipeline corridor, black-tailed deer may utilize the corridor for travel and for foraging, depending on vegetation species planted and rapidity of successful revegetation.

After construction, there will possibly be a secondary impact (Comer, 1982) on harvest rates with upgraded access to previously inaccessible areas; hunters are expected to achieve greater success, at least temporarily, with increased access. Big game species utilizing a cleared right-of-way, vegetated with herbaceous species, are more likely to be harvested than animals in forested habitat. Increased public recreation along the right-of-way in the fall hunting season, especially along access points, has been documented elsewhere (Crabtree, 1984).

Access could increase poaching of game animals and nongame wildlife on a local level. Enforcement of wildlife regulations is the responsibility of the Oregon State Police, Fish and Wildlife Division. There is no information to relate poaching effects to wildlife population status.

<u>Mitigation.</u> Mitigation proposed for Roosevelt elk would also benefit black-tailed deer.

<u>Forest Plan Consistency.</u> In the Umpqua National Forest, big game winter range timing limitations are from December 1 through April 30. Construction activities would occur within approximately 0.65 mile of designated big game winter range in the Umpqua National Forest and could occur during those timing limitations. However, PCGP would target the drier periods of the year to construct, where possible, which would minimize disturbance to Columbian black-tailed deer within designated habitat during that period. Similar to management of Roosevelt elk, the

Proposed Action would be consistent with the Forest Plan Standards and Guidelines, Management Prescriptions, and Management Area Directions related to black-tailed deer.

Since there is no significant trend in fawns per doe (young per adult female), but there is a declining trend ($p<0.01$) in ODFW's Trend Count index for deer in the Evans Wildlife Management Unit 29 **(**Table 2-9); however, there is no reason to expect that deer winter range carrying capacity in the Forest would be limited by the Proposed Action. Indeed, estimated young overwinter survival relative to adult overwinter survival indicates that juvenile black-tailed deer in the Evans Wildlife Management Unit 29 have had very high overwinter survival rates relative to adults (Table 2-9), which may indicate carrying capacity objectives of the Forest are being achieved. The Proposed Action would be consistent with the Forest Plan.

2.7 Peregrine Falcon

The peregrine falcon was identified as an indicator species because it was classified as an endangered species under the Endangered Species Act of 1973 (ESA) when the Forest Plan was developed. With the banning of DDT and other chlorinated hydrocarbons and successful captive breeding, rearing, and release of over thousands of peregrines annually, FWS (1999a) determined that the species had recovered and removed peregrine falcons from the list of Threatened and Endangered Species in 1999. Although no longer listed as threatened under the ESA, peregrine falcons remain protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712).

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for peregrine falcons and their habitat:

<u>Applicable Forest Plan Forest-wide Standards and Guidelines.</u>

- All proposed activities within areas designated for management under the bald eagle or peregrine falcon prescription will first be coordinated with the USFWS as required by consultation procedures.

<u>Management Prescriptions.</u> Forest Plan *Prescription C3-1, Peregrine Falcon*, applies to known and selected potential peregrine falcon nest sites and the area within a three-mile radius of nest site. It is intended to meet the requirements of the Endangered Species Act of 1973. However, since the species has been delisted, consultation with the FWS may no longer be required for projects which could have an impact on it.

- Wildlife and Fish: These sites are high priority for annual monitoring. Any proposed enhancement project or management technique must be reviewed and coordinated with the FWS.
- Timber: No programmed harvest within the immediate vicinity of the nest site. Restrict timber harvest activity between January 1 and July 31 as needed to reduce disturbance during nesting season. Within a 1.5-mile radius of nest site, if determined necessary, restrict timber sale activity during January 1 - July 31. Review all timber sales in the 1.5-mile zone with FWS. Within a 3-mile radius of a nest, manage harvest schedule to provide a diversity of age classes. Maintain 50 percent of the stands in pole size or larger. Where possible, leave five or more hardwoods per acre in regeneration units. Modify herbicide application to provide at least 25 percent of the original hardwood component. Manage snags at 40 percent or more of potential population capacity.
- Facilities: Roads within 1.5 miles may be blocked permanently or closed to use January 1 - July 31, if needed to reduce disturbance during nesting season. Road construction or

reconstruction within 1.5 miles will not normally take place during January 1 - July 31. New utility and transportation corridors will be discouraged. Where no reasonable alternatives exist, corridors will be located to impose the least impact as determined in the EA process.

- Protection: No use of chemicals to control insect and disease outbreaks within the 1.5-mile radius except under recommendation from FWS.

Management Area 10 Direction. Inventoried sites for peregrine falcons on MA 10 are assigned to Prescription C3-I.

Management Area 11 Direction. Not applicable.

Species Status in the Pipeline Project Area. The Umpqua National Forest Plan monitoring calls for annual monitoring of all known peregrine falcon sites, and to report the number of active nests. When the Umpqua Forest Plan was finalized in 1990, there were seven known nesting pairs, and in 2011 there were 16 known nesting pairs in the Umpqua National Forest that have fledged 183 young since 1990. The Umpqua National Forest is now considered a source population for peregrine falcons in southwestern Oregon, and the peregrine reproduction has been increasing with numbers of eyries detected, as well as number of young fledged. Therefore, the peregrine population in the Umpqua is being maintained at a viable level, with a positive trend in population size in the Umpqua National Forest.

A peregrine falcon eyrie in the Umpqua National Forest within the vicinity of the Proposed Action has been active for several years. The eyrie is approximately 0.2 mile southwest of PCGP Milepost (MP) 112.65 (T32S, R2W, Section 35).

Habitat. Throughout its vast range, the peregrine falcon has adapted to a wide array of nesting and prey habitats. In Oregon, the bird is found to nest on cliffs ranging in height from 75 to 1500 feet, as well as man-made structures such as bridges (Marshall et al., 2006). The average occupied cliff size in the Cascade Mountain Range is 229 feet. Cliff nests are on ledges or potholes with and without protective overhangs (Marshall et al., 2006). Nests previously built and occupied by ravens, golden eagles, and red-tailed hawks have also been located as nesting spots for falcons in Oregon (Marshall et al., 2006).

Peregrine falcons are associated with Westside Riparian-Wetlands and Southwest Oregon Mixed Conifer-Hardwood Forest habitats, both of which occur in the Umpqua National Forest and are crossed by the Proposed Action.

Forest Management Activities. The influence of fire and timber harvest can be considered in two ways: (1) as they affect the nest site and (2) as they affect the food base. Fire or harvest in the immediate vicinity of the nest site can be detrimental, if the site is severely modified so that it may no longer be suitable. To some extent, how much disturbance would be tolerated depends on the quality of the site and the characteristics of the individual birds. Because peregrines are long-ranging birds, fire or logging will not significantly affect the food base and may actually increase the food base if it results in an increase in the passerine (songbird) bird population.

Unusual or prolonged disturbance of nesting birds can lead to reproductive failure. The species' intense defensive behavior plus the high public interest in this species warrant limiting disturbance during the courtship and nesting period. Any changes in the characteristics of the nest site, through logging or road construction, would also be detrimental to the birds.

Effects of the Proposed Action. Since the Forest Plan was issued and peregrine falcons were delisted, the Umpqua National Forest has adopted new temporal and spatial buffers to protect peregrine falcon eyries. No disturbances are allowed within 1.5 miles of active nest sites from February 1 through August 31. Since the eyrie is at a higher elevation than the construction right-of-way and there is likely no intervening tree cover, noise generated by construction at the eyrie is predicted to range from 45 dBA (centerline surveying of the ditch) to 66 dBA (ditching with mitigated rock blasting) at the closest distance of 0.2 mile. That noise level is likely to be below levels (85 dB) that normally scare birds (Golden et al., 1980).

Disturbance of the adults could lead to egg or chick abandonment, leaving them vulnerable to predators and the elements. In extreme cases of disturbance, for example the sudden appearance of a human or machinery very close to a nest, the adult may leave so quickly as to knock eggs or chicks out of the nest (White et al., 2002).

Mitigation. PCGP would apply the spatial buffer to approximately 2.10 miles of the PCGP construction right-of-way in the Umpqua National Forest, from MP 111.12 to MP 113.22, to avoid potential impacts to a nesting peregrine falcon. No timber clearing or construction activities would occur within 1.5 miles of the active peregrine falcon eyrie from February 1 through August 31.

Forest Plan Consistency. Since Peregrine Falcons are no longer listed under the ESA, Forest Plan Prescription C3-I, Peregrine Falcon, intended to meet the requirements of the Endangered Species Act of 1973, is no longer applicable. The Proposed Action will be consistent with current temporal and spatial buffers to protect peregrine falcon eyries in the Umpqua National Forest. And, as noted above, the peregrine population in the Umpqua is being maintained at a viable level, with a positive trend in population size in the Umpqua National Forest.

2.8 Bald Eagle

The bald eagle was chosen as a MIS for the Forest because it was classified as a threatened species under the ESA (Forest Service, 1990b). However, the species is no longer listed under the Act. Although no longer listed as threatened under the ESA, bald eagles remain protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d) and the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712).

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for bald eagles and their habitat:

Applicable Forest Plan Forest-wide Standards and Guidelines.

- Active raptor nest sites identified in project planning or during project work should be protected from human disturbance until fledging or nesting is complete.
- All proposed activities within areas designated for management under the bald eagle prescription will first be coordinated with the FWS as required by consultation procedures.

Management Prescriptions. *Prescription C3-II, Bald Eagle, Maintained,* applies to areas within a 20-chain radius of known and selected potential bald eagle nest sites. Under the Forest Plan this prescription was intended to meet the requirements of the Endangered Species Act of 1973 and requires preparation of a site-specific management Plan within three years of Forest Plan approval.

- Wildlife and Fish: These sites are high priority for annual monitoring. Any proposed enhancement project or management technique must be reviewed and coordinated with the FWS.
- Timber: The following direction applies within a five-chain radius of active or alternate nest sites: No programmed harvest; no salvage. No silviculture-related activities January 1 through August 31.
- The following direction applies between five and ten chains from the nest: Three or more overmature trees shall be left. No more than 10 percent of the area may be impacted per decade. Use of toxic chemicals is prohibited. No salvage permitted. All activities prohibited January 1 through August 31. Commercial and personal-use firewood cutting shall be an incidental secondary product of timber harvest. Firewood cutting and gathering for on-site use is permitted.
- Facilities: No corridors, roads or trails will be constructed within 400 feet of nest trees. Within 650 feet, no construction or reconstruction between February 15 and August 15. New utility and transportation corridors will be discouraged. Where no reasonable alternatives exist, corridors will be located to impose the least impact. Existing facilities are allowed.
- Protection: No use of chemicals to control insect and disease problems within the 1.5-mile radius except under recommendation from FWS.

Management Areas 10 and 11 Direction. Not applicable.

<u>Species Status in the Pipeline Project Area.</u> This species is associated with larger bodies of water in the Umpqua, and the only known nest sites are in the Diamond Lake Ranger District. The Umpqua National Forest Plan monitoring plan calls for annual monitoring of all known bald eagles in the Umpqua National Forest to determine site occupancy and productivity on an annual basis. At the time of the issuance of the Umpqua National Forest Plan (Forest Service, 1990b), there were two nest sites (one at Diamond Lake and one at Lemolo Lake), and in 2011 there were four known nesting pairs in the Umpqua National Forest that have fledged 60 eagles since 1990. The trend for bald eagle reproduction has been increasing over the 21 years since the Umpqua National Forest Plan was signed. No bald eagles nest within the vicinity of the Proposed Action in the Umpqua National Forest.

The National Audubon Society (2017) has conducted Christmas Bird Counts (CBC) annually within the Medford Count Circle through 2016. The Medford Count Circle is 13.7 miles from the Pipeline and 23 miles from where the Pipeline crosses the Umpqua National Forest. Bald eagles have been observed each year within the Medford CBC and are reported as numbers counted per observational hour. Since 1992, the number of bald eagles counted per hour has significantly increased ($p<0.10$), shown in Figure 2-3 (National Audubon Society, 2017). A similar increase in wintering bald eagles is expected in the Umpqua National Forest.

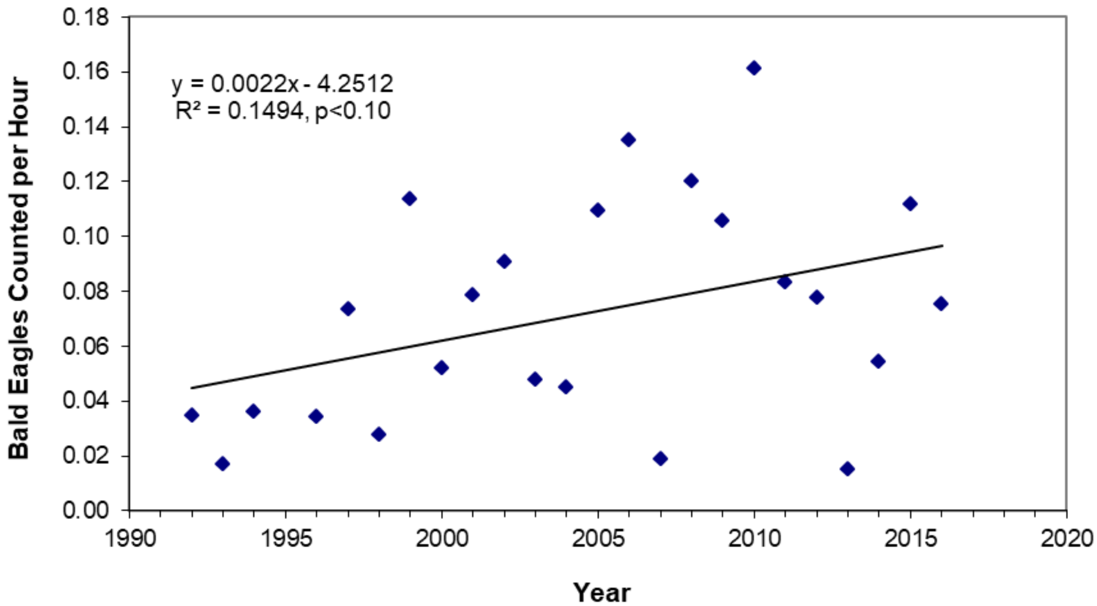

Figure 2-3
Bald Eagles Counted per Hour during National Audubon Society's Christmas Bird Count in the Medford Count Circle, 1992 to 2016 (data from National Audubon Society, 2017)

<u>Habitat.</u> Habitat requirements for this species are considered to be suitable nest sites and large lakes and rivers which serve as a food source. Suitable nest sites are generally within view of their feeding grounds near water (Forest Service, 1990c). Bald eagles are common in the vicinity of freshwater lakes and rivers and saltwater (Smith et al*.,* 1997). Nests are built on large, prominent trees and snags, usually within a mile of water, and are almost always reused (Isaacs and Anthony, 2004). Bald eagle nesting, feeding, and wintering areas are known or potentially occur on or near the Proposed Action.

Bald eagles are associated with most habitat types that occur within the Umpqua National Forest in proximity to waterbodies, including Westside Riparian-Wetlands and Southwest Oregon Mixed Conifer-Hardwood Forest.

In the Pacific Northwest, bald eagles may begin nest repairs in December but courtship and pair bonding generally occur during January and February (Stinson et al., 2001). Adults begin incubating eggs by mid to late March, and this lasts for 35 days or so and young hatch near the end of April (Stinson et al., 2001). Juveniles typically fledge during July, 11 to 13 weeks after hatching (Stinson et al., 2001) but may remain in the nest vicinity for a month, usually through August (Isaacs et al., 1983). Immediately before and during egg laying and early incubation are considered the most critical, during which even temporary abandonment by adults can leave eggs or young susceptible to chilling and inclement weather, excessive solar heating, and predation (Romin and Muck, 1999).

<u>Forest Management Activities.</u> Habitat destruction through logging, road construction, and recreational development has in the past had the most affect to this species throughout its range.

Recent public awareness and concerns have reduced this kind of detriment, at least on public lands.

Unintentional harassment or malicious destruction of nests and shooting eagles does occur, although it has not been a problem on this Forest. Public awareness has benefited this species.

The current management for this species requires, as a minimum, preparing a site-specific management plan for each bald eagle site. Plans will be coordinated and reviewed with the FWS (Forest Service, 1990c).

Effects of the Proposed Action. Bald eagles are sensitive to human disturbances during nesting periods (Fraser et al*.,* 1985; Johnson, 1990; Grubb et al*.,* 1992) and at other times of the year (Stalmaster and Newman, 1978; Knight and Knight, 1984; McGarigal et al*.,* 1991). Stinson et al. (2001) reviewed bald eagle responses to various human activities at different times in the annual cycle (nesting, roosting, foraging) and summarized various distances at which bald eagles might be expected to be adversely affected (displacement, nest abandonment) by such actions as residential developments, logging, road building, boating, recreational use, and presence of pedestrian traffic at several locales across North America. While noting that there was a high degree of variability in bald eagle response, Stinson et al. (2001) recommended spatial buffers of 1,640 feet (0.31 mile) to reduce bald eagle avoidance of shorelines with pedestrian or boat traffic and 1,690 feet (0.32 mile), a threshold within which breeding bald eagles exhibit alert responses. No bald eagles nest in the Umpqua National Forest within the vicinity of the Proposed Action (within 1 mile or closer); therefore, no effects to nesting bald eagles are expected.

Mitigation. Because of the lack of nests within the Pipeline project area on Umpqua National Forest, no mitigation specifically targeting potential impacts to bald eagles is proposed within Umpqua National Forest.

Forest Plan Consistency. Since Bald Eagles are no longer listed under the ESA, Forest Plan Prescription C3-II, Bald Eagle, intended to meet the requirements of the Endangered Species Act of 1973, is no longer applicable. The Proposed Action will not be inconsistent with the Forest Plan related to management of Bald Eagles. As reported above, bald eagle reproduction in the Umpqua National Forest has been trending slightly positive over the past 21 years, therefore Bald Eagle populations in the Umpqua National Forest are being maintained at viable levels.

2.9 Water Quality Indicator Species

Steelhead have been selected as indicator species because they occupy a variety of habitat across the Umpqua National Forest. Streams in the forest are classified based on the present and foreseeable uses made of the water, and the potential effects of on-site changes on downstream uses. Class I streams are direct sources of water used as a public water supply (more than 10 percent of the public water supply's watershed) or provide habitat usable by anadromous salmonids. Class II streams provide habitat usable by resident salmonids. Class III streams are perennial streams which are not Class I or II. Class IV streams are intermittent or seasonal streams which are not Class I or II. These stream classes are referenced extensively in the fish habitat management prescriptions detailed below.

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for Water Quality Indicator Species and their habitat:

Applicable Forest Plan Forest-wide Standards and Guidelines. Fisheries standards and guidelines in the Forest Plan, and listed below, are not specific to Forest fish indicator species but are primarily designed for the goal of maintaining, enhancing, and protecting habitat for populations of resident and anadromous fish both in and outside the Forest.

- Maintain all effective shading vegetation on perennial streams. Utilize silvicultural practices to establish shade on perennial streams where they are currently lacking.
- Maintain or improve soil stability adjacent to all streams. When slope stability risks are high or very high, use stability buffer specifications found in Forest Plan Soil Productivity standards and guidelines.
- Retain all existing instream large woody material, streamside snags, and streamside downed material within riparian areas of perennial streams (Class I, II, and III streams) that will not create a blockage to fish passage. Retain standing trees which are likely to fall into the stream in the future.
- Protect riparian areas from prescribed fire and equipment when treating slash in adjacent harvest unit, where practical.
- Fall timber directionally away from riparian areas to protect full width of residual vegetation, where practical.
- Do not apply pesticides within the riparian areas.
- Keep total fine sediment (<1.0 millimeter) to less than 20 percent by weight in spawning gravels.
- Design new stream crossings to provide for unimpeded fish passage and correct existing passage problems on a prioritized schedule.
- Locate new roads outside riparian areas, preferably on ridgetops, except where a stream crossing is necessary. Road reconstruction should not further degrade riparian areas.

Management Prescriptions. Similar to the Forest-wide Standards and Guidelines, management prescriptions for fish are not always specific to the forest indicator species for fish, but provide for maintaining and improving fish habitat in general. There are several management prescriptions for fish and fish habitat that apply only to specific areas or stream sections in the Forest. In some cases, these areas are not crossed by the Pipeline and so the management prescriptions are not included here.

Riparian objectives are to maintain or improve effective shade, existing sediment delivery, existing woody material for fish habitat, aquatic food source, and free salmonid fish passage. Temperature increases on Class I and II streams and lakes and ponds will be limited to the quantitative criteria in Oregon State basin standards (OAR Chapter 340). Existing stream temperatures exceed those limits in the Umpqua and Willamette basin standards, so temperature will not be increased.

Prescription C2-I, Riparian Area Class I and II Streams, Lakes, and Ponds, applies to streams and adjacent riparian areas that provide habitat for either anadromous or resident salmonids, and wildlife. It includes lakes and ponds greater than one acre, along with their riparian areas, and streams which supply water to public water systems. The riparian unit extends from 50 to 250 feet (average 100 feet), measured horizontally from each streambank at the bankfull flow mark. The prescription concentrates on maintaining existing wildlife and fish habitat, as well as existing water quality and quantity. Environmental alteration is permitted in order to meet riparian objectives. Minor changes caused by other resource activities must be mitigated to meet water quality, fish, and wildlife needs.

Prescription C2-II, Riparian Area Class III Stream, applies to perennial streams, lakes, ponds and adjacent riparian areas which do not provide salmonid fish habitat. The riparian unit extends 30 to 150 feet (average 50 feet) from each streambank at bankfull flow mark. The prescription concentrates on maintaining existing water quality and quantity. Moderate environmental alteration consistent with riparian objectives is permitted.

Riparian objectives are to provide large woody material and maintain or improve effective shade, existing sediment delivery, and aquatic food sources on Class III streams unless a site-specific assessment shows that shade removal will not result in temperature increases or degradation of aquatic habitat on downstream Class I or II waters.

Prescription C2-III, Riparian Area Class IV Stream, applies to streams with defined streambanks and seasonal surface streamflow, usually described as first- and often second-order channels. The riparian unit extends 30 to 150 feet (average 50 feet), measured horizontally from each streambank at bankfull flow mark. This prescription maintains existing water quality and quantity by maintaining existing channel, bank, and sideslope stability. Extensive environmental alteration consistent with riparian objectives is permitted.

Riparian objectives are to minimize sediment delivery to Class IV streams, and to maintain the existing channel profile with a vegetation rootmat in the streambank and stable woody material in the channel.

Prescription C2-IV, Fish Habitat Class I and II Streams, Lakes, and Ponds, applies to streams and adjacent riparian areas that provide habitat for either anadromous or resident salmonids, and lakes and ponds greater than one acre and their adjacent riparian area. The riparian unit extends from 100 to 200 feet (150-foot average), measured horizontally from the streambank at bankfull flow mark. This prescription protects and maintains the quality of anadromous and resident salmonid fish and wildlife habitat via structural and nonstructural means, as well as aquatic organism food sources and water quality and quantity. Environmental alteration is permitted in order to meet riparian objectives. Minor changes caused by other resource activities must be mitigated to meet water quality, fish, and wildlife needs.

Riparian objectives are to maintain or improve effective shade and existing sediment delivery on Class I and II streams, lakes, and ponds, and to maintain existing and future woody material, aquatic food sources and free fish passage. Temperature increases on Class I and II streams and lakes and ponds will be limited to the quantitative criteria in Oregon State basin standards (OAR Chapter 340). Existing stream temperatures are above those limits in the Umpqua and Willamette basin standards, so temperatures will not be increased.

Prescription C2-V, Fish Habitat Class III Streams applies to perennial streams, lakes, ponds, and adjacent riparian areas which do not provide salmonid fish habitat. The riparian area extends 30-150 feet (average 50 feet), measured horizontally from each streambank at the bankfull flow mark. The prescription protects and maintains aquatic food sources, water quality and quantity, and wildlife habitat. Moderate environmental alteration is permitted consistent with riparian objectives.

Riparian objectives are to provide large woody material, and maintain or improve effective shade, existing sediment delivery and aquatic food sources on Class III streams unless a site-specific assessment shows that shade removal will not result in temperature increases or degradation of aquatic habitat on downstream Class I or II waters.

Prescription C2-VI, Fish Habitat Class IV Streams applies to streams with defined streambanks and seasonal surface streamflow, usually described as first- and often second-order streams. The riparian unit extends 30 to 150 feet (average 50 feet), measured horizontally from each streambank at bankfull flow mark. This prescription protects and maintains wildlife habitat and downstream fish habitat as well as water quality and quantity by protecting groundcover vegetation in the riparian area. Moderate environmental alteration consistent with riparian objectives is permitted. Riparian objectives are to minimize sediment delivery to Class IV streams, and to maintain the existing channel profile with a vegetation root mat in the streambanks and stable woody material in the channel.

Management Areas. The Pipeline will cross portions of Forest Plan Management Areas 10 and 11. These MAs also contain river and stream drainages that are represented as resource scheduling areas (RSA) in the Forest Plan. The South Umpqua River in the vicinity of the Proposed Action is divided into five RSAs: Cow Creek, Elk Creek, Jackson Creek, the Upper South Umpqua, and the Lower South Umpqua. The Pipeline courses along the boundary shared by the Cow Creek (02) and Elk Creek (04) RSAs and intersects both of them. The RSAs in MAs 10 and 11 are assigned management prescriptions (described above) relative to fish habitat and presence.

Management Area 10 Direction. Riparian and fish habitat prescriptions are assigned for Class I, II, III and IV streams in this MA in order to meet management requirements or protect habitat for anadromous fish. In areas without anadromous fish (Resource Scheduling Areas (RSA): 2, 11-16 and 20-22), prescriptions are assigned as follows: prescription C2-I to Class I and II streams and lakes and ponds, prescription C2-II to Class III streams, and C2-III to Class IV streams. In RSAs 4 through 10, fish habitat prescriptions are assigned as follows: prescription C2-IV to Class I and II streams and lakes and ponds, prescription C2-V to Class III streams, and prescription C2-VI to Class IV streams.

Prescription C2-VIII is assigned on Class I streams with demonstrated unique anadromous fish populations. Prescription C2-VII is assigned on all anadromous fish pools signed by the Oregon Department of Fish and Wildlife. These two prescriptions do not apply to areas crossed by the Pipeline.

Management Area 11 Direction. Riparian and fish habitat prescriptions are assigned to each RSA in order to meet management requirements or protect habitat for anadromous fish. These prescriptions are assigned to inventoried Class I and II streams. Class III and IV streams that are regularly inventoried as a part of watershed management are also assigned special riparian prescriptions. In all RSAs without anadromous fish (RSAs: 02, 11-15, 20-22), MR riparian prescriptions are assigned as follows: prescription C2-I to Class I and II streams and lakes and ponds; prescription C2-II to Class III streams, and C2-III to Class IV streams. In RSAs 04 through 10, fish habitat prescriptions are assigned as follows: prescription C2-IV to Class I and II streams and lakes and ponds; prescription C2-V to Class III streams, and prescription C2-VI to Class IV streams. In RSAs 17 and 18 within the boundaries of MA 11, special fish habitat prescriptions are assigned as follows: prescription C2-IV to Class I and II streams and lakes and ponds, prescription C2-IV to Class III streams, and prescription C2-VI to the remaining Class IV streams. These prescriptions identify the maximum amount of vegetative disturbance permissible in a riparian area, other assigned prescriptions may indicate less disturbance.

Prescription C2-VIII is assigned on Class I streams with demonstrated unique anadromous fish populations. Prescription C2-VII is assigned on all anadromous fish pools signed by the Oregon

Department of Fish and Wildlife. These two prescriptions do not apply to areas crossed by the Pipeline.

Species Status in the Pipeline Project Area. Winter steelhead may be located in tributaries of the South Umpqua River, including the Upper Cow Creek watershed where the Pipeline crosses the Forest. Winter steelhead is the largest run of steelhead in the Forest and populations in the ODFW South Umpqua Species Management Unit (SMU) are not considered to be at risk (ODFW, 2005). Summer steelhead are not known to be present in the Pipeline project area within the Forest (ODFW, 2009 and Forest Service, 1990c).

In Tributaries to the Umpqua River, winter steelhead migrate upstream and spawn from January through May; egg incubation and fry emergence last from January through June; and downstream juvenile migration begins in February and ends in mid-July (ODFW, 2003c). In tributaries to the Rogue River between Marial and Lost Creek, winter steelhead may migrate upstream from September through mid-May, but spawning is from mid-February through mid-May; egg incubation and fry emergence is from mid-February through June; and downstream juvenile migration is from mid-February through June. Juvenile rearing in both drainages is likely to be throughout the year (ODFW, 2003c).

Winter steelhead are not likely to occur in the stream reaches crossed by the Proposed Action within the Umpqua National Forest. The Pipeline will cross four perennial and six intermittent tributaries to the East Fork of Cow Creek and the East Fork of Cow Creek within the Umpqua National Forest between MP 105.41 and MP 110.96, but the ODFW winter steelhead distribution in those waterbodies does not extend to the reaches crossed by the Pipeline (ODFW, 2016). The Pipeline will be within the riparian zone of another perennial stream, East Fork Cow Creek (MP 109.69) and an intermittent Tributary to West Fork Trail Creek (MP 110.57) but will not cross the waterbody within the Umpqua National Forest. Winter steelhead do occur within the West Fork Trail Creek but not in the tributary adjacent to MP 110.57r MP 110.76 (ODFW, 2016).

Habitat. Within the Umpqua National Forest, the Pipeline crosses four perennial streams (three of them assumed to be fish-bearing, the other is unknown) and six intermittent streams (fish presence is unknown) within the South Umpqua–Upper Cow Creek Fifth Field Watershed. The Pipeline also will pass through the riparian zone of one perennial stream (fish presence assumed) in the Upper Cow Creek watershed and an intermittent stream (fish presence is unknown) that is adjacent to the Pipeline but within the Upper Rogue River–Trail Creek Fifth Field Watershed.

Riparian zones associated with East Fork of Cow Creek and the tributaries that will be crossed are forested with late successional-old growth forest and/or mid-seral forest (Table 2-10). Likewise, the riparian zone associated with the Tributary to West Fork Trail Creek is forested by mid-seral forest but a developed road and rock quarry (altered habitat) are also within the riparian zone that will be crossed by the Pipeline.

Table 2-10
Summary of Habitats Removed by the Proposed Action from Riparian Zones Extending One-Site Potential Tree Height From Stream Banks and from Riparian Reserves, Extending up to Two Site-Potential Tree Heights from Stream Banks in the Umpqua National Forest

Fifth Field Watershed (Hydrologic Unit Code) and Riparian Zone	Forested Habitat [1]					Other Habitat [1]						Total Riparian Zone Impact(acres)
	Late Successional-Old Growth	Mid-Seral Forest	Regenerating Forest	Clearcut Forest	Forest Total	Forested Wetland	Non-Forested Wetland	Unaltered Non-Forested Habitat	Agriculture	Altered Habitat	Other Total	
Upper Cow Creek (HU 1710030206)												
One Site Potential Tree Height (187 feet)	2.03	2.90	2.00	0	6.93	0	0.16	0	0	0.62	**0.78**	**7.70**
Riparian Reserve	2.70	2.90	3.92	0	**9.52**	0	0.16	0	0	0.76	**0.92**	**10.45**
Trail Creek (HUC 1710030706)												
One Site Potential Tree Height (159 feet)	0	1.47	0	0	**1.47**	0	0	0	0	2.45	**2.45**	**3.92**
Riparian Reserve	0	1.47	0	0	**1.47**	0	0	0	0	2.45	**2.45**	**3.92**
Both Watersheds Total												
One Site Potential Tree Height	2.03	4.37	2.00	0	**8.4**	0	0.16	0	0	3.07	**3.23**	**11.62**
Riparian Reserve	2.70	4.37	3.92	0	**10.99**	0	0.16	0	0	3.21	**3.37**	**14.37**

Effects of the Proposed Action. Construction of the Proposed Action will remove a total of 8.40 acres of forested vegetation within one site-potential tree height of all riparian zones crossed in the Umpqua National Forest and at total of 10.99 acres of forested vegetation within Riparian Reserves crossed (Table 2-10). Effects to salmonids (Oregon Coast coho and Southern Oregon/Northern California Coast coho), to instream habitats, and to riparian zones during construction and operation were analyzed and discussed in detail in the Biological Assessment. Those same potential effects are relevant to steelhead and are summarized below:

- Removal of trees will decrease shade and cause an increase in stream water temperatures that are expected to be immeasurable.
- Construction during summer and early fall is likely to affect invertebrates that are prey to juvenile coho but will also coincide with periods of lowest fish use and lowest instream flow rates. Effects to prey are expected to be temporary and localized.
- Some herbicides may have toxic effects on aquatic organisms and may bioaccumulate while others do neither. Herbicides will not be used within 100 feet of a waterbody's mean high water mark.
- The contribution by the Proposed Action to cumulative effects by harvested timber within riparian zones on non-federal lands within the Action Area is expected to be a very small portion of overall cumulative effects within the reasonably foreseeable future.
- Total Suspended Solid (TSS) concentrations of 12 mg/L or more has the potential to adversely effect juvenile coho and steelhead (Bash et al, 2001; Berg and Northcote, 1985).
- Construction across one stream with bedrock in Umpqua National Forest may require blasting that could cause mortality to fish, eggs, and larvae by rupturing swim bladders

and addling egg sacs, if present. Adult and juvenile coho will be removed and/or prevented from being within 50 feet of blasting sites to the maximum extent possible.

- Fish salvage will occur within isolated construction sites, possibly when adult and juvenile coho are present.
- Lack of LWD is a limiting factor in most streams. Removal of Mid-Seral riparian forest (40-80 years old) will have long-term effects to recruitment of LWD and removal of Late Successional or Old Growth forest (≥80 years old) will have permanent effects to recruitment of LWD because planted conifers will not attain those age classes within the 50-year life of the Pipeline.

Mitigation. Conservation measures to address potential effects to salmonids within streams crossed by the Pipeline have been provided in the Biological Assessment for the Proposed Action. Those measures are summarized below:

- Construction across and proximate to all perennial and intermittent streams within the Riverine analysis area will be during the dates recommended by ODFW to conduct in-water construction. Construction will not coincide with steelhead upstream migration, spawning, egg incubation or fry emergence although juvenile steelhead may be present during construction.
- All waterbodies supporting fisheries will be backfilled with material (gravel, cobble or other rock substrates) removed from the trench with the upper 1-foot of the trench backfilled with clean gravel which will provide substrate for benthos and potential spawning sites for coho.
- PCGP proposes to place 16 pieces of LWD within the Upper Cow Creek watershed at streams crossed or adjacent to the centerline to address loss of riparian forests during construction within the Umpqua National Forest.
- Riparian forests will be replanted to within 15 feet of the centerline which will mature during the 50-year life of the Pipeline to provide shade and LWD to many waterbodies.

In addition to these measures, PCGP had agreed to fund other projects proposed by the Forest Service in the Umpqua National Forest that would provide benefits water quality indicator species within the Umpqua National Forest. The Forest Service will be reviewing these projects to verify their relevance to the current proposed Pipeline and implementation of these previously proposed projects or similar will be included in the CMP. Projects previously agreed to included funding for the decommissioning of 53-57.5 miles of roads and repair stream crossings at 32 locations which will provide benefits to steelhead and aquatic habitats in the Umpqua National Forest. Additionally, PCGP proposed to fund commercial and pre-commercial thinning on up to 1,240 acres that would also include fuel treatments to reduce risk of stand-replacing fire events. Downed wood and snag creation within 1,132 acres would also be funded and may occur within riparian zones and eventually contribute to large woody debris.

Forest Plan Consistency. Overall the Proposed Action will be consistent with fisheries standards and guidelines in the Forest Plan, included at the beginning of this section. The habitats of resident and anadromous fish in and outside of the Forest will be maintained through placing large woody debris in streams, reducing fire risks, avoiding use of pesticides, improving stream crossings that will reduce blockage and sediment delivery.

3.0 ROGUE RIVER-SISKIYOU NATIONAL FOREST

Species. The Management Indicator Species for the Rogue River-Siskiyou National Forest are Columbian black-tailed deer, Roosevelt elk, pine marten, northern spotted owl, pileated woodpecker, and all woodpeckers (primary cavity nesters). Species are designated as MIS for the following reasons: 1) they are dependent on specialized habitat conditions; 2) they require early, mature, or old-growth forest conditions for optimum habitat; 3) traditional game species; and 4) threatened, endangered, or sensitive species (Forest Service, 1990d).

Wildlife habitat management to rehabilitate, maintain, or improve habitats will emphasize (Forest Service, 1990d) indicator species' habitats, as well as others; examples include signing or creation of wildlife trees, manipulating stand or vegetation structure to optimize habitat components desired, improving nesting and roosting sites, restricting access during key time frames, improving forage, and providing adequate distribution of water sources (Forest Service, 1990d). Black-tailed deer and Roosevelt elk habitat will be managed to provide adequate forage, hiding cover, and thermal cover conditions throughout the summer and winter range. The pine marten, pileated woodpecker, and spotted owl represent mature and old-growth forest habitat conditions.

The northern spotted owl is now listed under the Endangered Species Act and its status is covered extensively under separate cover in the Biological Assessment.

Management Strategies 26, Restricted Riparian, and 28 are the only management strategies implicated by construction of the Pipeline. Management Strategy 26 encompasses 19,512 acres (Forest Service, 1990d).

Habitats. MIS in the Rogue River-Siskiyou National Forest are associated with a variety of habitats found throughout the forest. However, the Pipeline will cross only those habitats included in Table 3-1, below. In Table 3-1, the areas (acres) of existing forested habitats (Montane Mixed Conifer Forest and Southwest Oregon Mixed Conifer-Hardwood Forest) within one or more seral stages (clearcut-regenerating forest, mid-seral forest, late successional-old growth forest) that will be removed during construction and affected during operation are provided in addition to all other affected habitat type categories. Effects have been summarized by component during construction and during operation. Generally, most long-term disturbance is due to a 30-foot wide maintenance corridor, centered on the pipeline, that is maintained in a herbaceous and/or shrub state for the life of the Pipeline. Table 3-1 is referenced in discussions for each MIS in the sections, below.

The forested habitat (Johnson and O'Neil, 2001) corresponds to vegetation categories described by the Oregon Gap Analysis Project (Oregon Gap; Kagan et al., 1999) and mapped in the project area. For Southwest Oregon Mixed Conifer-Hardwood Forest, the corresponding vegetation categories include 1) Douglas-fir-White Fir/Tanoak-Madrone Mixed Forest, and 2) Douglas-fir Dominant-Mixed Conifer Forest (Kagan et al., 1999) and were discussed above for the Umpqua National Forest.

<u>Montane Mixed Conifer Forest</u> habitat (Johnson and O'Neil, 2001) in Table 3-1 corresponds to the True Fir-Hemlock Montane Forest vegetation type (Kagan et al., 1999) which is described as multi-story closed canopy forests. It also has canopy co-dominance of Pacific silver fir and/or noble fir along with both western and mountain hemlock. Other tree species present may include Douglas-fir, western white pine, subalpine fir, Alaska yellow cedar, and grand fir. Shrub layer is

dense and diverse with a number of deciduous and evergreen shrubs. It is found in middle to higher elevations (Kagan et al., 1999).

Table 3-1
Summary of Construction and Operation-Related Disturbance (acres[1]) to Corresponding Wildlife Habitat Categories (Johnson and O'Neil, 2001) in the Rogue River-Siskiyou National Forest

		Forest-Woodland			Grassland-Shrubland		Developed			
Component	**Forest –Woodland Seral Stage [2]**	**Montane Mixed Conifer Forest**	**Southwest Oregon Mixed Conifer-Hardwood Forest**	**Forest-Woodland Sub-Total**	**Shrub-Steppe**	**Grasslands**	**Developed-Urban and Mixed Environs**	**Roads**	**Open Water**	**Total**
CONSTRUCTION DISTURBANCE										
Pipeline Facilities										
Construction Right-of-Way	**L-O**	9.89	62.27	72.16	1.29	1.74		9.12	0.13	157.06
	M-S	6.71	9.98	16.69						
	C-R	22.67	33.25	55.92						
	Tot	39.26	105.5	144.76						
Hydrostatic Discharge Sites [3]	**L-O**									0
	M-S									
	C-R									
	Tot									
Rock Source/ Disposal	**L-O**						4.91			4.91
	M-S									
	C-R									
	Tot									
Temporary Extra Work Areas	**L-O**	0.15	5.87	6.02	4.2	1.18	10.76	3.09		48.56
	M-S	0.17	0.31	0.48						
	C-R	11.18	11.65	22.83						
	Tot	11.5	17.83	29.33						
Uncleared Storage Areas [4]	**L-O**	3.18	32.33	35.51	0.13	0.33		2.41	0.09	69.5
	M-S	3.57	3.76	7.33						
	C-R	11.53	12.18	23.71						
	Tot	18.29	48.27	66.56						
Total Construction Disturbance	**L-O**	13.22	100.47	113.69	5.62	3.25	15.67	14.62	0.22	280.03
	M-S	10.45	14.05	24.5						
	C-R	45.38	57.08	102.46						
	Tot	69.06	171.6	240.66						
OPERATION DISTURBANCE										
Pipeline Facilities										
	L-O	3.3	19.87	23.17	0.42	0.59		2.14	0.03	49.89

Component	Forest –Woodland Seral Stage [2]	Forest-Woodland: Montane Mixed Conifer Forest	Forest-Woodland: Southwest Oregon Mixed Conifer-Hardwood Forest	Forest-Woodland: Forest-Woodland Sub-Total	Grassland-Shrubland: Shrub-Steppe	Grassland-Shrubland: Grasslands	Developed: Developed-Urban and Mixed Environs	Developed: Roads	Open Water	Total
30-foot Maintenance Corridor	M-S	2.39	3.07	5.46						
	C-R	7.22	10.85	18.07						
	Tot	12.92	33.79	46.71						
Total Operation Disturbance	L-O	3.3	19.87	23.17	0.42	0.59		2.14	0.03	49.89
	M-S	2.39	3.07	5.46						
	C-R	7.22	10.85	18.07						
	Tot	12.92	33.79	46.71						

[1] Acres disturbed were evaluated using GIS; footprints for each component (temporary construction right-of-way, temporary extra work areas, temporary access roads, uncleared storage areas, pipe storage yards, aboveground facilities, permanent easement, and 30-foot maintenance corridor) were overlaid on the digitized vegetation coverage.

[2] Forest-Woodland Seral Stages are L-O, Late Succession/Old Growth assumed to be ≥80 years old; M-S, Mid-Seral assumed to be ≥40 but ≤80 years old; C-R, Clearcut-Regenerating Forest assumed to be ≤40 years old.

[3] Small brush or trees may be cleared by a rubber-tired rotary or flail motor (brush hog) or by hand with machetes/chainsaws. No soil disturbance will occur. A rubber-tired or track hoe will be utilized to lay the discharge line and to remove the saturated haybales or filter bags upon completion of hydrostatic discharge.

[4] PCGP uncleared storage areas (UCSAs) will not be cleared of trees during construction. These areas will be used to store forest slash, stumps and dead and downed log materials that will be removed and scattered across the right-of-way after construction during restoration and are considered as temporary insignificant habitat modifications.

Other habitat types affected by the Proposed Action within the Rogue River-Siskiyou National Forest (Table 3-1) include:

Shrub-Steppe is a mosaic of grasses (mostly introduced) and shrubs that include big sagebrush subspecies, such as Wyoming, basin, and mountain. Other shrubs found within this cover type include low, silver, and three-tip sagebrush, and rabbitbrush. A variety of bunchgrasses are scattered with the shrubs, although overgrazing has limited their presence (Kagan et al., 1999).

Grasslands. West of Cascades, Oregon Gap aggregated this category with agriculture. This habitat contains less than 30 percent tree or shrub cover and is generally used for livestock grazing. Bunchgrasses dominate native-dominated sites, with mosses, lichens, and native forbs occurring throughout. Found at lower elevations (Johnson and O'Neil, 2001). Within the Pipeline project, this vegetation type is found within Coos, Douglas, and Jackson counties.

Other types, Developed-Urban and Mixed Environs, Roads, and Open Water, have similar characteristics to those described above for the Umpqua National Forest.

3.1 Northern Spotted Owl

The NSO was selected as a MIS for mature and old growth habitat in the 1990 Rogue River-Siskiyou National Forest Plan (Forest Service, 1990d). The NSO was proposed for listing under the Endangered Species Act (ESA) when the Rogue River-Siskiyou National Forest's Plan was signed in 1990, and was officially listed as Threatened in 1992. The Northwest Forest Plan (BLM and Forest Service, 1994) amended the Rogue River's Forest Plan (Forest Service, 1990d), and was designed to ensure the population viability of the NSO. In 1994, there were approximately

154,102 acres of suitable NSO NRF habitat that were modeled in the Rogue River-Siskiyou National Forest, and 195 inventoried NSO pairs or resident singles assumed present in the Rogue River-Siskiyou National Forest (Forest Service and BLM, 1994). In 1990, prior to extensive NSO surveys from 1990 to 1994, there was 105 known NSO pair on Rogue River-Siskiyou National Forest (Forest Service, 1990d). Since the NSO is now listed under the Endangered Species Act, it is covered extensively under separate cover in the Biological Assessment prepared for the Proposed Action. A summary of the status of NSOs and their habitat on Rogue River-Siskiyou National Forest is included here, including effects to NSO habitat from the Pipeline. Additional information can be reviewed in the Biological Assessment.

Rogue River-Siskiyou National Forest occurs within three physiographic provinces within the range of the northern spotted owl in Oregon: Klamath Mountains, West Cascades, and East Cascades. To assess the current condition of NSO habitat in the Rogue River-Siskiyou National Forest, a new dataset was used to analyze NSO habitat. In 2016, the improved 2012 Gradient Nearest Neighbor (GNN) dataset was used to assess suitable NRF habitat for spotted owls within the NWFP area (see Davis et al. 2016 and https://www.fs.fed.us/r6/reo/monitoring/data/). This model applied to the Rogue River-Siskiyou National Forest predicts that there is approximately 309,784 acres of suitable NSO NRF habitat available, which is an increase of 155,682 acres of suitable NSO habitat from what was predicted in the 1994 Northwest Forest Plan (Forest Service and BLM, 1994). Through surveys for spotted owls that have occurred in the Rogue River-Siskiyou National Forest since 1990, with the majority of recent survey efforts through demographic studies, there are more than 195 pairs of NSO or resident singles documented to have occurred or are occurring in the Rogue River-Siskiyou National Forest (Rogue River-Siskiyou National Forest, 2013 GIS data layer). This is similar to the number of NSO pairs and resident singles documented on Rogue River-Siskiyou National Forest as reported in the 1994 Northwest Forest Plan (Forest Service and BLM, 1994).

The Proposed Action affects NSO habitat (high NRF, NRF, dispersal only, and capable habitat as defined by FWS in the Conservation Framework developed for the Proposed Action; see FWS, 2014) on Rogue River-Siskiyou National Forest within the West and East Cascades physiographic provinces. All NSO habitat affected by the Proposed Action on Rogue River-Siskiyou National Forest occurs within NSO home ranges; some of the NSO home ranges analyzed on Rogue River-Siskiyou National Forest are not “known” NSO sites, but sites determined to be a “best location” from survey efforts conducted for the PIpeline. Twenty NSO home ranges with a radius of 1.2 miles (15 known, 5 PCGP best location) occur within the Pipeline project area and will have NSO habitat affected, including habitat from eight NSO core areas (6 known, 2 PCGP best location) and two known nest patches. Table 3-2, below identifies the amount of NSO habitat removed by the Pipeline in Rogue River-Siskiyou National Forest. Overall, the Pipeline would remove approximately 78.18 acres of NRF habitat (high NRF and NRF, combined), which is approximately 0.03 percent of the 309,784 acres of NRF habitat available within Rogue River-Siskiyou National Forest.

Table 3-2
Summary of NSO Habitat Removed (acres)
within Rogue River-Siskiyou National Forest

NSO Habitat	Construction Right-of-Way	Temporary Extra Work Space	Total Habitat Removed
High NRF	28.55	2.03	30.58
NRF	43.61	3.99	47.60
Dispersal Only	16.69	0.48	17.17
Capable	55.92	22.83	78.75
Total NSO Habitat	**144.77**	**29.34**	**174.10**

3.2 Columbian Black-tailed Deer

The black tailed deer is listed as an indicator species because of its economic importance in Region 6 (Forest Service, 1990d). The entire Rogue River-Siskiyou National Forest is summer and/or winter range (Forest Service, 1990d) for Columbian black-tailed deer. Summer and winter range habitat are both important to the black-tailed deer since their survival depends on the condition and presence of winter range, and on early successional vegetation stages or non-forest habitat for forage in summer range (Forest Service, 1990d). Deer summer range capability indices are useful indicators for species needing non-forested habitat for survival (Forest Service, 1990d).

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for Columbian black-tailed deer and their habitat:

Applicable Forest Plan Forest-wide Standards and Guidelines.

- Manage habitat to provide adequate forage, hiding cover, and thermal cover conditions throughout summer and winter range.
- Habitat capability levels are to be consistent with those needed to meet and sustain state big game population benchmark levels, which are the number of deer that must be produced on an ODFW Management Unit before restrictions or regulations designed to limit excessive harvest can begin to be relaxed (Forest Service, 1990d). Benchmarks must be reached prior to initiation of antlerless hunts. (Forest Service, 1990d)
- The Forest Plan allocates 67,700 acres to winter range management. Since 1990, the Forest Plan anticipated that deer winter range carrying capacity would improve as management objectives for deer winter range needs were implemented; these improvements were expected to result in a capability to support up to 16,700 deer, which is 10 percent above the ODFW benchmark level of 15,200 deer (Forest Service, 1990d) on the Forest. Big game winter range timing limitations are December 1-April 30. Construction constraints deem that there shall be no disturbance within designated habitat during that period (App. 3D, 54).

Management Prescriptions. Management Strategy (MS) 26, Restricted Riparian, and MS 28, Late Successional Reserves.

Management Strategy 26 goals are to protect the riparian habitats associated with perennial streams for wildlife, fishery, and other beneficial uses, and to protect perennial streams from harmful water temperature variations, blockages, and sediment deposits.

- Deer: Maintain summer range to provide forage, hiding, and thermal cover. Restricted operating period Apr 1-June 30 may be imposed in identified fawning or calving areas.

- Recreation-Road Natural: Manage for Retention Visual Quality Objective, by blending and shaping regeneration openings with natural terrain, and assessing visual resource impacts in all project analyses.
- Wildlife, Fish, and Plants: Maintain existing fish habitat capability. If sensitive species are found, avoidance or other mitigation shall be used for species whose viability has been identified as a concern. Specific practices are outlined for the following species: Northern Spotted Owl, osprey, goshawk, woodpeckers, elk, bald eagle, and peregrine falcon.
- Timber: Harvest is not programmed and normally would not occur.
- Water: Evaluate effects on stream courses.

Species Status in the Pipeline Project Area. Black-tailed deer are found throughout the entire Rogue River-Siskiyou National Forest. ODFW conducts surveys for black-tailed deer within portions of three Oregon Wildlife Management Units (WMU) that occur within the Rogue River-Siskiyou National Forest: Applegate, Dixon, and Rogue. Based on ODFW estimations of total deer population within three ODFW WMUs (Dixon, Applegate, and Rogue), the population of black-tailed deer was estimated at 12,000 animals in Rogue River National Forest at the time of the Rogue River National Forest Plan in 1990. The 1990 Forest Plan estimated that the black-tailed deer population was expected to increase by 15 percent per decade for the first two decades, then return to then-current growth levels and stabilize by the end of the sixth decade (Forest Service, 1990d). Trend data from ODFW indicate that the population had declined by approximately 24 percent since peak years in the early 1960s (Forest Service, 1990d). With the exception of fluctuations generated by extreme weather conditions, the 1990 deer population was described as healthy, and its numbers adequate to provide success to one out of every 4 to 5 hunters (Forest Service, 1990d).

ODFW's Rogue WMU 30 coincides with the portion of the Rogue River National Forest within which the Proposed Action is located (MPs 153.81-148.33). ODFW (2018a) has compiled harvest data on black-tailed deer within Wildlife Management Unit 30 through the 2016 (ODFW, 2018a). From 2003 through 2016, percent hunter success has been relatively consistent. Hunter effort per animal harvest from 2004 through 2014 increased slightly, but no significant trends are apparent (Table 3-3).

Thermal cover had become limiting on many areas of the forest by 1990 and for the next 20 to 30 years it was expected that forage could become limiting. As a result, the deer population was expected to remain constant for a time then drop somewhat from 2010-2030. Since deer are not as sensitive to these habitat factors as elk, actual population variations were thought to be less drastic than indicated by the habitat conditions. In 1990, the National Forest Service believed that increased demand for deer hunting might not be met in the future (Forest Service, 1990d); however, that possibility does not appear supported by harvest data in Table 3-3.

Table 3-3
Harvest Statistics for Black-Tailed Deer within the Rogue Wildlife Management Unit 30, 2003-2016

Year	Total Hunters	Total Hunter Days	Harvest: Total Males (antlered)	Harvest: Total Non-Males (non-antlered)	Harvest: Total	Days per Harvest	Percent Hunter Success
2016	9,983	not reported	1,825	28	1,853	not available	19
2015	10,079	not reported	1,851	30	1,881	not available	19
2014	10,394	72,787	1,915	13	1,928	38	19
2013	10,652	73,652	1,878	21	1,899	39	18
2012	10,537	75,374	1,858	45	1,903	40	18
2011	9128	61503	1524	15	1539	40	17
2010	9478	63782	1303	38	1341	48	14
2009	9703	63092	1631	28	1659	38	17
2008	10608	70626	2116	30	2146	33	20
2007	10326	64071	2002	31	2033	32	20
2006	9158	56285	1574	12	1586	35	17
2005	7279	44293	1326	33	1359	33	19
2004	8682	56245	1794	18	1812	31	21
2003	9478	64424	1307	134	1441	45	15

Annual reports for each WMU provided by ODFW include 1) a population index - ODFW's Trend Count for animals in the WMU, conducted along a fixed route each year, usually at the end of winter, 2) productivity (young per female from ODFW's Composition Count data reported in December), and 3) an estimate of the maximum overwinter juvenile survival rate (derived from composition count data in December and composition count data the following March). There is no significant trend ($p>0.10$) in fawns per doe (young per adult female) through 2012; however, there is a significant increasing trend in ODFW's Population Index from 1998 through 2012 in Table 3-4 ($P<0.01$). Estimated young overwinter survival relative to adult overwinter survival indicates that juvenile black-tailed deer in the Rogue Wildlife Management Unit 30 have had high overwinter survival rates relative to adult deer - estimates near or greater than 1 - since 1998 (Table 3-4). ODFW has not provided any similar, additional data for black-tailed deer since 2012 and more recent trends in population growth, productivity, and overwinter survival are unknown.

Table 3-4
Population Trends, Annual Productivity, and Estimated Overwinter Survival for Juvenile Black-tailed Deer within the Rogue Wildlife Management Unit 30, 1998-2012

Year	Population Index [1]	Young per Adult Female [2]	Young per Adult – Fall (Ratio A) [3]	Young per Adult – Spring (Ratio B) [4]	Maximum Overwinter Juvenile Survival Rate [5]
2012	10.0	0.51	0.38	0.42	1.11
2011	10.7	0.45	0.38	0.51	1.75
2010	10.4	0.39	0.29	0.50	1.93
2009	12.1	0.36	0.26	0.55	2.11
2008	10.2	0.38	0.26	0.49	1.31
2007	10.6	0.53	0.37	0.55	1.43
2006	8.1	0.43	0.38	0.61	1.22
2005	5.5	0.69	0.50	0.63	1.82

Year	Population Index [1]	Young per Adult Female [2]	Young per Adult – Fall (Ratio A) [3]	Young per Adult – Spring (Ratio B) [4]	Maximum Overwinter Juvenile Survival Rate [5]
2004	-	0.44	0.35	0.45	1.97
2003	6.5	0.29	0.23	0.38	1.10
2002	0.0	0.41	0.34	0.43	1.24
2001	6.0	0.45	0.35	0.57	1.66
2000	7.3	0.43	0.34	0.40	0.88
1999	7.1	0.53	0.45	0.57	1.63
1998	6.7	0.42	0.35	0.42	-

[1] **Population Index** is ODFW's Trend Count for the Hunt Area which is conducted along a fixed route each year, usually at the end of winter (ODFW, 2018b).
[2] **Productivity** data is young per female from ODFW's Composition Count data reported as Young per 100 Females counted in December (ODFW, 2018b).
[3] **Ratio A** (White et al., 1996) is the ratio of Young per Adult, derived from Composition Count data (Males per 100 Females and Young per 100 Females) counted in December (ODFW2018b).
[4] **Ratio B** (White et al., 1996) is the ratio of Young per Adult (Young per 100 Adults) counted in March (ODFW, 2018b).
[5] **Maximum Overwinter Juvenile Survival** is related to ratios ***A*** and ***B*** and to the following relationship of adult over-winter survival rate ($\hat{S}_a$) and juvenile over-winter survival rate ($\hat{S}_j$) by the formula (see equation 9 in Paulik and Robson, 1969): $\hat{S}_j / \hat{S}_a = \boldsymbol{B/A}$ or $\hat{S}_j = \hat{S}_a (\boldsymbol{B/A})$. Since many of the estimates of maximum juvenile survival rates are greater than 1, they indicate survival of adults was less than juveniles over winter which is highly unlikely.

Habitat. Black-tailed deer are year-round residents of the Forest and rely upon several different successional stages of vegetation to meet their life needs. Areas with heavy canopy closure are used during all seasons. In summer, areas of heavy canopy closure are used to facilitate thermal regulation during periods of high temperatures. During winter, heavy canopy closure moderates temperatures and intercepts snowfall during winter storms. The reduction of snow depth under heavy canopy reduces energetic expenditure during movements of deer and provides areas of browse that would normally be under the snow surface. Areas with little or no overstory canopy cover are important for deer as forage areas. Forest gaps and natural openings provide optimal conditions for shrubs and forbs to grow, which deer depend on for forage. Quality deer ranges provide both forested conditions for thermal regulation and hiding/escape cover interspersed with open areas for optimal foraging conditions.

Deer winter range was considered to be below 4,000 feet elevation in 1990 (Forest Service, 1990d). Core winter range is that portion of total winter range occupied by 90 per cent of the population 90 percent of the winters. If unusually severe snow conditions make core winter range unsuitable, the deer tend to move off-Forest to lower elevation on private and BLM lands. These areas were referred to as critical winter range.

Currently forage habitat for deer is the primary limiting factor in the Rogue River-Siskiyou National Forest, constituting less than ten percent of the Forest land base. The west side of the Forest provides good forage in designated big game winter range for black-tail deer due to a preponderance of low elevation non-conifer forest lands and an active fuels and habitat enhancement program. Deer thermal and hiding cover have increased significantly across the Forest although in some areas of big game winter range still not to that amount prescribed in the Rogue River Management Plan (Forest Service, 1990d).

Black-tailed deer use of habitats in the Rogue River-Siskiyou National Forest within the vicinity of the Proposed Action are assumed to be similar to those described above, for black-tailed deer in the Umpqua National Forest. Black-tailed deer have general associations with all terrestrial habitats that are present in the Pipeline project area including forested-woodland types, grassland-shrubland types, and developed (urban and mixed environs) types (Johnson and O'Neil, 2001). Most black-tailed deer that summer in the high Cascades winter at lower elevations on the west slope, although some wintering deer may occur east of the Cascade crest (ODFW, 2003b). Winter loss of black-tailed deer is generally far less than for mule deer, because the snow does not remain on the valley floors for extended periods and a crust does not form on the surface as it does on the east side of the Cascades (ODFW, 2003b). The Proposed Action will cross 1.44 miles of Lake Creek deer winter range in the Rogue River-Siskiyou National Forest.

Forest Management Activities. Timber harvest activities have created the most impacts on deer populations. Browse created by conversion of old-growth timber to young, thrifty stands has caused a large expansion in the number of animals. However, in many cases, the amount and arrangement of thermal/hiding cover has not allowed for full utilization of the forage. Development of the road system has also had a detrimental effect due to increased harassment and hunter access (Forest Service, 1990a).

Any pest control that removes palatable grasses, forbs, and brush directly affects the suitability of the habitat; wildfire produces the same effects. However, these activities can also be beneficial if they return the vegetation to more forage-producing seral stages (Forest Service, 1990a).

Effects of Proposed Action: Direct mortality of black-tailed deer due to the Proposed Action is possible if vehicles collide with animals traveling to and from construction sites (see discussion under Umpqua National Forest, Section 1.5, above). Black-tailed deer would be expected to avoid noise from vehicles and/or increased road traffic, blasting, and aerial fly-overs. Seasonal road closures on public lands have been applied to big-game winter range within National Forest lands to minimize the effect of winter stress on deer and elk. Following reclamation of the pipeline corridor, black-tailed deer may utilize the corridor for travel and for foraging, depending on vegetation species planted and rapidity of successful revegetation. After construction, there will possibly be a secondary impact (Comer, 1982) on harvest rates with upgraded access to previously inaccessible areas; hunters are expected to achieve greater success, at least temporarily, with increased access. In addition, increased access could increase poaching of game animals and nongame wildlife on a local level (see discussions under Umpqua National Forest, Section 1.5, above).

No information has been found that identifies specific deer fawning areas or fawning habitats within the Rogue River-Siskiyou National Forest. Construction may coincide with fawning generally in late spring (May-early June). Fawning areas may be proximate to winter ranges or may be at higher elevations than winter range. If construction is in progress, parturient females will most likely avoid construction areas though the extent (distance) of avoidance cannot be estimated. Avoidance of construction areas by big game during winter and during parturition is also expected and may adversely affect animals in one or more ways, including increased energy expense if they escape from disturbances or are displaced to areas of deeper snow accumulation, use of suboptimal habitats that do not provide adequate functions (food, shelter, escape cover), and use of habitats that increase the risk of predation. The expected consequences of these responses would be decreased over-winter survival and decreased natality potentially related to embryo resorption, abortion, and/or predation of neonates (for example, see Bradshaw et al., 1998).

Construction of the Pipeline will remove 174.10 acres of forested habitat (Table 3-1) including 78.18 acres of late successional-old growth, 17.17 acres of mid-seral forest, and 78.75 acres of clearcut-regenerating forest within Rogue River-Siskiyou National Forest. This includes approximately 17.67 acres of big game winter range in the Rogue River-Siskiyou National Forest. Black-tailed deer are likely to be generally associated with the forest types affected and all structural conditions of affected forest (shrub-seedling, small tree, medium tree, large tree, giant tree, single and multi-story forests, open, moderate, and closed canopy forests). An additional 66.56 acres of forested habitat would be affected in the short-term within Uncleared Storage Areas (UCSAs). The Pipeline will remove approximately 5.62 acres of shrub, 3.25 acres of grassland, and 15.67 acres of developed urban environs. Black-tailed deer are generally associated with a variety of shrub/grassland structural conditions, grass-forb habitats, and low density urban conditions (Johnson and O'Neil, 2001). Given that black-tailed deer are such generalists, effects to any one type of structural habitat condition with replacement by another structural stage (eg. shrub-seedling, grass-forb) will not adversely affect the species.

<u>Mitigation.</u> The Proposed Action will cross approximately 1.44 miles of Lake Creek deer winter range in the Rogue River-Siskiyou National Forest. Timber felling will occur before April 1 and after July 15, outside of the migratory bird primary nesting season and would occur concurrent, but prior to construction. Construction and timber removal activities are scheduled to reduce impact to migratory birds nesting in standing trees, take advantage of the drier periods of the year to minimize winter construction, to reduce potential environmental impacts and construction safety risks, and ultimately reduce disturbance to black-tailed deer utilizing big game winter range. Therefore impact to wintering Columbian black-tailed deer should be minimized during timber removal and construction activities.

After construction, deer use open areas for foraging (Jageman, 1994). The pipeline right-of-way provides an opportunity for developing high quality feeding areas (Lees, 1989) for deer species, especially if noxious weeds are controlled and high quality native forage is seeded. As required by FERC's Upland Plan, PCGP consulted with the NRCS, the BLM, and the Forest Service regarding specific seeding dates and recommended seed mixtures for the Pipeline project, including important winter forage species, such as wedgeleaf ceanothus, in riparian areas and areas outside of the 30-foot maintenance corridor on National Forest lands. The recommendations have been incorporated into the ECRP. The ECRP describes the procedures that will be implemented to minimize erosion and enhance revegetation success, the procedures that will be utilized to minimize the spread of noxious weeds as a result of construction, and describes the silvicultural prescriptions that will be implemented in areas that are outside the 30-foot maintenance corridor. Seeding mixtures and inhibition of noxious weeds will enhance forage production. Restoration of construction disturbance is expected to begin once construction is completed; restoration would start in the fall and would be completed by the end of the winter season when forest, wetland, and riparian plantings would be installed. Depending on site-specific conditions, it may be necessary to continue restoration through the spring.

Vegetation management over the long-term will benefit winter range browse and forage for Columbian black-tailed deer. Vegetation within the 30-foot maintenance corridor will be periodically maintained by mowing, cutting, and trimming (either by mechanical or hand methods). In upland areas, the 30-foot maintenance corridor will be maintained in a condition where trees or shrubs greater than 6 feet tall will be controlled (cut or trimmed) within 15 feet either side of the centerline (for a total of 30 cleared feet). Maintenance activities are expected to occur approximately every 3 to 5 years depending on the growth rate of vegetation. During maintenance, vegetation will be cut/trimmed in 4 to 6-foot lengths and scattered across the permanent easement to naturally decompose and to discourage OHV traffic, benefit wildlife habitat, and to decompose naturally.

Approximately 241 acres of forested habitat will be affected within the Rogue River-Siskiyou National Forest. However, PCGP will revegetate 194 acres of the affected area with trees to provide a similar vegetative community to what was present prior to timber clearing. The remaining 47 acres of affected forest will be converted to an herbaceous/shrub vegetative cover for the long-term within the 30-foot maintenance corridor during Pipeline operation, increasing the amount of forage available to big game adjacent to forested stands potentially used for thermal cover.

Open trenches during construction have the potential to entrap deer. Within delineated big-game winter and summer range, PCGP will leave trench segments (>5 feet wide) of the proposed alignment untrenched and herbaceously vegetated (every 0.5 mile and at visible wildlife game trails) to serve as a route (i.e., green bridge or landscape connector) for big game across the construction right-of-way until pipe is ready to be installed (Forman et al., 2003). Alternatively, PCGP will install soft plugs (backfilled trench materials) in the trench after excavation at these distances to provide wildlife passage. Additionally, 20-foot gaps will be left in spoil and topsoil stockpiles at all hard or soft plug locations and a corresponding gap in the welded pipe string will be left in these locations. Suitable ramps will be installed from the bottom of the trench to the top to prevent potential wildlife entrapment within the trench.

Forest Plan Consistency. In the Rogue River-Siskiyou National Forest, big game winter range timing limitations are December 1 to April 30. Construction activities would occur within approximately 1.44 miles of designated big game winter range in the Rogue River-Siskiyou National Forest and could occur during those timing limitations. However, PCGP would target the drier periods of the year to construct, where possible, which would minimize disturbance to black-tailed deer within designated habitat during that period. Big game travel lanes will not be blocked by construction or operation of the Proposed Action. Columbian black-tailed deer are expected to utilize the pipeline right-of-way for travel and foraging and was discussed, above.

Since there is no significant trend in fawns per doe (young per adult female) nor is the any significant trend in ODFW's Trend Count for deer in the Rogue Wildlife Management Unit 30 through 2012 (Table 3-4), there is no reason to expect that deer winter range carrying capacity in the Rogue River-Siskiyou National Forest would be limited by the Proposed Action. Indeed, estimated young overwinter survival relative to adult overwinter survival indicates that juvenile black-tailed deer in the Rogue Wildlife Management Unit 30 have had high overwinter survival rates relative to adults (Table 3-4) which may indicate carrying capacity objectives of the Forest are being achieved. The Proposed Action would be consistent with the Forest Plan.

3.3 Roosevelt Elk

Roosevelt elk was selected as a management indicator species because of the species economic importance and demand for elk hunting. Elk were chosen as an indicator for winter range and thermal cover. The Roosevelt elk is dependent on winter range for survival (Forest Service, 1990d). The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for Roosevelt elk and their habitat:

Applicable Forest Plan Forest-wide Standards and Guidelines.
The management of Roosevelt elk winter range is critical for the maintenance of existing herds, and even more so in order to increase the population. Winter range generally lies below 4,000

feet, but can be quite variable. It can be divided into three separate areas based on amount and type of use, which include core, critical, and peripheral areas. Core winter range is utilized by 90 percent of the animals during 90 percent of the winters. Peripheral winter range is an area used by a few animals in most winters or by large numbers during mild winters; it does little in maintaining the big game population since either few animals use it or conditions are mild so that little stress is placed on the animals. Critical winter range is the area the animals concentrate in during extremely severe winters. It is usually a small segment of the core winter range that is located at the lowest elevations or otherwise provides a special set of properties which allow survival under extreme conditions. Critical winter range is most useful in preventing total loss of a population during extremely severe winters. Under these conditions, a large proportion of the wintering animals are either trapped on less favorable areas or are otherwise unable to move to critical winter range. Sufficient numbers are able to survive on these critical winter range areas to repopulate the summer range, should large numbers of animals die on the other winter range areas (Forest Service, 1990a).

Management Prescription. *MS 26, Restricted Riparian*

- Elk: Maintain summer range to provide forage, hiding and thermal cover. Restricted operating period April 1 to June 30 may be imposed in identified fawning or calving areas.
- See description for Black-tailed deer, Section 2.1, above.

Species Status in the Pipeline Project Area. The historic elk population in the vicinity of the Rogue River-Siskiyou National Forest was affected by the loss of cover on much of the lands beyond the forest boundaries, which resulted in the loss of much winter range capability off the Forest. This relative lack of cover appears to inhibit migration to the even lower elevation areas that might be capable of supporting the animals; therefore, elk are wintering at higher elevations than they historically may have, resulting in winter range being a limiting factor to further growth of the present elk herds. The opportunity for further recolonization of the remaining habitat on the Dead Indian Plateau as well as within the Siskiyou Mountains portion of the Forest still remains (Forest Service, 1990d).

In the early 1980s, lower cow/calf ratios and reduced calf-survival rates due to late calf crops occurred. Because of the decline, restrictions were placed on the hunting season and a cooperative road closure program was instituted. The result was an improved bull/cow ratio (11 to 12 bulls/100 cows) for the years following the changes (Forest Service, 1990d). As a result of continued herd expansion into previously unoccupied habitat, the elk population was expected to increase at about 5 percent per year, with occupancy of all available range in next 20 to 30 years, from 2010 through 2030. However, it was not expected that the increases will meet hunter demands because increased restrictions and regulations have been placed upon the hunting public to reduce the pressure on the existing herd (Forest Service, 1990d).

The Rogue River-Siskiyou National Forest falls within portions of six wildlife management units: Sixes, Powers, Chetco, Applegate, Dixon, and Rogue. Elk are found throughout the Rogue River-Siskiyou National Forest, except within the Applegate Management Area. Data from ODFW's elk census shows annual fluctuations (ODFW, 2012), but in general, show a steady increase in elk numbers throughout the 1980's. Elk numbers peaked in the early 1990's and remained relatively stable until the early 2000's when they show a slight decline.

ODFW's Rogue WMU 30 coincides with the portion of the Rogue River-Siskiyou National Forest within which the Proposed Action is located (MPs 153.81-148.33). .ODFW (2018a) has compiled harvest data for Roosevelt elk within WMU 30 through the 2016 season (ODFW, 2018a). ODFW harvest data from 2003 through 2016 indicate that days per harvest of Roosevelt elk through 2014 and percent hunter success through 2016 had been relatively consistent, showing no significant trends (Table 3-5).

Table 3-5
Harvest Statistics for Roosevelt Elk within the Rogue Wildlife Management Unit 30, 2003-2011

Year	Total Hunters	Total Hunter Days	Harvest: Total Males (antlered)	Harvest: Total Non-Males (non-antlered)	Harvest: Total	Days per Harvest	Percent Hunter Success
2016	2869	not reported	89	41	130	not available	5
2015	3267	not reported	114	60	174	not available	5
2014	3442	19940	139	57	196	102	6
2013	3607	20459	121	15	136	150	4
2012	3736	21843	157	69	226	97	6
2011	3193	18163	134	63	197	92	6
2010	3142	18753	109	90	199	94	6
2009	3244	18299	130	97	227	81	7
2008	3974	21753	145	119	264	82	7
2007	3645	18790	144	106	250	75	7
2006	3280	17125	167	76	243	70	7
2005	3289	16703	156	50	206	81	6
2004	3651	21971	142	64	206	107	6
2003	4248	24286	198	125	323	75	8

As of 1990, the population had been increasing 5 to 8 percent per year, with an estimated existing population of 900 animals. Expansion depends on the condition and availability of winter range, both on and off the National Forest, and the quality of habitat available on summer range. A predictive model, assuming adequate core winter range and based upon seral stages and road use factors, indicates a capability to support about 1,800 elk on the Prospect and Butte Falls Districts. If elk occupied all available habitat on Rogue River-Siskiyou National Forest, a capability to support over 3,000 elk was predicted (Forest Service, 1990d).

Although population data for Roosevelt elk in Wildlife Management Unit 30 are limited, the number of calves per adult cow (young per adult female) appears to have been significantly declining since 1998 (Figure 3-1). No population indices are available beyond 2004. Productivity (calf per cow) in the Rogue WMU shows a significant ($p<0.05$) declining trend (Figure 3-1) from 1998 through 2016, consistent with a decreasing population growth rate.

Based on management of winter range under guidelines in the Forest Plan, improved winter range conditions and a better balance in winter and summer range could result in a capability to support up to 2,700 elk (higher than the ODFW benchmark level of 1,750 animals) within 5 or 6 decades past 1990 (Forest Service, 1990d). .

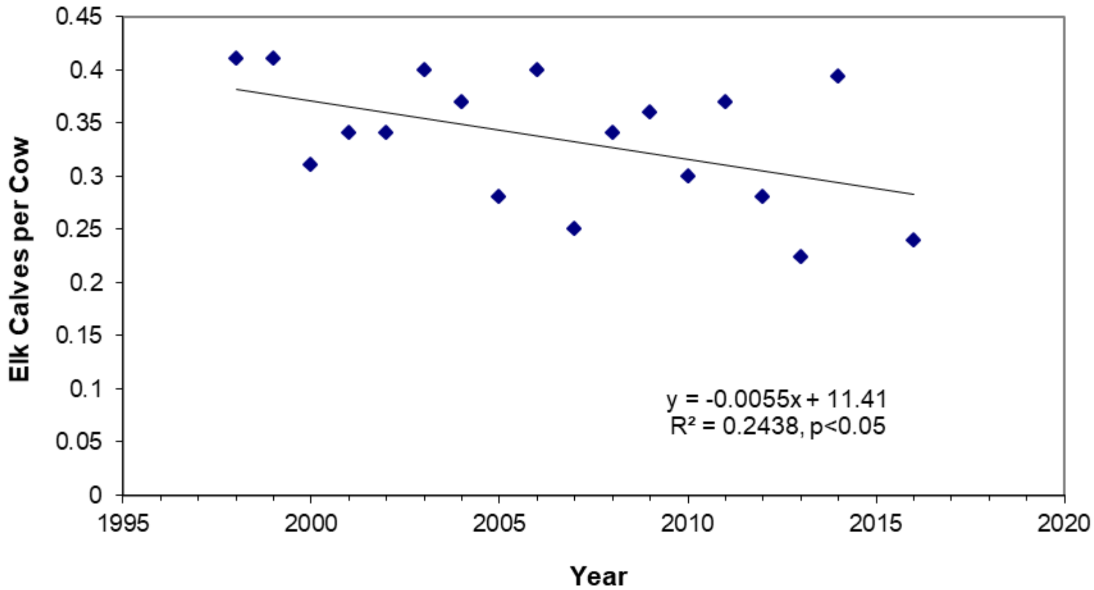

Figure 3-1
Trend in Productivity (Calves per Cow) for Roosevelt Elk in the Rogue Wildlife Management Unit 30 which Coincides with the Pipeline in the Rogue River-Siskiyou National Forest (data from ODFW, 2018b)

Habitat. The Roosevelt elk is a grazing and browsing animal (Forest Service, 1990d). It forages on ground/shrub or understory vegetation (Johnson and O'Neil, 2001). It is dependent on winter range for survival, and benefits from early successional stages for forage throughout its range (Forest Service, 1990d). Thermal cover is important (Forest Service, 1990d). During winters of heavy snowfall, elk in the Cascades move to lower elevations in November and December, and move back up in March and April for spring green-up. Altitudinal movements occur in the Cascade Range, but rarely is snow depth sufficient to cause movements in the Oregon Coast Range (Johnson and O'Neil, 2001).

Winter range is usually within forested sites which provide protection against weather, as well rich with lichens and other plants used as forage (ODFW, 2003b); however, in Jackson County, winter range also consists of other habitat types such as grassy meadows, recent clearcuts, industrial forest lands, agricultural fields, orchards, and urban edges. Most elk range is on BLM and National Forest Service lands (ODFW, 2003b); however, within the Pipeline project area, most winter range occurs on private lands (Forest Service, 1990d). There is insufficient critical elk winter range in the Rogue River-Siskiyou National Forest to carry the ODFW benchmark level of 2,000 animals during severe winters, resulting in increased dependence on private land pastures as elk winter range with resulting conflicts from loss of needed livestock forage and/or damage to property or tree seedlings (Forest Service, 1990a). Since inception of the NWFP (Forest Service and BLM, 1994), the Rogue River National Forest has emphasized retention of both nesting/roosting/foraging (NRF) and dispersal habitats for northern spotted owl. An increase in NSO NRF and dispersal habitat has also provided additional optimal thermal cover for elk.

The Forest supports about 204,800 acres of elk winter range mostly located in the Butte Falls and Prospect Ranger Districts. Of this, approximately 67,700 acres has been identified as core winter range. In good condition, core winter range can relieve some of the burden from the critical winter range areas, since fewer animals will die even in the extreme winters. All critical winter range in the Forest is located within the core winter range (Forest Service, 1990d). The Proposed Action will cross 1.44 miles of elk winter range but not affect core winter range within the Forest.

Roosevelt elk have general associations with Montane Mixed Conifer and Southwest Oregon Mixed Conifer-Hardwood forested types, Westside Grasslands, and may be present in Urban and Mixed Environs (Johnson and O'Neil, 2001). They have no apparent association with Shrub-Steppe habitats (Johnson and O'Neil, 2001) that will be affected by the Proposed Action within the Rogue River-Siskiyou National Forest.

Forest Management Activities. Current timber harvesting has created a large amount of available forage but has also decreased available thermal and hiding cover. Total cover has remained at or above adequate levels, although the distribution is not great, with large distances between cover patches in some areas, and thermal cover shortages in other areas. This may be limiting some sub-populations to 20 percent of their potential. During warm summers, heat build-up on an exposed animal creates a heavy thermal load which takes energy to eliminate. This energy could have been stored as fat for winter (Forest Service, 1990a).

Much of the land adjacent to the forest is capable of being winter range. Due to harvest practices on these adjacent lands, much of the winter range carrying capacity has been lost. Much of the forest's summertime elk population historically wintered on these adjacent lands. As the population increases, it is expected that there will be increased conflicts with private landowners, resulting in increased pressure on the remaining forest winter range (Forest Service, 1990a).

Due to past timber harvest, an imbalance in forage and cover is likely to occur from 2010 to 2030. At that time, existing harvest areas will likely have reached the pole seral stage and will be shading out most forage production, and there will not be sufficient remaining older stands to be harvested to provide adequate replacement forage areas (Forest Service, 1990a). Forage needed to meet deer and elk needs on winter range portion of range allotments is reserved for wildlife, which could result in restrictions in grazing allotments if forage production is inadequate. In 1990, there were problems in some riparian zones and meadows, and it was felt that the conflicts would increase in subsequent years (Forest Service, 1990a).

Any pest management activities that remove grass or browse species in summer or winter range can affect the elk. Wildfire creates habitat if sufficient thermal and hiding cover remain; fire suppression has decreased elk habitat to some extent over the last 50 years since it has allowed the early seral stages to mature, thereby reducing forage supply. However, controlled fire activities after timber harvest have created favorable seral stages for expansion of the population. The most critical habitat problems for summer range are: road development, loss of forage areas, and difficulties in managing the road system to lessen impacts on elk (Forest Service, 1990a).

Numerous studies have shown that Roosevelt elk are sensitive to human disturbances such as motorized travel on and off roads (Rowland et al., 2000). Roads are generally avoided by elk when they are open, but are heavily utilized by elk as travel corridors when closed (ODFW, 2003b).

Effects of the Proposed Action. Direct mortality of Roosevelt elk due to the Proposed Action is possible if vehicles collide with animals traveling to and from construction sites (see discussion under Umpqua National Forest, Section 1.4, above). Elk would be expected to avoid noise from vehicles and/or increased road traffic, blasting, and aerial fly-overs. Seasonal road closures on public lands have been applied to big-game winter range within National Forest lands to minimize the effect of winter stress on deer and elk. Following reclamation of the pipeline corridor, Roosevelt elk may utilize the corridor for travel and for foraging (Brusnyk and Westworth, 1985), depending on vegetation species planted and rapidity of successful revegetation. After construction, there will possibly be a secondary impact (Comer, 1982) on harvest rates with upgraded access to previously inaccessible areas; hunters are expected to achieve greater success, at least temporarily, with increased access. In addition, increased access could increase poaching of game animals and nongame wildlife on a local level (see discussions under Umpqua National Forest, Section 1.4, above).

Unlike big game winter ranges, no information has been provided that identifies specific elk calving areas or habitats. Even so, with elk habitats distributed throughout the Pipeline project, construction may coincide with calving times, generally in late spring (May to early June). Calving areas may be proximate to winter ranges or may be at higher elevations than winter range. If construction is in progress, parturient females will most likely avoid construction areas though the extent (distance) of avoidance cannot be estimated. Avoidance of construction areas by big game during winter and during parturition is also expected and may adversely affect animals in one or more ways, including increased energy expense if they escape from disturbances or are displaced to areas of deeper snow accumulation, use of suboptimal habitats that do not provide adequate functions (food, shelter, escape cover), and use of habitats that increase the risk of predation. The expected consequences of these responses would be decreased over-winter survival and decreased natality potentially related to embryo resorption, abortion, and/or predation of neonates (for example, see Bradshaw et al., 1998).

Construction will remove 174.10 acres of Montane Mixed Conifer Forest and Southwest Oregon Mixed Conifer-Hardwood Forest within Rogue River-Siskiyou National Forest (Table 3-1), both of which have general associations with Roosevelt elk. Effects to those two forest types include removing 78.18 acres of late successional-old growth, 17.17 acres of mid-seral forest, and 78.75 acres of clearcut-regenerating forest. Roosevelt elk are likely to be generally associated with the forest types affected and all structural conditions of affected forest (shrub-seedling, small tree, medium tree, large tree, giant tree, single and multi-story forest, open, moderate, and closed canopy forests). An additional 66.56 acres of forested habitat would be affected in the short-term within Uncleared Storage Areas (UCSAs). The Pipeline will remove approximately 5.62 acres of shrub, 3.25 acres of grassland, and 15.67 acres of developed urban environs. Roosevelt elk are generally associated with a variety of shrub/grassland structural conditions, grass-forb habitats, and low density urban conditions (Johnson and O'Neil, 2001). Given that Roosevelt elk are such generalists, effects to any one type of structural habitat condition with replacement by another structural stage (e.g. shrub-seedling, grass-forb) will not adversely affect the species.

Mitigation. The Proposed Action will cross approximately 1.44 miles of Lake Creek winter range in the Rogue River-Siskiyou National Forest. Timber felling will occur before April 1 and after July 15, outside of the migratory bird primary nesting season and would occur concurrent, but prior to construction. Construction and timber removal activities are scheduled to take advantage of the drier periods of the year to minimize winter construction, to reduce potential environmental impacts and construction safety risks, and ultimately reduce disturbance to Roosevelt elk utilizing big game winter range. Therefore impact to wintering Roosevelt elk should be minimized during timber removal and construction activities.

Open trenches during construction have the potential to entrap elk. Within delineated big-game winter and summer range, PCGP will leave trench segments (>5 feet wide) of the proposed alignment untrenched and herbaceously vegetated (every 0.5 mile and at visible wildlife game trails) to serve as a route (i.e., green bridge or landscape connector) for big game across the construction right-of-way until pipe is ready to be installed (Forman et al., 2003). Alternatively, PCGP will install soft plugs (backfilled trench materials) in the trench after excavation at these distances to provide wildlife passage. Additionally, 20-foot gaps will be left in spoil and topsoil stockpiles at all hard or soft plug locations and a corresponding gap in the welded pipe string will be left in these locations. Suitable ramps will be installed from the bottom of the trench to the top to prevent potential wildlife entrapment within the trench.

After construction, elk tend to use pipeline rights-of-way for feeding areas, especially when hunting is not occurring (Lees, 1989). The pipeline right-of-way provides an opportunity for developing high quality feeding areas (Lees, 1989) for elk species, especially if noxious weeds are controlled and high quality native forage is seeded. Big-game winter range disturbed during construction will be revegetated with preferred elk forage species as recommended by ODFW, BLM, and Forest Service, including important winter forage species, such as wedgeleaf ceanothus, in riparian areas and areas outside of the 30-foot maintenance corridor on National Forest lands.

The recommendations have been incorporated into the ECRP. The ECRP describes the procedures that will be implemented to minimize erosion and enhance revegetation success, describes the procedures that will be utilized to minimize the spread of noxious weeds as a result of construction, and describes the silvicultural prescriptions that will be implemented in areas that are outside the permanent easement. Seeding mixtures and inhibition of noxious weeds will enhance forage production.

Vegetation within the 30-foot wide maintenance corridor will be periodically maintained by mowing, cutting, and trimming (either by mechanical or hand methods). In upland areas, the 30-foot maintenance corridor will be maintained in a condition where trees or shrubs greater than 6 feet tall will be controlled (cut or trimmed) within 15 feet either side of the centerline (for a total of 30 cleared feet). Maintenance activities are expected to occur approximately every 3-5 years depending on the growth rate of vegetation. During maintenance, vegetation will be cut/trimmed in 4 to 6-foot lengths and scattered across the permanent easement to naturally decompose and to discourage OHV traffic, benefit wildlife habitat, and to decompose naturally. Vegetation management over the long-term will benefit winter range forage for Roosevelt elk.

Approximately 241 acres of forested habitat will be affected within the Rogue River-Siskiyou National Forest. However, PCGP will revegetate 194 acres of the affected area with trees to eventually provide a similar vegetative community to what was present prior to timber clearing. The remaining 47 acres of affected forest will be converted to an herbaceous/shrub vegetative cover for the long-term within the 30-foot maintenance corridor during Pipeline operation, increasing the amount of forage available to big game adjacent to forested stands potentially used for thermal cover.

Forest Plan Consistency. In the Rogue River-Siskiyou National Forest, big game winter range timing limitations are December 1 to April 30. Construction activities would occur within approximately 1.44 miles of designated big game winter range in the Rogue River-Siskiyou National Forest and could occur during those timing limitations. However, PCGP would target the drier periods of the year to construct, where possible, which would minimize disturbance to Roosevelt elk within designated habitat during that period. Additionally, big game travel lanes will not be blocked by construction or operation of the Proposed Action.

Based on management of winter range under guidelines in the Forest Plan, improved winter range conditions and a better balance in winter and summer range could result in a capability to support up to 2,700 elk (higher than the ODFW benchmark level of 1,750 animals) within 5 or 6 decades past 1990 (Forest Service, 1990d). However, the population productivity shown in Figure 3-1 does not indicate that positive population growth rate has occurred. Roosevelt elk are expected to utilize the pipeline right-of-way for travel and foraging. The Proposed Action would be consistent with the Forest Plan.

3.4 American (Pine) Marten

The Pine marten is an indicator species for all species dependent upon mature and old-growth habitat (Forest Service, 1990d). Pine martens represent those species utilizing mature conifer forests which need mature habitat areas spaced closer than 5 to 6 miles apart. They are not generally found at elevations below 4,000 feet in the Forest and do not appear to have an upper elevation restriction, which makes it an especially important indicator for those species capable of utilizing high elevation habitat or that are less mobile than either the northern spotted owl or pileated woodpecker (Forest Service, 1990a).

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for pine martens and their habitat:

Applicable Forest Plan Forest-wide Standards and Guidelines. *None specified for MS 26, but these are the general guides for the Forest:*

- Habitat capability objectives have been set in each Management Area, ranging from 40 percent of potential population capability in Areas programmed for intensive timber harvest, to 100 percent of potential capability in Areas with less intensive or no scheduled timber production (Forest Service, 1990d).
- The pine marten uses seral stages III-IV, closed sapling pole, large mature, and old growth, with seral stages V and VI its principal habitat. In 1986, the maximum dispersal distance between habitat areas was recommended to be one habitat for every 4,000-5,000 acres. Juvenile marten dispersal up to 25 miles has been observed (Forest Service, 1990d).
- Home ranges are from 160 acres for females with the males ranging up to 15 miles in their activities. A contiguous area of 160 acres (composed of multi-layered stands with a crown closure equal to or greater than 50 percent in mature or old-growth) is considered the minimum necessary (Forest Service, 1990d).

Management Prescriptions. Based on distributional requirements, management requirements are met with the establishment of 29 pine marten areas above 4,000 feet. The combined habitat networks for the spotted owl, pileated woodpecker, and pine marten, along with intertwined riparian, minimum management and reserved areas, serve as interlocking habitat system for all species utilizing older forest and mature habitat (Forest Service, 1990d).

Species Status in the Pipeline Project Area. Past extensive logging and trapping for pelts led to extirpation in some areas of Oregon; however, martens have been re-introduced to Oregon. In the Rogue River-Siskiyou National Forest, marten are known to occur on the High Cascades, Wild Rivers, Gold Beach and Powers Ranger Districts. There are few and only undocumented records or sighting from the Siskiyou Mountains, namely along the Siskiyou Crest from Mt. Ashland through the Applegate Valley to the Illinois Valley.

Population capabilities were estimated at 250 pairs in 1990 (Forest Service, 1990d). Populations and the mature habitat dependent species they represent are expected to drop 10 to 20 percent in the first 3 to 5 decades, before returning to 1990 or slightly greater levels in later decades (Forest Service, 1990d). In 1990, there were no comprehensive population surveys. Sightings by the Forest Service have been mapped (with one exception, all sightings were at 4,200 to 6,500 feet elevation) (Forest Service, 1990d). The High Cascades Ranger District conducted numerous presence/absence surveys for forest carnivores throughout the District during the 1990's and 2000's. Throughout these efforts, marten have been found to be prevalent at elevations 4,000 feet and higher. However, an estimate of how many pairs is not available.

ODFW maintains records on Oregon furbearer harvest and catch/unit effort. These records include information on marten in the southern Oregon Cascades and Coast Ranges. Catch/unit effort and total kill is widely variable since 1990, with peaks in the late 1990's. No trend (positive or negative) in population numbers is apparent based on this information (see Table 3-6). Populations in high-elevation habitats are probably stable, but loss of habitat due to human encroachment in low and mid-elevation areas has resulted in population declines and local extirpations (Johnson and O'Neil, 2001).

Table 3-6
Annual County Harvest Summary from ODFW for Rogue River-Siskiyou National Forest

<table>
<tr><th>Forest</th><th>County</th><th>Total # of martens harvested (1969-present)</th><th>Range of years harvest was reported</th><th>Range of harvested marten/ year</th></tr>
<tr><td rowspan="5">Rogue River NF</td><td>Douglas</td><td>167</td><td>1971-1992</td><td>2-47 /year</td></tr>
<tr><td>Jackson</td><td>47</td><td>1973-1994</td><td>1-12 /year</td></tr>
<tr><td>Josephine</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Klamath</td><td>525</td><td>1969-1995</td><td>1-66 per year</td></tr>
<tr><td>Subtotal</td><td>739</td><td colspan="2"></td></tr>
<tr><td rowspan="4">Siskiyou NF</td><td>Coos</td><td>10</td><td>1969-1988</td><td>1-4 /year</td></tr>
<tr><td>Curry</td><td>11</td><td>1969-1989</td><td>1-3 /year</td></tr>
<tr><td>Josephine</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Subtotal</td><td>21</td><td colspan="2"></td></tr>
</table>

Habitat. American marten are typically associated with late-seral coniferous forests and closed canopies, large trees, and abundant snags and down wood (Zielinski et al., 2001). Thomas et al. (1993) and FEMAT (1993) also report a strong relationship of marten with riparian areas.

Marten use a variety of structures for rest and den sites. Resting and denning sites offer protection from predation and thermal stress; thus, availability of quality denning sites likely increases the rates of survival and fecundity in marten (Raphael and Jones, 1997). A breeding female pine marten can be supported on 160 acres of quality habitat. Female home range is estimated at 160 acres, although research varies on the necessary size of the area. Pine martens require dead and down material for foraging, cover, and denning, and six down logs/acre is the minimum down material requirement (Forest Service, 1990a). Denning can also take place in slash, snags, and live trees. Densities of snags are relatively high in Montane Mixed Conifer Forests, late-seral stands and naturally provide more dead wood habitat across the landscape than the other habitat types. Montane Mixed Conifer Forests likely provides the best habitat for marten. Only a small portion of the landscape in the lodgepole pine forest, small/medium tree stands are capable of providing dead wood habitat for marten. In Oregon and Washington, lodgepole pine rarely grows large enough to provide denning or resting sites for marten. However, high density piles of smaller down logs may provide subnivean access points and resting sites (Bull and Blumton, 1999, Bull and Heater, 2000; Jones and Raphael, 1991; Raphael and Jones, 1997).

In addition to providing rest and den sites, down wood is an important component of marten habitat because the primary prey of martens is small mammals associated with down wood. These small mammals include voles (*Microtus sp.*) red-backed voles (*Clethrionomys gapperi*), snowshoe hares (*Lepus americanus*) and squirrels in northeast Oregon (Bull and Blumton, 1999; Bull, 2000). Subnivean (under snow) spaces created by logs provide marten with access to prey during the winter (Bull and Blumton, 1999, Buskirk and Ruggiero, 1994, Sherburne and Bissonette, 1994). Pine martens also eat insects, birds, fruits, and nuts (Forest Service, 1990a).

The marten has a home range of approximately 450 acres. A minimum contiguous area of 160 acres with a crown closure equal to or greater than 50 percent in seral stages V and VI is considered necessary. A maximum spacing of habitat areas (to allow interaction with adjacent animals) is considered to be three miles. Based on distributional requirements, the management requirements of managing habitat to maintain viable populations of wildlife is met with the establishment of 93 pine marten areas above 4,000 feet in elevation (Forest Service, 1990d).

Currently there is far more marten denning and resting habitat available and more habitat within reserve land allocations for marten than was planned for in the original Rogue River National Forest Management Plan. To determine current habitat available for pine marten in the Rogue River-Siskiyou National Forest, highly suitable habitat identified within the NSO habitat model created by Davis et al. (2016) was used as a surrogate for pine marten habitat since both species are an indicator for the same mature/old-growth habitat. According to NSO habitat model (highly suitable habitat), suitable habitat for marten in the Forest is currently approximately 125,939 acres; of that, 83,308 acres (66 percent) are in reserve land allocations with no programmed timber harvest. In addition, there are ninety-five 100-acre spotted owl core areas totaling 9,500 acres identified outside of LSRs on the Cascade side of the Forest that also provide for suitable habitat for marten. It is very likely that the forest is providing a sufficient amount of habitat and in a spatial juxtaposition for far more marten pairs than the 93 originally thought to be needed across the Forest to provide for long term viability for this species. The forest believes that the population trend for this species is likely stable and that population viability will be provided for within reserve lands in the forest.

Pine martens are associated with the following habitat types that occur within the Rogue River-Siskiyou National Forest and which will be affected by construction of the Pipeline: they are closely associated with Montane Mixed Confer Forest and occurrence is uncertain in Southwest Oregon Mixed Conifer-Hardwood Forest (Johnson and O'Neil, 2001).

<u>Forest Management Activities.</u> Pest management should not bother pine martens since they usually occur in recently cut-over areas which they use infrequently. Wildfire would have a serious effect (Forest Service, 1990a) on pine martens by destroying ground and overhead cover and consuming dead and down material.

<u>Effects of the Proposed Action.</u> Within Montane Mixed Confer Forest, pine martens may feed and breed within various forest structural conditions including small tree, medium tree, large tree, and giant tree conditions, single and multi-story, and open moderate and closed canopies, but only if snags, down logs, and/or rock outcrops are present for denning (Johnson and O'Neil, 2001). Removal of approximately 50.77 acres of Montane Mixed Confer Forest over approximately 3.6 miles in the eastern portion of Rogue River-Siskiyou National Forest, of which more than half of the acres crossed are early seral forest (10.04 acres of late successional-old

growth forest, 6.88 acres of mid-seral forest, and 33.85 acres of clearcut-regenerating forest) would affect the equivalent of approximately one-third a female home range (160 acres). It is not expected that removal of 50.77 acres of Montane Mixed Conifer Forest would affect the population of martens on Rogue River-Siskiyou National Forest.

Parturition takes place in March and April, and mating occurs in June through early August. If pine marten home ranges are assumed to be circular, the diameter of a 160-acre home range would be 3,000 feet. Blasting at one edge of that home range (assuming 200 feet of intervening tree cover) would attenuate to 32 dBA at the far edge of the home range and would attenuate to ambient noise (assumed to be 40 dBA) 1,390 feet away. Noise due to construction would be a short term effect (restricted to the period of constriction) to pine martens and expected to affect them only if their home ranges were on or very close to the construction right-of-way.

Mitigation. Mitigation measures that would minimize impacts to pine martens include planting trees within the right-of-way after construction. Conifers would be planted to within 15 feet of each side of the centerline. After tree planting, there will be approximately 12.92 acres of former Montane Mixed Confer Forest (3.3 acres of late successional-old growth, 2.39 acres of mid-seral forest, and 7.22 acres of clear cut-regenerating forest) that will remain in an herbaceous and/or shrub state within the 30-foot maintenance corridor during the life of the Pipeline (Table 3-1).

Approximately 1 mile of forested habitat on Rogue River-Siskiyou National Forest occurs within 0.25 mile of NSO activity centers and will be harvested outside of the NSO breeding season and should not affect breeding or parturition activities of pine martens. Timber removal greater than 0.25 mile of NSO activity centers and construction could occur during the breeding and parturition dates for American marten (March through August); however, the majority of construction within Montane Mixed Conifer Forest occurs within clearcut and regenerating forest (34 acres) and should not affect pine martens denning or resting spots, if present. Also, at least 1 mile of construction within 0.25 mile of NSO activity centers will occur after the NSO critical breeding period (March 1 through July 15) and so should further minimize effects to pine marten, if present. Noise from blasting, if it is required during construction, will be minimized through application of various measures. Mitigation measures commonly applied to blasting of this type include drilling small (2.5-inch) charge holes, stemming the blast holes with sand and placing inert material on top of the blast area (Michael Minor & Associates, 2008).

To mitigate for loss of downed wood and snags within the construction right-of-way, PCGP will create snags in large trees strategically left on the edge of the construction right-of-way by topping and or girdling trees. Those trees will eventually contribute to downed wood along the right-of-way. Previously, PCGP had agreed to fund other projects proposed by the Forest Service in the Rogue River - Siskiyou National Forest that would provide benefits to American marten within the Rogue River - Siskiyou National Forest. The Forest Service will be reviewing these projects to verify their relevance to the current proposed Pipeline and implementation of these previously proposed projects or similar will be included in the CMP. Projects previously agreed to included creating snags and placing large wood in habitats adjacent to the proposed Pipeline to meet the management objectives of snag densities and enhance areas deficient in coarse woody material. The proposal to create snags and place large wood (previously proposed up to 1,100 acres) would accelerate the development of late successional habitat characteristics of structure and diversity (snags/large wood) and would create structure by placing large wood across the corridor for use by pine martens and other small wildlife species (large wood). The project would also reduce localized fuel loads while improving habitat in deficient stands (large wood) and provide long-term structure in the event of fire since larger logs maintain moisture longer and are less likely to be fully consumed by fire.

Additionally, PCGP agreed to fund or undertake other projects proposed by the Forest Service in the Rogue River-Siskiyou National Forest such as decommissioning 53 to 57.5 miles of roads, commercial and/or pre-commercial thinning on up to 1,240 acres to accelerate development of late successional and old growth habitat characteristics, among other objectives, and reallocating 593 acres from matrix to LSR designation so that forested habitat within former matrix lands will be managed to obtain late successional forest characteristics. Those additional projects would provide benefits to pine martens within the Rogue River - Siskiyou National Forest.

Forest Plan Consistency. Implementation of the mitigation measures is expected to increase potential population capabilities for pine martens in areas that would otherwise be subject to intensive timber harvest and would provide for additional interlocking habitats for species utilizing older forest and mature habitat. In these respects, the Proposed Action would be consistent with the Forest Plan.

3.5 Pileated Woodpecker

The pileated woodpecker is an indicator species for all species dependent upon mature habitat (Forest Service, 1990d). Pileated woodpeckers represent primary cavity-creating and cavity-dwelling species that use large, standing dead trees and mature/old-growth timber when nesting, roosting, and foraging (Forest Service, 1990d). The pileated woodpecker represents over 160 wildlife species utilizing mature forest habitat (Forest Service, 1990a).

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for pileated woodpeckers and their habitat:

Applicable Forest Plan Forest-wide Standards and Guidelines. Nothing is specified in MS 26 for the pileated woodpecker, although there are specifications for woodpeckers generally, as described in the following section. These are general for the Forest:

- Habitat areas should be 300 acres in size, distributed at least every five and one-half miles, with no programmed timber harvest (Forest Service, 1990d).
- Older forest habitat of 300 acres (trees having diameters of 25 inches dbh or greater) are considered necessary for each pair. Areas should be within 5 miles of each other, center to center, and evenly spaced to allow interaction of birds between suitable territories (Forest Service, 1990a).

Management Prescriptions. Specifications for the pileated woodpecker (from “A Report on Minimum Management Requirements for Forest Planning on the National Forests of the Pacific Northwest Region, USDA Forest Service,” June 1986) include a five-mile maximum dispersal distance to one habitat area for every 12,000 to 13,000 acres. The size of areas used by pairs during nesting season has ranged from 320 acres in eastern Oregon to 1,357 acres in western Oregon, and the management requirement calls for 300 acres of old growth or mature timber containing at least 45 snags greater than 20 inches, plus 300 acres of feeding area (Forest Service, 1990a).

Downed logs serve as important sources of food and 300 acres of mature and old-growth timber (trees having diameters of 21-inches DBH or greater) are considered necessary for each pair. Areas should be within 5 miles of each other, center-to-center, and evenly spaced over the Forest to allow interaction of the birds between suitable territories. Based on distributional requirements, the MR of managing habitat to maintain viable populations of wildlife is met with the establishment of 57 pileated woodpecker areas (Forest Service, 1990a).

When possible, 300 contiguous acres of conifers in seral stage V or VI should be maintained. If not possible, habitat may be arranged in blocks of no less than 50 acres and no more than one quarter mile apart (Forest Service, 1990d)

There are timing limitations from March 1 to July 31, as well as construction constraints, calling for no disturbance within 1,320 feet of active pileated woodpecker nests (Forest Service, 1990d).

Species Status in the Pipeline Project Area. The Forest Service has no historical trend data for the pileated woodpecker; however, the trend of mature and old-growth habitat has been downward, with an estimated 74 percent loss since mid-1800s. Until the early 1970s, few snags, large down woody material or green replacement trees were left in treated stands, and snags were actively cut to avoid fire hazard. As a result, habitat capability is probably less than the trend in mature and old-growth habitat would indicate. However, as long as sufficient large diameter dead trees and downed material are present, pileated woodpeckers appear to be less sensitive to modifications of mature habitat than some other mature habitat dependent species (Forest Service, 1990a).

As of 1990, there were no population surveys. Some non-mature seral stages can provide part of a woodpecker's needs, and a predictive model recognizing varying population densities by seral stage was developed. This model indicates that a population of approximately 900 birds may be supportable. Based on distributional requirements, the Management Requirements for the Forest are met with nine pileated woodpecker areas (Forest Service, 1990a).

The population capability in 1990 was estimated at 930 pileated woodpecker pairs (Forest Service, 1990d). Populations and the mature habitat dependent species they represent were expected to drop 10 to 20 percent in the first 3 to 5 decades after the Plan, before returning to 1990 or slightly greater levels in later decades (Forest Service, 1990d). In June 1998, a pileated woodpecker was recorded just west of the Forest Service Boundary, approximately 1.7 miles from the Proposed Action (BLM, 2006).

The same data that were collected on 17 National Biological Survey BBS routes (Pardieck et al., 2017) that are within approximately 50 miles of the Rogue River-Siskiyou National Forest and Pipeline and used to evaluate the regional population trend for BCR 5 are discussed in Section 1.1. During a 20-year period from 1997 through 2016, pileated woodpeckers appear to be relatively stable (neither increasing nor decreasing on BBS routes) on BBS routes within the Pipeline vicinity including the Rogue River-Siskiyou National Forest in BCR 5 (Figure 2-1)

Habitat. Pileated woodpeckers are found primarily in dense mixed-conifer forests or in deciduous tree stands in valley bottoms. They use mature and older, closed canopy stands for nesting and roosting, but may use younger (40-70 years), closed-canopy stands for foraging if large snags are available; large snags and decadent trees are critical habitat components for pileated woodpeckers; down logs do not appear to be an important foraging substrate for pileated woodpeckers on the west side of Oregon and Washington (Hartwig et al. 2004, Mellen et al. 1992, Raley and Aubry 2006). A new nest cavity is excavated each spring, usually in a dead tree, by each pair. Nest cavities are quite large (mean diameter of 8 inches and depth of 22 inches) and are excavated at an average height of 50 feet above the ground. A pair shares and defends the territory all year, and home ranges are large (Marshall et al., 2006).

In the Rogue River-Siskiyou National Forest, pileated woodpeckers forage exclusively on carpenter ants and wood-boring beetle larvae, mostly in decayed wood (Forest Service, 1990a). Older forest habitat meets foraging needs, and other areas next to and including clearcuts with snags and large down woody material are also used (Forest Service, 1990d). Downed logs are important substrates from which food is obtained. For foraging, the most important things are the presence of the correct sizes and numbers of snags and down logs. The pileated woodpecker, as the largest cavity excavator, is important to cavity users that are incapable of creating their own cavities (Forest Service, 1990a).

Currently, there is far more pileated woodpecker habitat available and more habitat within reserve land allocations for pileated woodpeckers than was planned for in the original 1990 Rogue River Resource Management Plan (Forest Service, 1990d). To determine current habitat available for pileated woodpeckers in Rogue River National Forest, the NSO suitable nesting habitat created by Davis et al. (2016) was used as a surrogate for pileated woodpecker habitat since both species are an indicator for the same mature/old-growth habitat. In addition to the NSO suitable nesting habitat, snag habitat has also been identified as an indicator for pileated woodpeckers. To quantify current snag habitat, fire perimeters and documented tree mortality from the Region 6 Aerial Insect and Disease surveys from the past 10 years (2008 - 2017) were counted as suitable snag habitat for pileated woodpeckers to forage in (Table 2-3). Using both the NSO habitat model and snag habitat created by wildfire and insects, there are 246,763 acres of current habitat; of that, 160,718 acres (65 percent) are in reserve land allocations with no programmed timber harvest. There are still one hundred and fifty-three 100-acre spotted owl core areas totaling 15,300 acres identified outside of LSRs for the Rogue River National Forest. These core areas also provide suitable habitat for Pileated woodpecker. It is very likely that the Rogue River-Siskiyou National Forest is providing habitat for more pileated woodpecker pairs than the 57 originally thought to be needed across the Forest to provide for long term viability for this species. As a result, it is assumed that the population trend for this species is trending up and that viability will be provided for within reserve lands in the Rogue River-Siskiyou National Forest.

Pileated woodpeckers are generally associated with Montane Mixed Conifer Forest and Southwest Oregon Mixed Conifer-Hardwood Forests (Johnson and O'Neil, 2001) that coincide with the Proposed Action (Table 3-1). Since they are dependent on downed wood and snags, pileated woodpeckers would be most likely to inhabit the old growth or late successional stands (≥80 years old) of those forests included in Table 3-1. However research suggests that only a small portion of the landscape in the Southwest Oregon Mixed Conifer-Hardwood Forest, late-seral stands are likely capable of providing nesting and roosting habitat for pileated woodpecker based on snag densities on unharvested plots (see Mellen-McLean et al., 2009).

<u>Forest Management Activities.</u> Pest management that includes spray would have a detrimental effect. Wildfire would destroy nesting and foraging habitat, but also creates new snag habitats and attracts insect infestations (Forest Service, 1990a).

Timber harvest has the most significant effect on habitat for this woodpecker. Forest fragmentation reduces population density and makes birds more vulnerable to predation. Harvesting and prescribed burning that eliminates or reduces the number of snags, logs, and cover are detrimental (Marshall et al., 2006).

<u>Effects of the Proposed Action.</u> Pileated woodpeckers could be negatively impacted during construction of the Pipeline through the same direct and indirect effects that were discussed in Section 1.1 above, for the Umpqua National Forest. Trees will be felled before April 1 and after July 15, outside of the primary migratory bird nesting season; felling trees at these time periods will avoid directly impacting active nests during the nesting season. However, other timber removal activities (timber removal, brushing) and construction of the Proposed Action could occur during the breeding season of pileated woodpeckers (March 1 through July 31) and disturb

nesting pileated woodpeckers if located within 0.25 mile of the Proposed Action. Clearing the right-of-way will modify habitat, changing the seral stage and tree species makeup of occupied forests. Construction will remove 10.04 acres of late successional-old growth Montane Mixed Conifer Forest and 68.14 acres of late successional-old growth Southwest Oregon Mixed Conifer-Hardwood Forests (Table 3-1). Also, 35.51 acres of late successional-old growth will be affected within UCSAs, an expected short-term disturbance. Additional potential long-term effects to pileated woodpeckers will be removal of 17.17 acres of mid-seral conifer-hardwood forest (≥40 years but ≤80 years old), thereby setting back seral development that would be expected to eventually provide suitable habitat elements for pileated woodpeckers, including downed wood and snags.

The amount of late successional-old growth habitat that would be removed by the Pipeline is not expected to have an impact on the local or regional population of pileated woodpeckers which have mean home ranges of 478 hectares or 1,180 acres in western Oregon (Mellen, 1987; Mellen et al., 1992). If all of the impacted late successional-old growth (78.18 acres) occurred within a bird's or pair's home range, less than 6.5 percent of one home range would be affected. More likely, the Proposed Action would span several home ranges and the overall effect to any single bird or pair would be less than 6.5 percent removal.

If pileated woodpecker home ranges are assumed to be circular, the diameter of a 1,180-acre home range would be 8,090 feet. Blasting at one edge of that home range would attenuate to 30 dBA at the far edge of the home range and would attenuate to ambient noise (assumed to be 40 dBA) 4,630 feet away or a distance equal to 57 percent the diameter of a home range. Noise due to construction would be a short term effect to pileated woodpeckers and would be expected to affect them within only a portion of their home ranges.

Mitigation. Mitigation measures that would minimize potential impacts to pileated woodpeckers include planting trees within the right-of-way after construction. Conifers would be planted to within 15 feet of each side of the centerline. After tree planting, there will be 46.71 acres of former forest (23.17 acres of late successional-old growth, 5.46 acres of mid-seral forest, and 18.07 acres of clear cut-regenerating forest) that will remain in an herbaceous and/or shrub state within the 30-foot maintenance corridor during the life of the Pipeline (Table 3-1).

Timber felling will occur before April 1 and after July 15, outside of the primary migratory bird nesting season. Other timber removal activities (i.e., timber removal) and construction of the Proposed Action could occur during the breeding season of pileated woodpeckers (March 1 through July 31) and disturb nesting pileated woodpeckers if located within 0.25 mile of the Proposed Action. However, disturbance would be minimized in at least 1 mile of the Proposed Action on Rogue River-Siskiyou National Forest where NSO activity centers occur within 0.25 mile of the Proposed Action and construction activities would not occur during the NSO critical breeding period (March 1 through July 15). In this same area of NSO presence, timber harvest would occur outside of the entire NSO breeding season (after September 30 but before March 1). Felling trees during this time period will avoid directly impacting young birds during the nesting season. Noise from blasting, if it is required during construction, will be minimized through application of various measures. Mitigation measures commonly applied to blasting of this type include drilling small (2.5-inch) charge holes, stemming the blast holes with sand and placing inert material on top of the blast area (Michael Minor & Associates, 2008).

To mitigate for loss of cavities and snags within the construction right-of-way, PCGP will create snags in large trees strategically left on the edge of the construction right-of-way by topping and or girdling trees. Previously, PCGP had agreed to fund other projects proposed by the Forest

Service in the Rogue River - Siskiyou National Forest that would provide benefits to pileated woodpeckers within the Rogue River - Siskiyou National Forest. The Forest Service will be reviewing these projects to verify their relevance to the current proposed Pipeline and implementation of these previously proposed projects or similar will be included in the CMP. Projects previously agreed to included creating snags and placing large wood in habitats adjacent to the proposed Pipeline to meet the management objectives of snag densities and enhance areas deficient in coarse woody material. The proposal to create snags and place large wood (previously proposed up to 1,100 acres) would accelerate the development of late successional habitat characteristics of structure and diversity (snags/large wood) including suitable nesting structures for pileated woodpeckers. The project would also reduce localized fuel loads while improving habitat in deficient stands (large wood) and provide long-term structure in the event of fire since larger logs maintain moisture longer and are less likely to be fully consumed by fire.

Additionally, PCGP previously proposed to fund or undertake other projects proposed by the Forest Service in the Rogue River-Siskiyou National Forest such as decommissioning 53-57.5 miles of roads, commercial and/or pre-commercial thinning on up to 1,240 acres to accelerate development of late successional and old growth habitat characteristic among other objectives, and reallocating 593 acres from matrix to LSR designation so that forested habitat within former matrix lands will be managed to obtain late successional forest characteristics. Those additional projects would provide benefits to pileated within the Rogue River-Siskiyou National Forest. During construction, potential impact to nesting pileated woodpeckers and other species by predatory corvids will be addressed by assuring that all contractors practice appropriate trash containment and removal.

PCGP has also prepared a Migratory Bird Conservation Plan that identifies additional measures that would benefit pileated woodpeckers.

Forest Plan Consistency. A viability assessment was completed by the Forest Ecosystem Management Assessment Team (FEMAT, 1993). The viability outcome for the pileated woodpecker was 100 percent likelihood of Outcome A – “Habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands” (Forest Service and BLM, 1994). This outcome determination was based on provisions of: 1) a large system of late-successional reserves, 2) standards and guidelines for riparian reserves, and 3) retention of green trees, snags, and coarse woody debris within the matrix. The Forest Service has been implementing the NWFP and monitoring late-successional habitat trends since 1994. The 10-year monitoring report (Haynes et al. 2006) states “…it appears that the status and trends in abundance, diversity, and ecological functions of older forests are generally consistent with expectations of the Plan. The total area of late-successional and old-growth forest (older forests) has increased at a rate that is somewhat higher than expected, and losses from wildfires are in line with what was anticipated.” As a result, projects consistent with the NWFP should be expected to maintain viability of late-successional associated species such as the pileated woodpecker.

Implementation of the mitigation measures is expected to increase potential population capabilities for pileated woodpeckers in areas that would otherwise be subject to intensive timber harvest and would provide for additional habitats for species utilizing older forest and mature habitat. In these respects, the Proposed Action would be consistent with the Forest Plan. Although some timber felling and construction (at least 1 mile where NSO occur within 0.25 mile of the Proposed Action; before April 1 and after July 15 – outside of the migratory bird primary nesting season) would occur outside of the pileated woodpecker nesting season, most other timber clearing activities and construction could occur during the pileated woodpecker nesting season (nesting season: March 1 – July 31), potentially within 1,320 feet of an active pileated woodpecker nest. If that occurred, the action would not be consistent with the Forest Plan. See PCGP's Migratory Bird Conservation Plan that describes measures that would benefit pileated woodpeckers.

3.6 Primary Cavity Excavators (nesters)

Primary cavity excavators represent those animals which require dead and defective woody material for nesting, roosting, and foraging. They are the common (northern) flicker (*Colaptes auratus*), hairy woodpecker, and downy woodpecker. This also includes the pileated woodpecker, which is discussed separately (Forest Service, 1990d). Snags and down logs, fairly uniformly distributed, provide critical habitat (Forest Service, 1990d).

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for primary cavity excavators and their habitat:

<u>Applicable Forest Plan Forest-wide Standards and Guidelines.</u>

- To satisfy cavity nester habitat requirements at 60 percent of their potential maximum population, about 200 snags (ranging from 11 inch diameter to over 25 inch diameter) are needed per 100 acres. Snags must be provided continuously through time, and usable snag life is considered to be 20 to 30 years depending on the tree species (Forest Service, 1990a).

<u>Woodpeckers Management Prescriptions.</u> *MS 26, Restricted Riparian*

- For other details on MS 26, see Deer.
- Leave sufficient wildlife trees in coniferous forests to provide for 100 percent of the potential population levels for cavity nesting species. The distribution of numbers and size class necessary to meet 100 percent per 100 acres as follows:

Species distribution should be representative of the site's original stand. Trees selected for retention should maximize use of the stand's cull component; if this does not exist, the proper number will be selected from the next lower class. Material that satisfies the need for down woody material recruitment will come from existing down material that is a result of a silvicultural treatment and from trees that are designated to meet standing wildlife tree requirements. The long-term LWM goal is 10 to 20 pieces of class I and II logs per acre, and all existing class III, IV, and V, except for incidental amounts.

Additional green merchantable trees will not be designated unless none of the other categories exist. The expected life span of snags or dead trees in mixed conifer working groups is 30 years, and in true fir is 20 years. The silvicultural prescription will describe the total number, size, and species of wildlife trees that will be required through the next full rotation of stand being treated.

Down woody material will be included as part of the silvicultural prescription for each stand, with information for the prescription provided by a wildlife biologist site by site. A certified silviculturist will validate the data and include it in the preparation of the final prescription. The logging system required, reforestation needs, slash disposal requirements, and site preparation needs should be compatible with tree distribution needs.

Primary cavity excavator habitat will be met on areas no larger than 60 acres, including adjacent harvest units, in order to provide well distributed habitat and allow adjacent stands to provide the needed wildlife trees for past harvest units where the adjacent stands plus harvest do not exceed

60 acres. Where past harvest units were very large, adjacent stands within 900 feet would be managed at higher wildlife tree levels to bring the overall area to the 40 percent level. When past harvest units were so large that these methods cannot bring the area to the 40 percent level, the remaining shortage will not be provided for, but will be recorded and tracked. Selection of wildlife trees to make up for past deficits will meet the same selection criteria as in newly treated stands. Green merchantable trees will not be girdled to create wildlife snags, until 5 to 7 years after Pipeline completion, in order to capture any mortality that may occur during that time (Forest Service, 1990d).

Species Status in the Pipeline Project Area. In 1990, it was thought that there was a population capability of 49,000 cavity excavator pairs (woodpeckers other than pileated woodpeckers) in the Forest (Forest Service, 1990d). There was no comprehensive inventory, although they are assumed to be highly correlated to snag levels (Forest Service, 1990a). Based on the 1990 assessment, woodpecker populations (as based on mixes of forest habitat types) would remain relatively constant through the fourth decade and then would increase to 100 percent of populations existing previous to the Plan in the fifth decade (Forest Service, 1990d). It was also expected that habitat capability would remain relatively stable or slightly rise through the fifth decade because more snags would be designated to remain than in the past (Forest Service, 1990d).

The historic trend estimates show that woodpeckers seem to be decreasing due to loss of snag habitat through timber harvest and firewood cutting activities. The viable population that would preserve the gene pool is undetermined. The habitat needed to maintain primary cavity excavators at 20 percent of their potential population (minimum viable level) is considered to be 45 snags per 100 acres. The habitat to maintain viable population levels where the species have an opportunity to interact within their environment is 135 snags per 100 acres, ranging in sizes from 11-inch dbh to 25-inch or greater dbh, which equates to 40 percent of their potential population level. Based on these parameters, a population model predicts an existing population of over 60,000 other woodpeckers (Forest Service, 1990a). In 1994 and 1998, a hairy woodpecker was documented just outside Rogue River-Siskiyou Forest Service boundaries, approximately 2.6 to 2.8 miles from the Proposed Action (BLM, 2006). In unmanaged forested areas, the total cavity excavator population is limited by territorial needs, not by the availability of wildlife trees (snags). When the FEIS was written, there was a wide range of cavity excavator population capability, from 100 percent in areas not under managed rotation to zero in some areas harvested before the 1980s (Forest Service, 1990a).

The same data that were collected on 17 National Biological Survey BBS routes (Pardieck et al. 2017) that are within BCR 5 in approximately 50 miles of the Proposed Action and Rogue River-Siskiyou National Forest and used to evaluate the regional population trends are discussed in Section 2.2. Numbers of northern (common) flicker, hairy woodpecker, and downy woodpecker that were reported on each route were compiled and averaged (numbers per route) for each year, 1997 through 2016 (Table 3-7) to develop a population index.

Table 3-7
Data Compiled for 20-years and Trends of Population Indices (Numbers Counted per BBS Route per Year) for BCR 5 of Primary Cavity Excavator MIS in the Vicinity of Rogue River-Siskiyou National Forest and the Pipeline

Cavity Nesting Species	Data Compiled for 20 Years, 1993-2012			
	Average Number of Routes per Year[1]	Average Annual Count per Route [1]	Population Index Trend	Comments
Common (Northern) Flicker	10.75	3.68	No trend	none
Hairy Woodpecker	10.45	1.10	Significantly decreasing (P < 0.01)	none
Downy Woodpecker	8.45	0.71	Insufficient data	Too few observations per year
[1] Data from BBS routes in Bird Conservation Region 5 within 50 miles of the Proposed Action.				

During the 20-year period (1997-2016), an average of 3.68 northern flickers was observed per BBS route (observed on average of 10.75 routes per year) each year in BCR 5 in approximately 50 miles of Rogue River-Siskiyou National Forest and the Proposed Action. Over the past 20 years, hairy woodpecker populations appear to be significantly decreasing ($P < 0.01$) on BBS routes within the vicinity of Rogue River-Siskiyou National Forest and the Proposed Action (Table 3-7 and Figure 3-2). Northern flickers are also decreasing in BCR 5 within the vicinity of the Rogue River-Siskiyou National Forest and the Proposed Action, but no significant trend is detectible reviewing both the long-term trend (20-year trend) (Table 3-7). In addition to pileated woodpeckers discussed above, northern flickers and hairy woodpeckers are the only other species of cavity nesters included as a MIS with sufficient data to estimate 20-year population trends, indexed as annual counts per route.

Habitat. All the primary cavity nester MIS species require snags of appropriate size, species, condition, and density, but these snags must be provided in the right habitat type. Sub-sections below, for each species summarizes the general habitat type for each species.

Hairy Woodpecker Habitat. In Oregon, the hairy woodpecker can be found in both dry and wet coniferous forests at low to mid-elevations, with the exception of juniper forests. They are found primarily in mixed-conifer and ponderosa pine forests. Hairy woodpeckers also use deciduous forest and riparian areas, especially if adjacent to coniferous forest. Although hairy woodpeckers have been reported to use forested stands at various seral stages (Marshall et al., 2003; Wahl et al., 2005), on the west side of the Cascades they occur in higher densities in mature and old-growth stands. They are common throughout most of their range, although most common in burns or in areas with trees that are dead from or infested with mountain pine beetles, and uncommon to fairly common along the coast and in western interior valleys. They prefer to nest in dead trees with light to moderate decay, and few consistent seasonal movements are known (Marshall et al., 2006).

Hairy woodpeckers are generally associated with the following habitat types that will be affected within the Rogue River-Siskiyou forest: Montane Mixed Conifer Forest, Southwest Oregon Mixed Conifer-Hardwood Forests, and Urban and Mixed Environs. They are present in Westside Grasslands but are expected to feed and breed within the habitats with which they are generally associated (Johnson and O'Neil, 2001). Using DecAID version 2.1 (Mellen-McLean et al., 2009), general snag characteristics used by hairy woodpeckers for each habitat type could be determined. Within forest types affected by the Proposed Action, hairy woodpeckers are generally associated with moderate to hard snag decay, with the exception of Southwest Oregon Mixed Conifer-Hardwood Forest where all classes of snag decay are used, within Douglas-fir, ponderosa pine, and western hemlock species. Snag size and density of snags per acre are variable, but the hairy woodpecker tends to be associated with smaller snag sizes that the other MIS species.

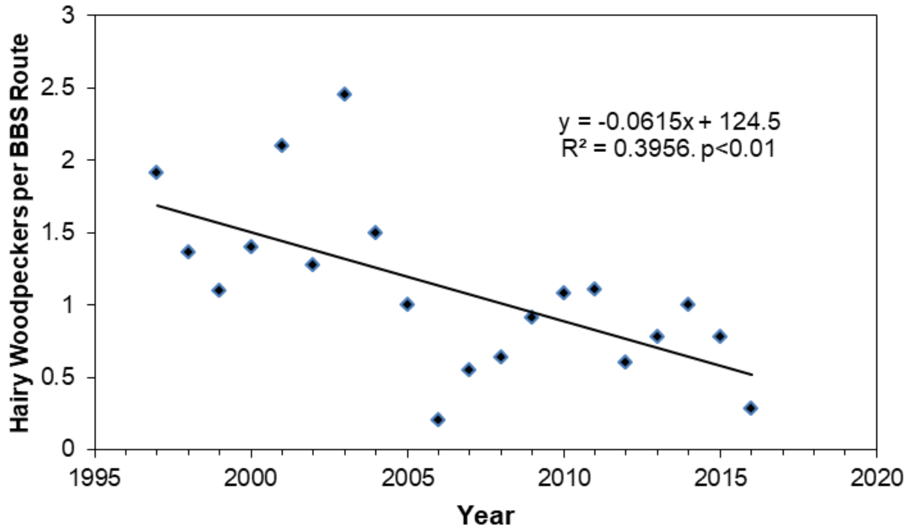

Figure 3-2
20-year Trend in Hairy Woodpeckers Counted per BBS Route in BCR 5 in the Vicinity of Rogue River-Siskiyou National Forest and the Pipeline

Downy Woodpecker Habitat. The downy woodpecker is found at low to moderate elevations in deciduous (alder, cottonwood, willow, aspen, and oaks) and mixed deciduous-coniferous forests, and is most abundant in riparian areas and red alder. They show a preference for decayed wood for nesting. Some local movements occur in fall/winter as some individuals move to lower elevations. They nest primarily in dead trees (Marshall et al., 2006; Wahl et al., 2005).

Downy woodpeckers are generally associated with the following habitat types that will be affected within the Rogue River-Siskiyou forest: Southwest Oregon Mixed Conifer-Hardwood Forests, and Urban and Mixed Environs. They are present in Westside Grasslands but are expected to feed and breed within the habitats with which they are generally associated (Johnson and O'Neil, 2001). Using DecAID version 2.1 (Mellen-McLean et al., 2009), general snag characteristics used by downy woodpeckers for each habitat type could be determined. Within forest types affected by the Proposed Action, downy woodpeckers are generally associated with moderate to hard snag decay within Douglas-fir, red alder, ponderosa pine, and golden chinquapin tree species. Snag size and density of snags per acre are variable.

Northern Flicker Habitat. The northern flicker is the most ubiquitous woodpecker in Oregon including the vicinity of the Proposed Action (Table 3-7). Northern flickers are most abundant in open forests and forest edges adjacent to open country. They typically avoid dense forest, and prefer to nest in trees with some decay. Some flickers move to higher elevations in spring (Marshall et al., 2006).

Northern flickers are generally associated with the following habitat types that will be affected within the Rogue River-Siskiyou forest: Montane Mixed Conifer Forest, Southwest Oregon Mixed Conifer-Hardwood Forests, Westside Grasslands, and Urban and Mixed Environs. They are present in Shrub-steppe but are expected to feed and breed within the habitats with which they are generally associated (Johnson and O'Neil, 2001). Using DecAID version 2.1 (Mellen-McLean et al., 2009), general snag characteristics used by northern flickers for each habitat type could be determined. Within forest types affected by the Proposed Action, northern flickers are generally associated with soft to moderate snag decay, with the exception of Southwest Oregon Mixed Conifer-Hardwood Forest where all classes of snag decay are used, within Douglas-fir, ponderosa pine, western hemlock, and oak species. Snag size and density of snags per acre are variable, but the northern flicker tends to be associated with larger snag sizes than the other two species.

Forest Management Activities. Depending on the target species, pest management would serve to remove a part of the species' food choice. Wildfire destroys nesting and foraging habitat, but also creates new snag habitat and weakens other trees to the point where they become infected with disease and insects, increasing the food supply. Timber harvesting and firewood cutting are the major activities that affect woodpeckers. The removal of snags and down/dead material would continue the downward trend in population levels (Forest Service, 1990a).

Effects of the Proposed Action. Primary Cavity Excavators could be negatively impacted during construction of the Pipeline through the same direct and indirect impacts that were discussed above for the pileated woodpecker (Section 2.2), for the Umpqua National Forest.

Clearing the right-of-way will modify habitat, changing the seral stage and tree species makeup of occupied forests. Similar to effects to pileated woodpeckers discussed above in Section 2.4, construction will remove a total of 78.18 acres of late successional-old growth Montane Mixed Conifer Forest and Southwest Oregon Mixed Conifer-Hardwood Forests in Rogue River-Siskiyou National Forest (Table 3-1). Additional potential long-term effects to Primary Cavity Excavators will be removal of 17.17 acres of mid-seral conifer-hardwood forest (≥40 years but ≤80 years old), thereby setting back seral development that would be expected to eventually provide suitable habitat elements including snags.

Unlike the large home ranges of pileated woodpeckers, those of the other Primary Cavity Excavator MIS are relatively small at 10 ha (25 acres) for the downy and hairy woodpeckers and 50 ha (124 acres) for the northern flicker (Johnson and O'Neil, 2001). While the amount of late successional-old growth habitat that would be removed by the Proposed Action is not expected to impact local or regional populations of Primary Cavity Excavators, home ranges of several individuals or pairs could be affected.

If Primary Cavity Excavator MIS' home ranges are assumed to be circular, the diameter of a 25-acre home range would be 1,170 feet and that of a 124-acre home range would be 2,600 feet. Blasting at one edge of a home range would attenuate to 55 dBA (at 1,170 feet) or 46 dBA (at 2,600 feet) at the far edges of the home range, depending on home range size. Noise due to construction would be a short term effect to Primary Cavity Excavators and expected to affect them through home ranges since noise levels would be above ambient levels (assumed to be 40 dBA) throughout species' home ranges that are adjacent to the construction right-of-way.

Mitigation. The same mitigation measures that were discussed in Section 3.5 for pileated woodpeckers would also apply to and benefit primary cavity excavators. PCGP has also prepared a Migratory Bird Conservation Plan that identifies additional measures that would benefit primary cavity nesters.

Forest Plan Consistency. Implementation of the mitigation measures is expected to increase potential population capabilities for primary cavity excavators in areas that would otherwise be subject to intensive timber harvest and would provide for additional habitats for species utilizing older forest and mature habitat. In these respects, the Proposed Action would be consistent with the Forest Plan.

Timber felling will occur before April 1 and after July 15, outside of the migratory bird primary nesting season; additionally, some timber felling and construction (at least 1 mile where NSO occur within 0.25 mile of the Proposed Action) would occur outside of the primary cavity nester breeding seasons. However, some timber felling, and most timber removal and construction activities could occur during the respective nesting season (nesting season: downy woodpecker April 15 to August 31, hairy woodpecker March 1 to August 31, and northern flicker March 15 to August 31; Johnson and O'Neil, 2001), potentially within 1,320 feet of an active primary cavity nester nest. If that occurred, the action would not be consistent with the Forest Plan. See PCGP's Migratory Bird Conservation Plan that describes measures that would benefit primary cavity nesters.

4.0 FREMONT-WINEMA NATIONAL FOREST

Species. The MIS for the Fremont-Winema National Forest include the three-toed woodpecker, pine marten, northern spotted owl, pileated woodpecker, resident trout, mule deer, bald eagle and northern goshawk (Forest Service, 1990e). The bald eagle was listed as threatened or endangered species requiring special management at the time of the Forest Plan's release, but has since been delisted. However, it is included in this discussion because it still remains an indicator species under the current Forest Plan. Old growth communities are used by the northern spotted owl, pileated woodpecker, northern goshawk, three-toed woodpecker, and pine marten. (Forest Service, 1990e). However, the northern spotted owl is now listed under the Endangered Species Act and its status is covered extensively under separate cover in the Biological Assessment and is not discussed here.

Management areas 3A, Scenic Management-Foreground Retention, 3B, Scenic Management-Foreground Partial Retention, 3C, Scenic Management-Middleground Partial Retention, and 18 will be affected by the Pipeline.

Habitats. The anticipated Future Condition which was expected in 1990 to have been met by 2000 is that mature and old-growth habitat would decrease but be maintained at or above levels determined to be needed for viable wildlife populations by the Region 6 guide. The condition of the riparian area and the habitat effectiveness for historic big game winter range was expected to have improved. Summer range habitat effectiveness for deer was expected to be at 1990 levels or higher. It was not anticipated that mule deer populations would increase above 1990 levels when based on the assumption of a direct relationship between deer production and habitat. A mule deer study to determine causes of decline would have been completed. The Forest would have provided habitat to meet bald eagle recovery objectives. (Forest Service, 1990e).

It was predicated that fifty years past the time of the 1990 report, riparian areas and streams would have been improved to provide for increased fish production by the third decade, and the fish program would consist primarily of reconstruction and maintenance of improvements. Deer production and populations would remain low. Plans would have been implemented for the recovery of threatened and endangered species and for the management of sensitive species. (Forest Service, 1990e).

MIS in the Fremont-Winema National Forest are associated with a variety of habitats found throughout the forest. However, the Pipeline will affect only those habitats included in Table 4-1, below. In Table 4-1, the areas (acres) of existing forested habitats (Southwest Oregon Mixed Conifer-Hardwood Forest and Ponderosa Pine Forest and Woodlands) within one or more seral stages (clearcut-regenerating forest, mid-seral forest, late successional-old growth forest) that will be removed during construction and affected during operation are provided in addition to all other affected habitat type categories. Effects from the Proposed Action have been summarized by component during construction and during operation. Generally, most long-term disturbance is due to a 30-foot wide corridor, centered on the pipeline, that is maintained in a herbaceous and/or shrub stated for the life of the Pipeline. Table 4-1 is referenced in discussions for each MIS in the sections, below.

The forested habitats (Johnson and O'Neil, 2001) correspond to vegetation categories described by the Oregon Gap Analysis Project (Oregon Gap; Kagan et al., 1999) and generally mapped within 100 meters of the Pipeline project. For Southwest Oregon Mixed Conifer-Hardwood Forest, the corresponding vegetation categories include 1) Douglas-fir-White Fir/Tanoak-Madrone Mixed

Forest, and 2) Douglas-fir Dominant-Mixed Conifer Forest (Kagan et al., 1999) and were discussed above for the Umpqua National Forest. Likewise, Montane Mixed Conifer habitat (Johnson and O'Neil, 2001) in Table 4-1 was discussed above for the Rogue River-Siskiyou National Forest. Descriptions of Forested and Non-Forested Wetlands were provided in those sections under the Umpqua National Forest and a description of Westside Grasslands was provided for the Rogue River-Siskiyou National Forest. However, Eastside Grasslands also occur within the Fremont-Winema National Forest:

Grasslands (east of Cascades)/Forest-Grassland Mosaic: This type is a mosaic of bunchgrass grasses and conifer forest in the east Cascades. Ponderosa pine, Douglas-fir, white fir, and incense cedar are common conifers, with Idaho fescue generally the dominant grass. Other grasses that can form co-dominances are bluebunch wheatgrass, junegrass, Sandberg bluegrass, and western needlegrass. In stands heavily grazed, cheatgrass and bottlebrush squirreltail can be dominant. Found at mid to low elevations (Kagan et al., 1999).

Table 4-1
Summary of Construction and Operation-Related Disturbance (acres [1]) to Corresponding Wildlife Habitat Categories (Johnson and O'Neil, 2001) in the Fremont-Winema National Forest

		Forest-Woodland			Riparian					
Component	**Forest –Woodland Seral Stage [2]**	**Montane Mixed Conifer Forest**	**Southwest Oregon Mixed Conifer-**	**Forest-Woodland Sub-Total**	**Forested Wetland**	**Non-Forested Wetland**	**Grasslands**	**Roads**	**Open Water**	**Total**
CONSTRUCTION DISTURBANCE										
Pipeline Facilities										
Construction Right-of-Way	**L-O**	5.77	30.67	36.44	0.26		0.69	1.38	0.07	68.62
	M-S	2.49	3.94	6.43						
	C-R	14.62	8.74	23.36						
	Tot	22.88	43.35	66.23						
Hydrostatic Discharge Sites	**L-O**									0
	M-S									
	C-R									
	Tot									
Rock Source/ Disposal	**L-O**									0
	M-S									
	C-R									
	Tot									
Temporary Extra Work Areas	**L-O**	0.53	4.13	4.66			0.22	1.58		12.04
	M-S	0.29	1.1	1.39						
	C-R	3.54	0.64	4.18						
	Tot	4.37	5.88	10.25						
	L-O	2.96	3.12	6.08				0.06		11.56
	M-S	0.92	0.17	1.09						

Component	Forest –Woodland Seral Stage [2]	Forest-Woodland: Montane Mixed Conifer Forest	Forest-Woodland: Southwest Oregon Mixed Conifer-	Forest-Woodland: Forest-Woodland Sub-Total	Riparian: Forested Wetland	Riparian: Non-Forested Wetland	Grasslands	Roads	Open Water	Total
Uncleared Storage Areas [3]	C-R	3.23	1.10	4.33						
	Tot	7.11	4.39	11.5						
Total Construction Disturbance	L-O	9.27	37.92	47.19	0.26		0.91	3.02	0.07	92.23
	M-S	3.7	5.21	8.91						
	C-R	21.39	10.48	31.87						
	Tot	34.35	53.61	87.96						
OPERATION DISTURBANCE										
Pipeline Facilities										
30-foot Maintenance Corridor	L-O	1.84	9.91	11.75	0.1		0.26	0.28	0.02	22.02
	M-S	0.84	1.24	2.08						
	C-R	4.73	2.81	7.54						
	Tot	7.4	13.96	21.36						
Total Operation Disturbance	L-O	1.84	9.91	11.75	0.1		0.26	0.28	0.02	22.02
	M-S	0.84	1.24	2.08						
	C-R	4.73	2.81	7.54						
	Tot	7.4	13.96	21.36						

[1] Acres disturbed were evaluated using GIS; footprints for each component (temporary construction right-of-way, temporary extra work areas, temporary access roads, uncleared storage areas, pipe storage yards, aboveground facilities, permanent easement, and 30-foot maintenance corridor) were overlaid on the digitized vegetation coverage.

[2] Forest-Woodland Seral Stages are L-O, Late Succession/Old Growth assumed to be ≥80 years old; M-S, Mid-Seral assumed to be ≥40 but ≤80 years old; C-R, Clearcut-Regenerating Forest assumed to be ≤40 years old.

[3] Small brush or trees may be cleared by a rubber-tired rotary or flail motor (brush hog) or by hand with machetes/chainsaws. No soil disturbance will occur. A rubber-tired or track hoe will be utilized to lay the discharge line and to remove the saturated haybales or filter bags upon completion of hydrostatic discharge.

4.1 Northern Spotted Owl

The NSO was selected as a MIS for mature and old growth habitat in the 1990 Fremont-Winema National Forest Plan (Forest Service, 1990e). The NSO was proposed for listing under the Endangered Species Act (ESA) when the Fremont-Winema National Forest's Plan was signed in 1990, and was officially listed as Threatened in 1992. The Northwest Forest Plan (BLM and Forest Service, 1994) amended Fremont-Winema's Forest Plan (Forest Service, 1990e), and was designed to ensure the population viability of the NSO. Since the NSO is now listed under the Endangered Species Act, it is covered extensively under separate cover in the Biological Assessment prepared for the Proposed Action. A summary of the status of NSOs and their habitat on Fremont-Winema National Forest is included here, including effects to NSO habitat from the Pipeline. Additional information can be reviewed in the Biological Assessment.

Fremont-Winema National Forest occurs within the East Cascades physiographic province. To assess the current condition of NSO habitat in the Fremont-Winema National Forest, a new dataset was used to determine NSO habitat. In 2016, the improved 2012 GNN dataset was used to assess suitable NRF habitat for spotted owls within the NWFP area (see Davis et al. 2016 and https://www.fs.fed.us/r6/reo/monitoring/data/). This model applied to the Fremont-Winema National Forest predicts that there is approximately 85,150 acres of suitable NSO NRF habitat available. Through surveys for spotted owls that have occurred in the Fremont-Winema National Forest since 1990, with the majority of recent survey efforts through demographic studies, there are approximately 51 NSO pairs and/or resident singles that have been documented to occur or are occurring in the Fremont-Winema National Forest (Fremont-Winema Forest, 2006 GIS data layer); approximately 38 NSOs are monitored annually through NSO demographic studies on Fremont-Winema National Forest.

The Proposed Action affects NSO habitat (high NRF, NRF, dispersal only, and capable habitat as defined by FWS in the Conservation Framework developed for the Proposed Action; see FWS, 2014) on Fremont-Winema National Forest within the East Cascades physiographic province. Approximately 75 percent of NSO habitat affected from the Proposed Action on Fremont-Winema National Forest occurs within NSO home ranges (Table 4-2). Three known NSO home ranges with a radius of 1.2 miles occur within the Pipeline project area and will have NSO habitat affected, including habitat from one NSO core area and nest patch. Table 4-2, below identifies the amount of NSO habitat removed by the Proposed Action in Fremont-Winema National Forest. Overall, the Pipeline would remove approximately 41.10 acres of NRF habitat (high NRF and NRF, combined), which is approximately 0.05 percent of the 85,150 acres of NRF habitat available within Fremont-Winema National Forest.

Table 4-2
Summary of NSO Habitat Removed (acres) within Fremont-Winema National Forest

NSO Habitat	Location	Construction Right-of-Way	Temporary Extra Work Space	Total Habitat Removed
High NRF	Within Home Range	3.46	0.27	3.72
	Outside Home Range	1.26	0.45	1.71
	High NRF Total	4.72	0.71	5.43
NRF	Within Home Range	22.16	2.38	24.54
	Outside Home Range	9.57	1.57	11.13
	NRF Total	31.73	3.95	35.67
Dispersal Only	Within Home Range	2.49	0.29	2.78
	Outside Home Range	3.94	1.10	5.04
	Dispersal Only Total	6.42	1.40	7.82
Capable	Within Home Range	23.06	4.16	27.22
	Outside Home Range	0.29	0.02	0.32
	Capable Total	23.35	4.19	27.54
Total NSO Habitat	Within Home Range	52.76	8.10	60.86
	Outside Home Range	15.86	3.94	19.80
	Overall NSO Habitat	68.62	12.04	80.66

4.2 Pileated Woodpecker

The pileated woodpecker is an indicator species for the Winema National Forest for old-growth and mature mixed conifer habitats. The Proposed Action will not affect any of Fremont-Winema National Forest management areas designated for pileated woodpeckers. The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for pileated woodpeckers and their habitat:

Management Area 7 (Forest Service, 1990e):

- Provide suitable mature and old-growth nesting and foraging habitat for at least 28 pairs of pileated woodpeckers.
- Habitat areas should be a minimum of 300 acres of old-growth and/or mature mixed conifer, ponderosa pine and associated species as breeding and primary foraging habitat for one pair of pileated woodpeckers; large aspen or cottonwood trees in riparian areas can also be considered. Habitat areas shall be dispersed throughout suitable habitat not more than 5 miles apart from center of one area to the center of another area.
- Habitat should be contiguous, otherwise shall be at least 50 acres in size and not more than 0.25 mile apart.
- Within each 300-acre primary breeding area, a minimum average of two hard snags per acre greater than 12 inches DBH, including: 42 suitable nesting snags (hard) greater than 20 inches DBH within 300-acre breeding area, and 558 hard snags greater than 12 inches DBH.
- Disturbing human activities within 0.25 mile of an active pileated woodpecker nest site shall be discouraged or minimized from Macy 1 through July 31.

Habitat. Pileated woodpeckers occur within late-seral stages of the subalpine, montane, lower montane forests including: grand fir-white-fir, interior Douglas-fir, western larch, western white pine, western redcedar-western hemlock, Engelmann spruce-subalpine fir, and Pacific silver fir-mountain hemlock. Special habitat features are snags, down logs, and large hollow trees (Wisdom et al. 2000).

Pileated woodpeckers are generally associated with Montane Mixed Conifer Forest and Southwest Oregon Mixed Conifer-Hardwood Forests (Johnson and O'Neil, 2001) that coincide with the Pipeline (Table 4-1). Since they are dependent on downed wood and snags, pileated woodpeckers would be most likely to inhabit the old growth or late successional stands (≥80 years old) of those forests included in Table 4-1. However research suggests that only a small portion of the landscape in the Southwest Oregon Mixed Conifer-Hardwood Forest, late-seral stands are likely capable of providing nesting and roosting habitat for pileated woodpecker based on snag densities on unharvested plots (see Mellen-McLean et al., 2009).

Species' Status in the Pipeline Project Area. The Fremont-Winema National Forest occurs within both BCR 5 and BCR 9. In BCR 5, the past 20-year trend indicates relatively stable population with no significant trend in the vicinity (50 miles) of the Proposed Action and Fremont-Winema National Forest (see Section 2.2 and Figure 2-1). Pileated woodpeckers have also been documented in BCR 9; however, there are too few BBS routes where the species was observed and not enough data to determine a trend for this species in BCR 9 for the past 20 years.

This species has not been documented within or within the vicinity of the proposed Pipeline on Fremont-Winema National Forest per queries from existing, available GIS databases.

Effects of the Proposed Pipeline. Pileated woodpeckers could be negatively impacted during construction through the same direct and indirect effects that were discussed in Section 1.1 above, for the Umpqua National Forest. Clearing the right-of-way will modify habitat, changing the seral stage and tree species makeup of occupied forests. Construction will remove 6.31 acres of late successional-old growth Montane Mixed Conifer Forest and 34.8 acres of late successional-old growth Southwest Oregon Mixed Conifer-Hardwood Forests (Table 4-1). Also, 6.08 acres of late successional-old growth will be affected within UCSAs, an expected short-term disturbance. Additional potential long-term effects to pileated woodpeckers will be removal of 7.82 acres of mid-seral conifer-hardwood forest (≥40 years but ≤80 years old), thereby setting back seral development that would be expected to eventually provide suitable habitat elements for pileated woodpeckers, including downed wood and snags. No habitat within Management Area 7 would be affected.

The amount of late successional-old growth habitat that would be removed by the Proposed Action is not expected to have an impact on the local or regional population of pileated woodpeckers which have mean home ranges of 478 hectares or 1,180 acres in western Oregon (Mellen, 1987; Mellen et al., 1992). If all of the impacted late successional-old growth (40 acres) occurred within a bird's or pair's home range, less than 3 percent of one home range would be affected. More likely, the Proposed Action would span several home ranges and the overall effect to any single bird or pair would be less than 3 percent removal.

If pileated woodpecker home ranges are assumed to be circular, the diameter of a 1,180-acre home range would be 8,090 feet. Blasting at one edge of that home range would attenuate to 30 dBA at the far edge of the home range and would attenuate to ambient noise (assumed to be 40 dBA) 4,630 feet away or a distance equal to 57 percent the diameter of a home range. Noise due to construction would be a short term effect to pileated woodpeckers and would be expected to affect them within only a portion of their home ranges.

Mitigation. Mitigation measures that would minimize impacts to pileated woodpeckers include planting trees within the right-of-way after construction. Conifers would be planted to within 15 feet of each side of the centerline. After tree planting, there will be 21.36 acres of former forest (11.75 acres of late successional-old growth, 2.08 acres of mid-seral forest, and 7.54 acres of clear cut-regenerating forest) that will remain in an herbaceous and/or shrub state within the 30-foot maintenance corridor during the life of the Pipeline (Table 4-1).

Timber removal and construction of the Proposed Action could occur during the breeding season of pileated woodpeckers (March 1 through July 31) and disturb nesting pileated woodpeckers if located within 0.25 mile of the Proposed Action. However, disturbance would be minimized in at least 0.3 mile of the Proposed Action on Fremont-Winema National Forest where an NSO activity center occurs within 0.25 mile of the Proposed Action and construction activities would not occur during the NSO critical breeding period (March 1 through July 15). In this same area of NSO presence, timber felling would occur outside of the entire NSO breeding season (after September 30 but before March 1); outside of this area, PCGP would fell trees before April 1 and after July 15, outside of the migratory bird primary nesting season. Felling trees during these time periods will avoid directly impacting young birds during the nesting season. Noise from blasting, if it is required during construction, will be minimized through application of various measures. Mitigation measures commonly applied to blasting of this type include drilling small (2.5-inch) charge holes, stemming the blast holes with sand and placing inert material on top of the blast area (Michael Minor & Associates, 2008).

To mitigate for loss of cavities and snags within the construction right-of-way, PCGP will create snags in large trees strategically left on the edge of the construction right-of-way by topping and or girdling trees. In addition, PCGP had previously agreed to fund other projects proposed by the Forest Service in the Fremont-Winema National Forest that included decommissioning 21.4 to 29.21 miles of roads, and stand density and fuel treatments of 113 acres to accelerate development of late successional and old growth habitat characteristic among other objectives. The Forest Service will be reviewing these projects to verify their relevance to the current proposed Pipeline. Implementation of these or similar projects would provide benefits to pileated woodpeckers within the Fremont-Winema National Forest. Proposed projects will be included in the CMP. During construction, potential impact to nesting pileated woodpeckers and other species by predatory corvids will be addressed by assuring that all contractors practice appropriate trash containment and removal.

PCGP has also prepared a Migratory Bird Conservation Plan that identifies additional measures that would benefit pileated woodpeckers.

Forest Plan Consistency. The Proposed Action will not affect any of Fremont-Winema National Forest's management areas designated for the species. No further analyses or discussion is warranted (Forest Service, 1990e).

4.3 Northern Goshawk

The northern goshawk is the largest North American accipiter and was chosen as a management indicator species due to its association with mature and late and old-growth ponderosa and mixed conifer forest structural stages for nesting. The Proposed Action will not affect any of Fremont-Winema National Forest management areas designated for the northern goshawk. The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for northern goshawks and their habitat:

Management Area 7 (Forest Service, 1990e):

- Provide suitable mature and old-growth nesting and foraging habitat for at least 87 pairs of northern goshawks.
- A minimum of 60 acres of contiguous old-growth and/or mature mixed conifer, ponderosa pine and associated species, ponderosa pine, and lodgepole pine communities shall be provided as primary breeding and foraging habitat for one pair of northern goshawks.
- Habitat areas shall be dispersed throughout suitable habitat, not more than 5 miles apart from the center of one area to the center of another area.
- Disturbing human activities within 0.25 mile of any active northern goshawk nest shall be discouraged or minimized from March 1 through August 31.

Habitat. The northern goshawk's home range encompasses about 6,000 acres and is composed of a nest core area, post-fledging area (PFA), and a foraging area. Various forest structural stages are associated with the components of the home range. Nest areas often occur on north aspects, along stream zones or other areas where a dense forest canopy and late successional / old-growth forest conditions are present. Preferred nest stands have a minimum of 40 percent canopy closure; and the nest sites within these stands have greater than 60 percent canopy closure (Reynolds et al., 1991). Goshawks often use stands of old growth forest as nesting sites (DuBois et al., 1987). PFAs usually resemble the nest area, but also include a variety of forest types and conditions where hiding cover (for the young) and prey availability is present (Reynolds et al., 1991). Foraging areas may be as closely tied to prey availability as to habitat structure and composition. These areas often contain a mixture of various forest structural stages with snags, downed logs, large trees, and small openings with an herbaceous and/or shrubby understory present.

Northern goshawks are generally associated with Montane Mixed Conifer Forest and Southwest Oregon Mixed Conifer-Hardwood Forests (Johnson and O'Neil, 2001) that coincide with the Pipeline (Table 4-1). They are dependent on old growth or late successional stands (≥80 years old) of those forests included in Table 4-1. Goshawks are closely associated with Ponderosa Pine Forest and Woodlands (Johnson and O'Neil, 2001), which would not be affected by the Proposed Action.

Species' Status in the Pipeline Project Area. Northern goshawks have been documented at nine locations within approximately 3.5 miles (diameter of a home range) of the Proposed Action, including two locations within 0.5 mile (Forest Service, 2006 GIS data). A breeding site was also documented in 1992 north of the Pipeline in Fremont-Winema National Forest approximately 1.5 miles away (ORBIC, 2017). BBS routes in the vicinity of the Fremont-Winema National Forest and the Proposed Action have not detected goshawks during survey efforts.

Effects of the Proposed Pipeline. Northern goshawks could be negatively impacted during construction. Direct mortality of young could occur if nest trees are cleared prior to young fledging. Since nesting and roosting lasts from March 1 through August 31, tree felling during those periods could directly impact young birds. While adults would be able to escape temporary disturbances, adult birds could abandon nests, leaving eggs and chicks vulnerable to predation and the elements. However, tree felling before April 1 and after July 15 (outside of the migratory bird primary nesting season) and from October 1 to the end of February (after the breeding period for northern spotted owls) within 0.25 mile of one known NSO activity center on Fremont-Winema National Forest will likely avoid or minimize impact to nesting goshawks in that area, if present.

Clearing the right-of-way will modify habitat, changing the seral stage and tree species makeup of occupied forests. Construction will remove 6.31 acres of late successional-old growth Montane Mixed Conifer Forest and 34.80 acres of late successional-old growth Southwest Oregon Mixed Conifer-Hardwood Forests (Table 4-1). Also, 6.08 acres of late successional-old growth will be affected within UCSAs, an expected short-term disturbance. Additional potential long-term effects to northern goshawks will be removal of 7.82 acres of mid-seral conifer-hardwood forest (≥40 years but ≤80 years old), thereby setting back seral development that would be expected to eventually provide suitable habitat elements for northern goshawks. No habitat within Management Area 7 would be affected.

The amount of late successional-old growth habitat that would be removed is not expected to have an impact on the local or regional population of northern goshawks which have mean home ranges of 6,000 in western Oregon. If all of the impacted late successional-old growth (40 acres) occurred within a bird's or pair's home range, less than 0.1 percent of one home range would be affected. More likely, the Proposed Action would span several home ranges and the overall effect to any single bird or pair would be less than 0.1 percent removal.

If northern goshawk home ranges are assumed to be circular, the diameter of a 6,000-acre home range would be 3.5 miles (18,242 feet). Blasting at one edge of that home range would attenuate to 30 dBA at the far edge of the home range and would attenuate to ambient noise (assumed to be 40 dBA) 4,630 feet away or a distance equal to 25 percent the diameter of a home range. Noise due to construction would be a short term effect to northern goshawks and would be expected to affect them within only a portion of their home ranges, if nesting near the Proposed Action. Two nests have been documented (1992 and 1993; Forest Service, 2006 GIS data) approximately 0.5 mile from the Pipeline; if these sites are still present, it is not expected that noise associated with the Proposed Action would affect nesting goshawks.

Mitigation. Mitigation measures that would minimize impacts to northern goshawks include planting trees within the right-of-way after construction. Conifers would be planted to within 15 feet of each side of the centerline. After tree planting, there will be 21.36 acres of former forest (11.75 acres of late successional-old growth, 2.08 acres of mid-seral forest, and 7.54 acres of clear cut-regenerating forest) that will remain in an herbaceous and/or shrub state within the 30-foot maintenance corridor during the life of the Pipeline (Table 4-1).

Timber removal and construction of the Proposed Action could occur during the breeding season of northern goshawk (March 1 through August 31) and disturb nesting goshawks if located within 0.25 mile of the Proposed Action. However, disturbance would be minimized in at least 0.3 mile of the Proposed Action on Fremont-Winema National Forest where an NSO activity center occurs within 0.25 mile of the Proposed Action and construction activities would not occur during the NSO critical breeding period (March 1 through July 15). In this same area of NSO presence, timber felling would occur outside of the entire NSO breeding season (after September 30 but before March 1); outside of this area, PCGP would fell trees before April 1 and after July 15, outside of the migratory bird primary nesting season. Felling trees during these time periods will avoid directly impacting young birds during the nesting season. Noise from blasting, if it is required during construction, will be minimized through application of various measures. Mitigation measures commonly applied to blasting of this type include drilling small (2.5-inch) charge holes, stemming the blast holes with sand and placing inert material on top of the blast area (Michael Minor & Associates, 2008).

Previously, PCGP had agreed to fund projects proposed by the Forest Service in the Fremont-Winema National Forest that included decommissioning 21.4 to 29.21 miles of roads, and stand density and fuel treatments of 113 acres to accelerate development of late successional and old growth habitat characteristic among other objectives. The Forest Service will be reviewing these projects to verify their relevance to the current proposed Pipeline. Implementation of these or similar projects could provide benefits to northern goshawks within the Fremont-Winema National Forest. Proposed projects will be included in the CMP. During construction, potential impact to nesting goshawks and other species by predatory corvids will be addressed by assuring that all contractors practice appropriate trash containment and removal.

PCGP has also prepared a Migratory Bird Conservation Plan that identifies additional measures that would benefit northern goshawks.

Forest Plan Consistency. The Proposed Action will not affect any of Fremont-Winema National Forest's management areas designated for the species. No further analyses or discussion is warranted (Forest Service, 1990e).

4.4 Three-Toed Woodpecker or Black-backed Woodpecker

The three-toed woodpecker is an indicator species for the Fremont-Winema National Forest; however, the Fremont-Winema National Forest is considered to be outside of the range of three-toed woodpeckers. Therefore, the black-backed woodpecker has been substituted for three-toed woodpecker as an MIS species since they have similar habitat requirements. Black-backed woodpecker is an indicator of overmature and mature lodgepole pine forests.

The Proposed Action will not affect any of Fremont-Winema National Forest management areas designated for the three-toed woodpecker [black-backed woodpecker]. The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for three-toed woodpecker and their habitat and could be assumed to be similar for the black-backed woodpecker:

Management Area 7 (Forest Service, 1990e):

- Provide suitable mature and old-growth nesting and foraging habitat for at least 215 pairs of three-toed woodpeckers

- A minimum of 75 acres of contiguous old-growth and/or mature lodgepole pine or subalpine fir shall be provided as primary breeding and foraging habitat for one pair of three-toed woodpeckers
- Habitat area shall be dispersed throughout suitable habitat, not more than 25 miles apart from the center of one area to the center of another area
- Within 75-acre primary breeding area, a minimum average of 2 hard snags per acre greater than 10 inches DBH shall be maintained including 45 suitable nesting snags (hard) greater than 12 inches DBH and 105 hard snags greater than 10 inches DBH.
- Disturbing human activities within 0.25 mile of an active three-toed woodpecker nest site shall be discouraged or minimized from April 15 through July 15 [black-backed woodpeckers nesting range from April 1 through August 15; Adamus et al., 2001].

Habitat. Black-backed woodpeckers occur in conifer forest with snags, especially recently burned or bark-beetle killed forests. They nest in live trees with heart rot or dead trees, and can use smaller trees for nest cavities. Their main diet is larvae of wood-boring beetles gathered from under bark of trees.

Black-backed woodpeckers are generally associated with Montane Mixed Conifer Forest and Southwest Oregon Mixed Conifer-Hardwood Forests (Johnson and O'Neil, 2001) that coincide with the Proposed Action (Table 4-1). They are dependent on old growth or late successional stands (≥80 years old) of those forests included in Table 4-1.

Species' Status in the Pipeline Project Area. In Oregon, black-backed woodpeckers occur at high elevations of the west Cascades, is more widespread on the east slope of the Cascades with its center of abundance lodgepole pine forests from Bend to Klamath Falls, is uncommon in the Blue Mountains, and occasionally seen in the Siskiyou Mountains (Marshall et al., 2003). The closest documentation of black-backed woodpecker is greater than 8 miles southwest of the Proposed Action.

Data have been collected on 17 BBS routes in BCR 5 and 16 BBS routes in BCR 9 (Pardieck et al., 2017) that are within the region of the Fremont-Winema National Forest and the Proposed Action; no BBS routes occur on Fremont-Winema National Forest. No three-toed woodpeckers were included in any of the BBS observations on the compiled routes. No black-backed woodpeckers were reported in BBS routes compiled in BCR 5; however, six BBS routes compiled for BCR 9 have documented black-backed woodpeckers in the past 20 years, including one route located in the Forest. During the 20-year period 1997-2016, an average of 3.75 black-backed woodpeckers was reported on 4.35 routes reporting each year for an average of 0.84 birds per BBS route per year in BCR 9.. However, there is insufficient data to estimate 20-year population trends for this species within the region of the Proposed Action on Fremont-Winema National Forest.

Effects of the Proposed Pipeline. Black-backed woodpeckers could be negatively impacted during construction through the same direct and indirect effects that were discussed in Section 1.1 above, for the Umpqua National Forest. Clearing the right-of-way will modify habitat, changing the seral stage and tree species makeup of occupied forests. Construction will remove 6.31 acres of late successional-old growth Montane Mixed Conifer Forest and 34.80 acres of late successional-old growth Southwest Oregon Mixed Conifer-Hardwood Forests (Table 4-1). Also, 6.08 acres of late successional-old growth will be affected within UCSAs, an expected short-term disturbance. Additional potential long-term effects to black-backed woodpeckers will be removal of 7.82 acres of mid-seral conifer-hardwood forest (≥40 years but ≤80 years old), thereby setting back seral development that would be expected to eventually provide suitable habitat elements for black-backed woodpeckers, including downed wood and snags. No habitat within Management Area 7 identified for three-toed woodpeckers [black-backed woodpeckers] would be affected.

The amount of late successional-old growth habitat that would be removed is not expected to have an impact on the local or regional population of black-backed woodpeckers which have an average home range of 550 hectares or 1,360 acres (Johnson and O'Neil, 2001). If all of the impacted late successional-old growth (40 acres) occurred within a bird's or pair's home range, less than 3 percent of one home range would be affected. More likely, the Proposed Action would span several home ranges and the overall effect to any single bird or pair would be less than 3 percent removal.

If black-backed woodpecker home ranges are assumed to be circular, the diameter of a 1,360-acre home range would be 8,685 feet. Blasting at one edge of that home range would attenuate to 30 dBA at the far edge of the home range and would attenuate to ambient noise (assumed to be 40 dBA) 4,630 feet away or a distance equal approximately half (53 percent) the diameter of a home range. Noise due to construction would be a short term effect to black-backed woodpeckers and would be expected to affect them within only a portion of their home ranges.

Mitigation. Mitigation measures that would minimize impacts to black-backed woodpeckers include planting trees within the right-of-way after construction. Conifers would be planted to within 15 feet of each side of the centerline. After tree planting, there will be 21.36 acres of former forest (11.75 acres of late successional-old growth, 2.08 acres of mid-seral forest, and 7.54 acres of clear cut-regenerating forest) that will remain in an herbaceous and/or shrub state within the 30-foot maintenance corridor during the life of the Pipeline (Table 4-1).

Timber removal and construction of the Proposed Action could occur during the breeding season of black-backed woodpeckers (April 1 through August 15; Adamus et al., 2001) and disturb nesting black-backed woodpeckers if located within 0.25 mile of the Proposed Action. However, disturbance would be minimized in at least 0.3 mile of the Proposed Action on Fremont-Winema National Forest where an NSO activity center occurs within 0.25 mile of the Proposed Action and construction activities would not occur during the NSO critical breeding period (March 1 through July 15). In this same area of NSO presence, timber harvest would occur outside of the entire NSO breeding season (after September 30 but before March 1); outside of this area, timber felling ill occur before April 1 and after July 15, outside of the migratory bird primary nesting season. Felling trees during this time period will minimize or avoid directly impacting young birds during the nesting season. Noise from blasting, if it is required during construction, will be minimized through application of various measures. Mitigation measures commonly applied to blasting of this type include drilling small (2.5-inch) charge holes, stemming the blast holes with sand and placing inert material on top of the blast area (Michael Minor & Associates, 2008).

To mitigate for loss of cavities and snags within the construction right-of-way, PCGP will create snags in large trees strategically left on the edge of the construction right-of-way by topping and or girdling trees. Previously, PCGP had agreed to fund projects proposed by the Forest Service in the Fremont-Winema National Forest that include decommissioning 21.4 to 29.21 miles of roads, and stand density and fuel treatments of 113 acres to accelerate development of late successional and old growth habitat characteristic among other objectives. The Forest Service will be reviewing these projects to verify their relevance to the current proposed Pipeline. Implementation of these or similar projects would provide benefits to black-backed woodpeckers within the Fremont-Winema National Forest. Proposed projects will be included in the CMP. During construction, potential impact to nesting black-backed woodpeckers and other species by predatory corvids will be addressed by assuring that all contractors practice appropriate trash containment and removal.

PCGP has also prepared a Migratory Bird Conservation Plan that identifies additional measures that would benefit black-backed woodpeckers.

Forest Plan Consistency. The Proposed Action will not affect any of Fremont-Winema National Forest's management areas designated for three-toed woodpeckers [black-backed woodpeckers]. No further analyses or discussion is warranted (Forest Service, 1990e).

4.5 American (Pine) Marten

The pine marten was selected as an indicator species due to its close association with late successional mixed conifer and lodgepole pine forests (Forest Service, 1990f). Pine martens represent those species utilizing mature conifer forests which need mature habitat areas spaced closer than 5 to 6 miles apart. They are not generally found below 4,000 feet in the forest and do not appear to have an upper elevation restriction, which makes it an especially important indicator for those species capable of utilizing high elevation habitat or that are less mobile than either the spotted owl or pileated woodpecker (Forest Service, 1990f).

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for pine martens and their habitat:

Management Prescriptions. The monitoring objective for the pine marten is to assure that habitat that will meet or exceed the Forest share of that needed to meet viable populations of pine marten is provided and maintained. This applies to all management areas through which the Pipeline will pass, which includes 3A, 3B, and 3C (Forest Service, 1990e).

MA3A emphasizes the retention of natural-appearing foreground areas.

- Lands: For lands visible for up to 0.25 miles from selected travelways, waterbodies, or public use areas, only forms, lines, colors, and textures found in the characteristic landscape will be allowed. Natural appearing forms, colors, and textures dominate.
- Vegetation may be manipulated through enhancing large diameter trees, scattering large trees among other size classes, or creating small openings with natural appearing edges. Trees with distinctive bark and tree form characteristics, including occasional snags, are very evident. Large tree character should be maintained in the foreground retention area in all species except lodgepole pines, and should be distributed in groupings.
- Project evidence such as slash should not be noticeable one year after work completion.
- Fire suppression methods in the immediate foreground should use low-impact methods (Forest Service, 1990e).

MA3B emphasizes attractive scenery slightly altered from a natural condition as viewed in the foreground.

- Activities may repeat or introduce form, line, color, or texture common or not to the characteristics landscape, but changes in size, amount, intensity, direction, and pattern must remain visually subordinate.
- Lands: For lands visible for up to 0.25 miles from selected travelways, waterbodies, or public use areas, only forms, lines, colors, and textures found in the characteristic landscape will be allowed. Details such as individual tree shape, color, size, species mix, and related vegetation are the focus.

- The desired future condition emphasizes and maintains perpetually large tree character, except lodgepole pine, through large-diameter trees in groupings or scattering individually large trees among other tree size classes. Small openings with natural-appearing edges may be created. Trees with distinctive bark and tree form characteristics, with occasional snags, are very evident. Management activities may be noticeable.
- Project evidence such as slash should not be noticeable two to three years after work completion, and large tree character should be retained in the foreground area. Hand tools are preferred for fire suppression in the immediate foreground (Forest Service, 1990e).

MA3C emphasizes attractive scenery slightly altered from a natural condition as viewed in the middleground.

- Activities may repeat or introduce form, line, color, or texture common or not to the characteristics landscape, but changes in size, amount, intensity, direction, and pattern must remain visually subordinate.
- Lands: For lands visible for 0.25 to 5 miles from selected travelways, waterbodies, or public use areas, textures or forms are the focus, with groups or stands of trees similar as a unit compared to others that differ in size, texture, or pattern. Continuous canopy is typical, with variety provided by natural openings, rimrock, or rock outcrops.
- The desired future condition calls for masses or vegetation as evident, with a mosaic created by varying canopy levels with natural-appearing edges and forested ridgelines.
- Activities may introduce changes in form, line, color, or texture that are found infrequently or not at all in the characteristic landscape, but must remain subordinate to the visual strength of the characteristic landscape (Forest Service, 1990e).

The monitoring questions and thresholds of concern are as follows:

- is habitat in reserved sites meeting the needs of the pine marten in regard to structure, function, and size as per assumptions; the threshold of concern for this question occurs when more than 10 percent of marten habitat sites have less than 95 percent suitable habitat.
- is the distribution of pine marten habitat meeting species needs, and are areas occupied by pine martens being isolated from genetic interchange by management activities.
- the threshold of concern for all three monitoring questions occurs when more than a 10 percent reduction in the distributional area of pine martens after five years of baseline information is developed (Forest Service, 1990e).

<u>Species Status in the Pipeline Project Area.</u> Past extensive logging and trapping for pelts led to extirpation in some areas of Oregon; however, martens have been re-introduced to Oregon. Due to the loss of mature forest habitat, pine marten populations may be declining in Oregon (Csuti et al., 2001). Pine marten populations in high-elevation habitats are probably stable, but loss of habitat due to human encroachment in low and mid-elevation areas has resulted in population declines and local extirpations (Johnson and O'Neil, 2001). No specific information for species presence is available for Fremont-Winema National Forest.

<u>Habitat.</u> The American marten is associated with forested habitats at any elevation, but will wander through openings and even up into alpine areas. American marten are typically associated with late-seral coniferous forests with closed canopies, large trees, and abundant snags and down wood (Zielinski et al., 2001), but they will use openings in forests if there are sufficient downed logs to provide cover. The type of forest is less important to martens than the forest structure, although they are not found in dry woodlands (Csuti et al., 2001). Wisdom et al.

(2000; Appendix 1, Table 1) list subalpine and montane forests in old multi- and single-story, and unmanaged young multi-story structural stages as providing source habitat for American marten in the Columbia Basin. Lower montane forests are not listed as source habitat (Wisdom et al., 2000). Snags and down logs are identified as special habitat features of source habitat for the marten (Appendix 1, Table 2) (Wisdom, 2000). Down logs provide habitat for prey and subnivean access points. Raphael and Jones (1997) found that down wood and slash piles were important resting and denning structures in the eastern Cascades of central Oregon. Large slash piles and trees with branches that reach to the ground are also important to provide access through the snow during the winter (Forest Service, 1990e).

In the Cascades, marten selected sites with higher canopy closure during snow periods than during snow-free periods (Raphael and Jones, 1997). In Oregon, canopy closure at rest sites in lodgepole pine dominated stands averaged 36% in snow periods and 27% in snow-free periods (Raphael and Jones, 1997). Slauson et al. (2007) also found that larger patch sizes of habitat were important for marten occurrence. Marten used patches over 100 ha (247 acres) at higher rates than availability (Slauson et al., 2007). At the 1-km radius scale, a 10% increase in the amount of logged area was associated with a 23% decrease in marten occurrence (Slauson et al., 2007). Martens were not detected at any sample unit with more than 50% of the area logged in the 1-km radius circle (Slauson et al., 2007).

Pine martens are primarily carnivorous (Csuti et al., 2001) and diet on a variety of mammalian species. They feed on rodents and opportunistically on other small mammals and birds. Winter food sources are critical to marten survival as they carry very little fat reserves on their bodies. (Forest Service, 1990e). Martens will forage underground, on the ground, and on shrub or understory vegetation (Johnson and O'Neil, 2001).

The dens of pine martens are located in trees or underground. They often have multiple dens which they move between during the rearing season (Forest Service, 1990e). Denning takes place in coarse woody debris, slash, snags, and live trees. Parturition takes place in March and April, and mating occurs in June through early August.

Pine martens are associated with the following habitat types that occur within the Fremont-Winema National Forest and which will be affected by construction: they are closely associated with Montane Mixed Confer Forest and occurrence is uncertain in Southwest Oregon Mixed Conifer-Hardwood Forest (Johnson and O'Neil, 2001). They may be present in Eastside Riparian Wetlands at high elevations (Johnson and O'Neil, 2001). Presence of pine martens would depend on appropriate structural conditions including snags, down logs, and rock outcrops (Johnson and O'Neil, 2001).

Forest Management Activities. Fire can negatively affect marten habitat by destroying ground and overhead cover and consuming dead and down material. Recreation activity within the Fremont-Winema National Forest was not considered to be heavy enough to influence this species now or in the foreseeable future, at the time of the Forest Plan completion. Trapping of these fur bearing animals over the last 20 years has been light and localized to small areas. Broad wildlife coordination guidelines which address leaving snags, down material, unit size, shape, and spatial distribution, apply to timber sales and result in the maintenance of habitat.

Effects of the Proposed Action. Within Montane Mixed Conifer Forest and Southwest Oregon Mixed Conifer-Hardwood Forest, pine martens may be present within suitable structural conditions including small tree, medium tree, large tree, and giant tree conditions, singly and multi-story and open moderate and closed canopies, but only if snags, down logs, and/or rock outcrops are present for denning (Johnson and O'Neil, 2001). Removal of 27.24 acres of Montane Mixed Conifer Forest (6.31 acres of late successional-old growth forest, 2.78 acres of mid-seral forest, and 18.16 acres of clearcut-regenerating forest) and 49.22 acres of Southwest Oregon Mixed Conifer-Hardwood Forest (34.80 acres of late successional-old growth forest, 5.04 acres of mid-seral forest, and 9.38 acres of clearcut-regenerating forest) would affect less habitat than the equivalent of one-half of a female home range (160 acres – see discussion above under the Rogue River-Siskiyou National Forest). However, given the lack of association between pine martens and the forested types affected in the Fremont-Winema National Forest, effects to the species could occur but are not likely.

Mitigation. Mitigation measures that would minimize impacts to pine martens include planting trees within the right-of-way after construction. Conifers would be planted to within 15 feet of each side of the centerline. After tree planting, there will be 7.40 acres of former Montane Mixed Conifer and 13.96 acres of former Southwest Oregon Mixed Conifer-Hardwood Forest that will remain in an herbaceous state – the maintenance corridor - during the life of the Pipeline (Table 4-1).

To mitigate for loss of downed wood and snags within the construction right-of-way, PCGP had previously agreed to fund the Forest Service to treat approximately 113 acres by thinning forest and creating small openings adjacent to pipeline corridor along Clover Creek corridor and Dead Indian Road crossing. The projects would include fuel treatments. The treatments would accelerate the development of late successional habitat characteristics of structure. The Forest Service will be reviewing these projects to verify their relevance to the current proposed Pipeline. Implementation of these or similar projects would provide benefits to pine martens within the Fremont-Winema National Forest if they occur. Proposed projects will be included in the CMP.

Forest Plan Consistency. Implementation of the mitigation measures is expected to provide forest structure and function for pine martens in areas that would otherwise be subject to intensive timber harvest. In these respects, the Proposed Action would be consistent with the Forest Plan.

4.6 Bald Eagle

The bald eagle was chosen as a management indicator species for the Forest because it was classified as a threatened species under the ESA (Forest Service, 1990f). However, the species is no longer listed under the Act and was moved to the Region 6 Sensitive Species List as required by the USDA (see discussion under Section 2.7, above, Umpqua National Forest).

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for bald eagles and their habitat:

Applicable Forest Plan Forest-wide Standards and Guidelines. The monitoring objective for the bald eagle is to assure that recovery plan objectives are being met (Forest Service, 1990e). The following are monitoring questions and thresholds of concern for the bald eagle:

- is the bald eagle population approaching recovery objectives? The threshold of concern for this question occurring when more than a 10 percent decline of the bald eagle population in the Klamath Basin.
- are all known and identified potential nest sites protected in accordance with the Recovery Plan and has a site plan for each next been written? The threshold of concern for this question occurs when any site is not protected, and/or when there are more than 10 percent of sites with unfinished site plans two years after implementation.

- For both of these first two questions, concern would occur when an active nest site is unoccupied two years in succession; if this happens, the causes must be determined and the situation corrected, if possible.
- Other monitoring questions include: are nest sites producing young; is the winter roost receiving use, with concern if the decrease of winter roost use is greater than 20 percent over the previous two years average; is management of bald eagle replacement habitat producing stand conditions that meet objectives for large trees, with concern if silviculturally treated replacement areas are not releasing or achieving growth rates as anticipated five years after implementation; and is replacement area habitat receiving use by the bald eagle, with concern if there is no use of the replacement area within ten years of implementation (Forest Service, 1990e).

Management Prescriptions. All management areas through which the Pipeline will pass are to be monitored for the bald eagle, which includes 3A, 3B, and 3C. See description for Pine Marten, above. The nesting and roosting season is January 1 through August 31, and the required protection zone is 440 yards (Forest Service, 1990e).

Species Status in the Pipeline Project Area. There are two bald eagle nests within the Fremont-Winema National Forest (Fish Lake 543 and Fish Lake 1227) in the vicinity of the Pipeline but each is farther than one mile away. One nest was recently used in 2006 and the other, an alternate nest site, was used in 2003. The National Audubon Society (2017) has conducted Christmas Bird Counts (CBC) annually within the Klamath Falls Count Circle through 2016. The Klamath Falls Count Circle is 1.6 miles from the Pipeline and 21.7 miles from where the Pipeline crosses the Fremont-Winema National Forest. Bald eagles have been observed each year within the Klamath Falls CBC and are reported as numbers counted per observational hour. Since 1992, the number of bald eagles counted per hour has significantly increased ($p<0.01$), shown in Figure 4-1 (National Audubon Society, 2017). Wintering bald eagles have likewise been significantly increasing along the Pacific and within the Great Basin (see Steenhof et al., 2008). A similar increase in wintering bald eagles is expected in the Fremont-Winema National Forest. Bald eagles are fairly common breeders at Upper Klamath Lake.

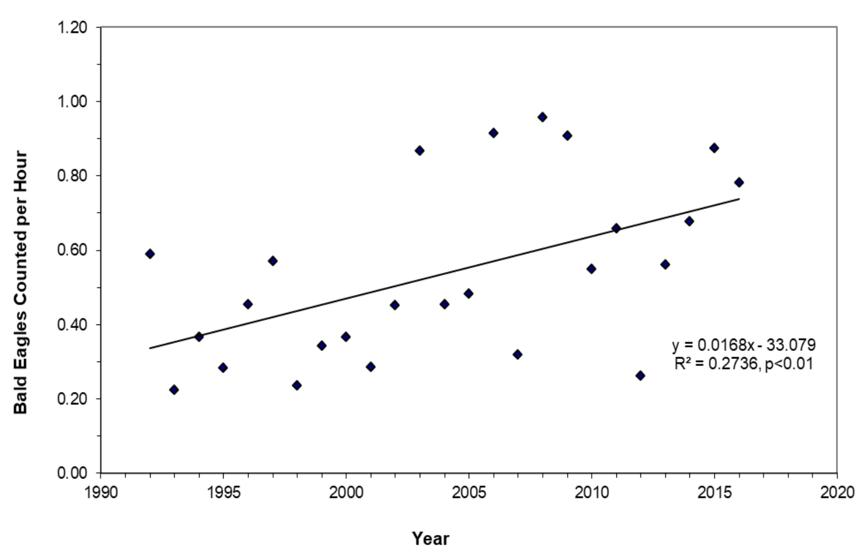

Figure 4-1
Bald Eagles Counted per Hour during National Audubon Society's Christmas Bird Count in the Klamath Falls Count Circle 1992- 2016 (data from National Audubon Society, 2017).

Habitat. The bald eagle is a year-round resident when food is available. Essential habitat elements of the bald eagle are nest sites, communal night roosts, foraging areas, and perch sites. Nests consist of bulky stick platforms built in the super-canopy of trees, or less frequently on cliffs. They are typically constructed within one mile of appropriate foraging habitat, which includes rivers and large (typically 90 surface acres or greater) lakes and reservoirs. All nests observed in Oregon have been in trees, primarily Sitka spruce and Douglas-fir west of the Cascades, and ponderosa pine, Douglas-fir, and sugar pine in eastern Oregon. Nests are usually built in live trees, but they will reuse the nest after the tree dies (Marshall, et al., 2006). Large snags, dead-topped trees, and live open-limbed trees within the nest stand is important for providing perch sites for the adults and landing sites for the fledglings. Bald eagles are sit-and-wait predators, which predominantly capture prey from perches over water; ideal perches are large trees and snags within 330 feet (100 meters) of water (Anthony et al., 1995). When they are not breeding, they may congregate where food is abundant, even away from water.

Bald eagles are associated most habitats within the Fremont-Winema National Forest in proximity to waterbodies, including Southwest Oregon Mixed Conifer-Hardwood Forest and Montane Mixed Conifer Forest.

Effects of the Proposed Action. Potential effects to bald eagles by the Proposed Action within the Fremont-Winema National Forest are expected to be the same as described above for effects in the Umpqua National Forest. Habitat destruction through logging, road construction, and recreational development has in the past had the most affect on this species throughout its range. Recent public awareness and concerns have reduced this kind of detriment, at least on public lands. Unintentional harassment or malicious destruction of nests and shooting eagles does occur, although it has not been a problem on this Forest. Public awareness has benefited this species. The current management for this species requires, as a minimum, preparing a site-specific management plan for each bald eagle site. Plans will be coordinated and reviewed with the FWS (Forest Service, 1990f). One bald eagle nest located in the Fremont-Winema National Forest is just beyond one mile from the Proposed Action. However, because the nesting pair is beyond 1 mile of the Pipeline, no effects to the nesting bald eagle pair is expected.

Mitigation. No mitigation specifically targeting impact to bald eagles is proposed in the Fremont-Winema National Forest.

Forest Plan Consistency. The Proposed Action will be consistent with Forest Plan Standards and Guidelines to meet the requirements of the Endangered Species Act of 1973, related to management of bald eagles.

4.7 Mule Deer

The mule deer is listed as an indicator species because of its economic importance (Forest Service, 1990e). Summer and winter range habitat are both important to the mule deer since their survival depends on the condition and presence of winter range, and on early successional vegetation stages or non-forest habitat for forage in summer range (Forest Service, 1990f). Deer summer range capability indices are useful indicators for species needing non-forested habitat for survival (Forest Service, 1990f).

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for mule deer and their habitat:

Applicable Forest Plan Forest-wide Standards and Guidelines. Mule deer habitat is supposed to be managed, taking into account all factors such as roads, cover, forage, water distribution, and livestock competition, so that habitat capability to support deer is maintained or improved. On limited site-specific instances, short-term decreases (less than 10 years) are acceptable to achieve long-term benefits. Effects will usually be calculated for projects on areas ranging from 8,000 to 60,000 acres. Habitat suitability models, such as the Interagency Technical Advisory Committee Mule Deer Model, 1985 as amended, may be used in some projects; for example, with timber sales, grazing plans, road construction and water development (Forest Service, 1990e).

The Forest is supposed to provide a minimum of 30 percent of its area as cover for deer; generally, 15 percent of the area will be hiding cover, 10 percent will be thermal cover, and 5 percent will be cover for fawning. All cover also will be hiding cover, whenever possible. A short-term reduction of cover to 15 percent of an area may be justified on a project-specific basis if reduction below 30 percent cover will provide long-term (greater than 10 years) benefits for deer. To provide adequate diversity of forage structure for deer, activities shall be planned to achieve multiple age classes in the brush vegetative component. Wildlife forage will be allocated to meet the needs of big game first, and then to meet the needs of other animals. (Forest Service, 1990e).

The monitoring objectives for the mule deer are to assure that habitat objectives are met, and to validate habitat assumptions. The monitoring questions and thresholds of concern are:

- what is the relationship between habitat and population, and what is the habitat variable that most limits the population of mule deer, with a decline exceeding 10 percent of 1990 populations of mule deer on any management unit influenced by the Forest being of concern, as well as a cumulative decrease of habitat suitability greater than 5 percent over five years and/or a cumulative decrease of habitat suitability index factors greater than 5 percent over five years being of concern.
- what are the cumulative effects of open roads, alterations in cover, alterations of forage, livestock competition, water developments, and cover/forage distribution on deer habitat suitability, and what is the primary cause of the decline of herds in the area, with the thresholds of concern the same as mentioned previously.
- what is the longevity of mule deer habitat structural and nonstructural improvements, with concern shown when the functional or structural failure rate of structural or nonstructural habitat improvements exceeding 10 percent over five years and/or failure to maintain 95 percent of structural improvements over five years, with minor maintenance expected and not considered a failure (Forest Service, 1990e).

Management Prescriptions. This affects all management areas through which the Pipeline will pass, which includes 3A, 3B, and 3C (Forest Service, 1990e). See management descriptions for Pine Marten, above.

Species Status in the Pipeline Project Area. Long-term, systematically collected data are available for this species, collected annually by the ODFW. Data are collected on population trends, sex ratios, winter mortality, and harvest. Within Fremont-Winema National Forest, seven ODFW Management Units occur: Fort Rock, Silver Lake, Sprague, Klamath Falls, Interstate, Rogue, and Keno. ODFW's Keno Hunt Management Unit 31 coincides with the portion of the Fremont-Winema National Forest within which the Proposed Action is located (MPs 168.85-175.38). ODFW (2018a) has compiled harvest data on mule deer within Wildlife Management Unit 31 through the 2016 season (ODFW, 2018a). Total mule deer harvest appears to be cyclic and has increased within the WMU from 2003 through 2007 and again from 2008 through 2011 and 2012 through 2016. During the same period of time, the same cyclic pattern has been observed where percent hunter success has increased through 2014 and the number of days per mule deer harvested has decreased through 2016, although no significant trends were observed (Table 4-3).

Table 4-3
Harvest Statistics for Mule Deer within the Keno Wildlife Management Unit 31, 2003-2016

Year	Total Hunters	Total Hunter Days	Harvest: Total Males (antlered)	Harvest: Total Non-Males (non-antlered)	Harvest: Total	Days per Harvest	Percent Hunter Success
2016	1504	not reported	443	1	444	not available	30
2015	1446	not reported	396	1	397	not available	27
2014	1340	8177	426	1	427	19	32
2013	1366	8296	489	0	489	17	36
2012	1205	7329	372	0	372	20	31
2011	1153	7095	495	0	495	14	43
2010	1181	7861	259	0	259	30	22
2009	1139	7138	270	0	270	26	24
2008	1007	6468	218	0	218	30	22
2007	1241	7951	472	0	472	17	38
2006	1146	6216	373	0	373	17	33
2005	1208	7528	366	0	366	21	30
2004	1101	7432	292	0	292	25	27
2003	1185	6343	223	0	223	28	19

Harvest data for Keno WMU 31 suggests that the mule deer population could be cyclic and as it increases, hunter success increases with decreased levels of effort. Annual reports for each WMU provided by ODFW include 1) a population index - ODFW's Trend Count for animals in the WMU (ODFW, 2018b), conducted along a fixed route each year, usually at the end of winter, 2) productivity (young per female from ODFW's Composition Count data reported in December), and 3) an estimate of the maximum overwinter juvenile survival rate (derived from composition count data in December and composition count data the following March). There is no significant trend in fawns per doe (young per adult female) nor is there any significant trend in ODFW's Trend Count in Table 4-4. Estimated young overwinter survival relative to adult overwinter survival indicates that juvenile mule deer in the Keno Wildlife Management Unit 30 have had moderate to high overwinter survival rates relative to adult deer since estimates ranged from 0.52 to 1.44 (Table 4-4).

Table 4-4
Population Trends, Annual Productivity, and Estimated Overwinter Survival for Juvenile Mule Deer within the Keno Wildlife Management Unit 31, 1998-2012

Year	Population Index [1]	Young per Adult Female [2]	Young per Adult – Fall (Ratio A) [3]	Young per Adult – Spring (Ratio B) [4]	Maximum Overwinter Juvenile Survival Rate [5]
2012	5.1	0.69	0.58	0.33	0.65
2011	-	0.64	0.51	-	-
2010	1.5	0.68	0.60	0.41	0.74
2009	4.1	0.66	0.56	0.53	1.44

2008	5.6	0.42	0.37	-	-
2007	6.0	0.63	0.53	0.38	0.80
2006	-	0.58	0.48	0.30	0.54
2005	2.0	0.64	0.55	0.50	0.98
2004	5.0	0.60	0.51	0.33	0.92
2003	5.5	0.48	0.36	0.32	0.52
2002	5.6	0.75	0.61	0.35	-
2001	5.6	-	-	0.33	0.76
2000	4.9	0.53	0.44	0.33	0.63
1999	3.9	0.61	0.53	0.50	0.90
1998	3.7	0.63	0.56	0.47	-

[1] **Population Index** is ODFW's Trend Count for the Hunt Area which is conducted along a fixed route each year, usually at the end of winter (ODFW, 2018b).
[2] **Productivity** data is young per female from ODFW's Composition Count data reported as Young per 100 Females counted in December (ODFW, 2018b).
[3] **Ratio A** (White et al., 1996) is the ratio of Young per Adult, derived from Composition Count data (Males per 100 Females and Young per 100 Females) counted in December (ODFW, 2018b).
[4] **Ratio B** (White et al., 1996) is the ratio of Young per Adult (Young per 100 Adults) counted in March (ODFW, 2018b).
[5] **Maximum Overwinter Juvenile Survival** is related to ratios ***A*** and ***B*** and to the following relationship of adult over-winter survival rate ($\hat{S}_a$) and juvenile over-winter survival rate ($\hat{S}_j$) by the formula (see equation 9 in Paulik and Robson, 1969): $\hat{S}_j / \hat{S}_a = \boldsymbol{B/A}$ or $\hat{S}_j = \hat{S}_a\,(\boldsymbol{B/A})$. Since many of the estimates of maximum juvenile survival rates are greater than 1, they indicate survival of adults was less than juveniles over winter which is highly unlikely.

Although population data for mule deer in Wildlife Management Unit 31 are limited, the number of fawns per doe appears to have been declining since 2002 although the trend is not significant (Figure 4-2).

Habitat. Optimal mule deer habitat is generally described as a mix of hiding, thermal, and fawning cover, and foraging habitat. They are found throughout Oregon, east of Cascades and ranges into Cascades in summer. They spend summer at higher elevations and move back to lower elevations during winter though not all populations exhibit marked movements (Johnson, and O'Neil, 2001). Mule deer in central Oregon are a migratory group of animals that roam a vast mountainous summer range and crowd into relatively small winter ranges (Dealy, 1971). Currently, they are confined mainly to open woods or isolated mountain ranges (Csuti et al., 2001).

Mule deer are browsers and grazers. Bitterbrush is an important component of summer range habitat; Gay (1998) found that bitterbrush along with other non-sprouting shrubs dominate summer deer diets in pumice influenced zones. Bitterbrush is a very valuable browse species for the diets of mule deer because the twigs and leaves contain high levels of protein (Clark and Britton, unk.). Grasses and forbs compose the bulk of spring diets.

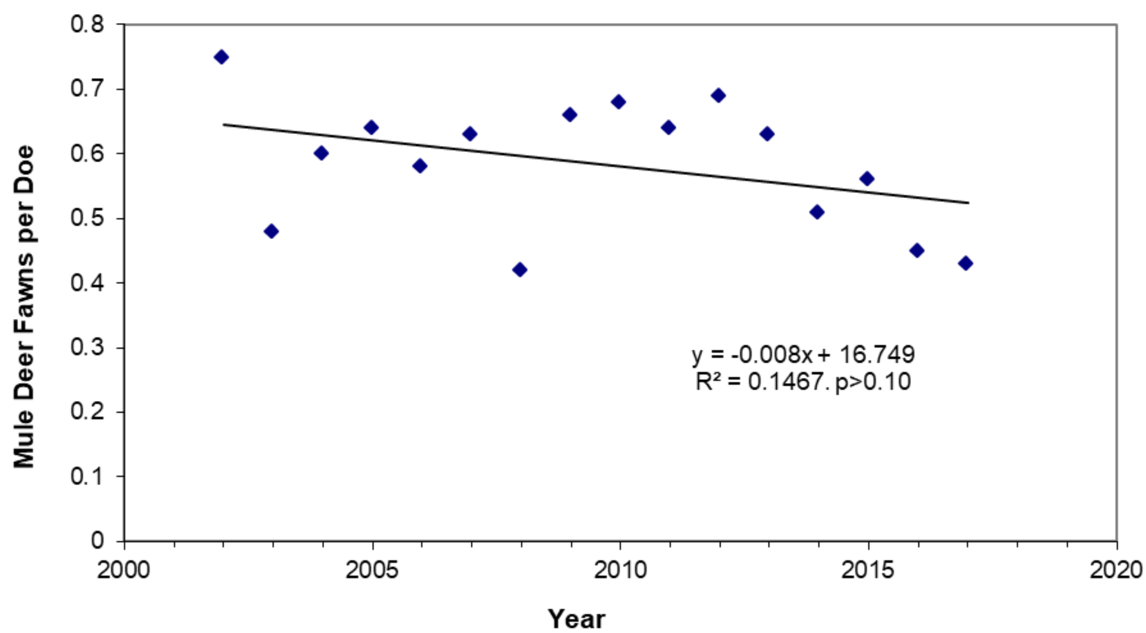

Figure 4-2
Trend in Productivity (Fawns per Doe) for Mule Deer in the Keno Wildlife Management Unit 31 which Coincides with the Pipeline in the Fremont-Winema National Forest (data from ODFW, 2018b)

Summer thermal cover minimizes metabolic and time costs associated with heat dissipation (Demarchi and Bunnel, 1993). Thermal cover can be provided by shrubs, juniper woodlands, or physical objects such as boulders and ledges (Peek et al., 1999). Hiding cover habitat is used for escape and protection from predators and humans (Peek et al., 1999). Optimal hiding cover is defined as that which is within 600 feet (183m) of cover (cover being defined as a stand that is at least 60 percent cover), and can hide 90 percent of a deer at 200 feet, which omits less dense vegetation types that deer also recognize as cover (Gay, 1998).

Mule deer are generally associated with most of the habitats crossed by the Proposed Action within Fremont-Winema National Forest including Montane Mixed Conifer Forest, Southwest Oregon Mixed Conifer-Hardwood Forest, Eastside (Interior) Riparian-Wetlands where structural conditions provide for cover, and Eastside (Interior) Grasslands generally used for feeding (Johnson, and O'Neil, 2001). No mule deer wintering ranges would be crossed within the Fremont-Winema National Forest.

Effects of the Proposed Action. Effects to mule deer in the Fremont-Winema National Forest are expected to be similar to effects to Columbian black-tailed deer described above for the Umpqua National Forest. Direct mortality of mule deer due to the Proposed Action is possible if vehicles collide with animals traveling to and from construction sites (see discussion under Umpqua National Forest, Section 1.5, above). Mule deer would be expected to avoid noise from vehicles and/or increased road traffic, blasting, and aerial fly-overs. Following reclamation of the pipeline corridor, mule deer may utilize the corridor for travel and for foraging, depending on vegetation species planted and rapidity of successful revegetation. After construction, there will possibly be a secondary impact (Comer, 1982) on harvest rates with upgraded access to previously inaccessible areas; hunters are expected to achieve greater success, at least temporarily, with increased access. In addition, increased access could increase poaching of game animals and nongame wildlife on a local level (see discussions under Umpqua National Forest, Section 1.5, above). The Proposed Action will remove 76.46 acres of Montane Mixed Conifer Forest and Southwest Oregon Mixed Conifer-Hardwood Forest, 0.26 acres of Forested Wetlands, and 0.91 acre of Eastside Grasslands (Table 4-1).

Mitigation. The pipeline right-of-way provides an opportunity for developing high quality feeding areas (Lees, 1989) for deer species, especially if noxious weeds are controlled and high quality native forage is seeded. As required by FERC's Upland Plan, PCGP consulted with the NRCS, the BLM, and the Forest Service regarding specific seeding dates and recommended seed mixtures for the Pipeline project, including important winter forage species, such as wedgeleaf ceanothus, in riparian areas and areas outside of the 30-foot maintenance corridor on National Forest lands. The ECRP describes the procedures that will be implemented to minimize erosion and enhance revegetation success, the procedures that will be utilized to minimize the spread of noxious weeds as a result of construction, and the silvicultural prescriptions that will be implemented in areas that are outside the permanent easement. Seeding mixtures and inhibition of noxious weeds will enhance forage production.

Vegetation management over the long-term will benefit winter range browse and forage for mule deer. Vegetation within the 30-foot maintenance corridor will be periodically maintained by mowing, cutting, and trimming (either by mechanical or hand methods). In upland areas, the 30-foot maintenance corridor will be maintained in a condition where trees or shrubs greater than 6 feet tall will be controlled (cut or trimmed) within 15 feet either side of the centerline (for a total of 30 cleared feet). Maintenance activities are expected to occur approximately every 3-5 years depending on the growth rate of vegetation. During maintenance, vegetation will be cut/trimmed in 4 to 6-foot lengths and scattered across the permanent easement to naturally decompose and to discourage OHV traffic, benefit wildlife habitat, and to decompose naturally.

Open trenches during construction have the potential to entrap deer. Within delineated big-game winter and summer range, PCGP will leave trench segments (>5 feet wide) of the proposed alignment untrenched and herbaceously vegetated (every 0.5 mile and at visible wildlife game trails) to serve as a route (i.e., green bridge or landscape connector) for big game across the construction right-of-way until pipe is ready to be installed (Forman et al., 2003). Alternatively, PCGP will install soft plugs (backfilled trench materials) in the trench after excavation at these distances to provide wildlife passage. Additionally, 20-foot gaps will be left in spoil and topsoil stockpiles at all hard or soft plug locations and a corresponding gap in the welded pipe string will be left in these locations. Suitable ramps will be installed from the bottom of the trench to the top to prevent potential wildlife entrapment within the trench.

Previously, PCGP had agreed to fund projects proposed by the Forest Service in the Fremont-Winema National Forest that included erecting 6 miles of let-down fence along Clover Creek Road and installing 3 cattle guards within the Forest. Fencing would protect wetland and riparian areas from livestock within the Spencer Creek Watershed. PCGP had also agreed to fund the Forest Service to treat approximately 113 acres by thinning forest and creating small openings adjacent to pipeline corridor along Clover Creek corridor and Dead Indian Road crossing. The projects would include fuel treatments. The Forest Service will be reviewing these projects to verify their relevance to the current proposed Pipeline. Implementation of these or similar projects would accelerate the development of late successional habitat characteristics of structure while reducing risks of stand-replacing wildfires. Proposed projects will be included in the CMP.

Forest Plan Consistency. The Proposed Action will result in forest removal but revegetation within the right-of-way following construction will create early seral forest that will eventually provide forage, thermal and hiding cover and the 30-wide maintenance corridor will provide for travel and forage for the life of the Pipeline. The Proposed Action and mitigation projects proposed within the Fremont-Winema National Forest will be consistent with the Forest Plan.

4.8 Resident Trout

Resident trout are indicator species for riparian and aquatic ecosystems. All trout species in the Fremont-Winema National Forest that are desirable are considered as MIS. This includes native redband trout, native bull trout, and the introduced game fish; rainbow trout, brook trout, brown trout, and lake trout. Trout habitat requirements are narrow enough to represent nearly all other fish species. Trout as a group are moderately reliable in representing favorable habitat for other fish species and the presence, or potential of, other species.

The following Standards and Guidelines and Management Prescriptions were identified in the Forest Plan to conserve and manage for resident trout and their habitat:

<u>Applicable Forest Plan Forest-wide Standards and Guidelines.</u> The monitoring element is for fish habitat generally, and is not specified for resident trout. Monitoring questions and thresholds of concern include:

- is fish habitat capability increasing to the 80 percent level, and is the fish population changing in terms of numbers, species composition, or age structure, with the threshold of concern being any decline over three years or more of fish numbers or numbers of fish species.
- what are the effects of fish habitat improvement structures on stream channel configuration, large woody material, and fish populations, with concern with any decline in pool volume, area, or average maximum depth of Class I or Class II streams.
- what is the longevity of stream habitat structures, with concern when functional or structural failure rate of habitat improvement structures exceeding 20 percent over five years, with minor maintenance expected and not considered failure.
- what are the cumulative effects of activities on fish habitat capability and the aquatic ecosystem, with concern when a one scale-class reduction in the community tolerance quotient for macroinvertebrates as measured at established critical reach stations by basin.

<u>Management Prescriptions</u>. *MA 18-Fish and Aquatic Habitat and* all Management Areas through which the Pipeline will pass, which includes 3A, 3B, and 3C. See Pine Marten.

Streams shall be managed to maintain or to improve the present level of native fish habitat capability (Forest Service, 1990e).

<u>Habitat.</u> Within the Fremont-Winema National Forest, the Pipeline crosses one perennial stream (Spencer Creek supports resident trout) and four intermittent tributary streams (fish presence is unknown for three and assumed for the fourth) within the Spencer Creek Fifth Field Watershed. Riparian zones associated with Spencer Creek and the tributaries that will be crossed are forested with late successional-old growth forest, mid-seral forest, and regenerating forest (Table 4-5).

Table 4-5
Summary of Habitats Removed by the Proposed Action from Riparian Zones Extending One-Site Potential Tree Height From Stream Banks and Riparian Reserves in the Fremont-Winema National Forest

Fifth Field Watershed (Hydrologic Unit Code) and Riparian Zone	Forested Habitat [1]					Other Habitat [1]						Total Riparian Zone Impact(acres)
	Late Successional - Old Growth	Mid-Seral Forest	Regenerating Forest	Clearcut Forest	Forest Total	Forested Wetland	Non-Forested Wetland	Unaltered Non-Forested Habitat	Agriculture	Altered Habitat	Other Total	
Spencer Creek (HU 1710030206)												
One Site Potential Tree Height (187 feet) and Riparian Reserve	1.59	0.34	1.82	0	**3.74**	0	0.26	0.04	0	0.13	0.42	**4.16**

Species Status in the Pipeline Project Area. Oregon Department of Fish and Wildlife (ODFW) has conducted stream surveys and population surveys, downstream of the Pipeline project, and have identified Spencer Creek as a critical spawning area for Klamath River Redband trout (BLM, 2008). However, ODFW (2012b) determined that the distribution of redband trout in Spencer Creek does not extend upstream from Buck Lake, including the reach that will be crossed by the Proposed Action.

Effects of the Proposed Action. Construction of the Proposed Action will remove a total of 3.74 acres of forested vegetation within one site-potential tree height of all riparian zones crossed and within Riparian Reserves crossed in the Fremont-Winema National Forest (Table 4-5). Effects to salmonids, to instream habitats, and to riparian zones during construction and operation were analyzed and discussed in detail in the Biological Assessment and summarized above in Section 2.8 for the Umpqua National Forest. The same effects are expected for stream crossed within the Fremont-Winema National Forest.

Effects of the Proposed Action on a population of Oregon spotted frogs inhabiting Buck Lake were included in the Biological Assessment. Effects due to crossing Spencer Creek included potential impacts by acoustic shock from blasting, turbidity generated during instream construction, introduction of nonnative species and pathogens, accidental release of petroleum products, and application of herbicides. None of the potential impacts was found to adversely affect Oregon spotted frogs in Buck Lake. The same conclusion would apply to redband trout. PCGP would follow the ODFW recommended in-water construction window for Spencer Creek and other fish-bearing waterbodies in this area (July 1 through September 30; ODFW, 2008), which would minimize effects to redband trout.

Mitigation. Conservation measures to mitigate effects to salmonids within streams impacted by construction have been provided and discussed in the Biological Assessment for the Proposed Action and summarized in Section 2.8 for the Umpqua National Forest. The mitigation measures would be implemented within the Fremont-Winema National Forest.

Previously, PCGP had agreed to fund other projects proposed by the Forest Service on Fremont-Winema National Forest that included erecting 6 miles of let-down fence along Clover Creek Road and installing 3 cattle guards within the Forest. Fencing would protect wetland and riparian areas from livestock within the Spencer Creek Watershed. PCGP had also agreed to fund the Forest Service to treat 500 acres by thinning forest and creating small openings adjacent to pipeline corridor along Clover Creek corridor and Dead Indian Road crossing. The projects would include fuel treatments. Funding would also be used to restore stream contours, improve riparian vegetation, and replace culvert, if needed, at one site. The Forest Service will be reviewing these projects to verify their relevance to the current proposed Pipeline. Implementation of these or similar projects would accelerate the development of late successional habitat characteristics of structure while reducing risks of stand-replacing wildfires. Proposed projects will be included in the CMP.

Forest Plan Consistency. The Proposed Action and proposed mitigation measures will maintain present level of native fish habitat capability and be consistent with the Forest Plan.

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APPENDIX F.7

Biological Evaluation

Appendix F.7

Pacific Connector Gas Pipeline Project

Biological Evaluation

October 2019

Prepared by:

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Acronyms and Abbreviations

BA	Biological Assessment
BB	Breeding Bird Survey
BCR	Bird Conservation Region
BE	Biological Evaluation
BI	Beneficial Impact
BLM	Bureau of Land Management
BMP	best management practices
CR	Clearcut-Regenerating
dB	decibels
dBA	A-weighted decibels
dbh	diameter at breast height
DEIS	Draft Environmental Impact Statement
ECRP	Erosion Control and Revegetation Plan
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
Forest Service	U.S. Department of Agriculture, Forest Service
FWS	U.S. Fish and Wildlife Service
GAP	Gap Analysis Project
GIS	Geographical Information System
HDD	Horizontal Directional Drilling
ISSSSP	Interagency Special Status/Sensitive Species Program
LAA	Likely to Adversely Affect
LNG	liquefied natural gas
LO	Late Successional-Old Growth
LRMP	Land and Resource Management Plan
LSR	Late-Successional Reserve
LWD	large woody debris

MIIH	May Impact Individuals or Habitat but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species
MP	milepost
MS	Mid-Seral
NE	No Effect
NFS	National Forest System
NJ	Not likely to jeopardize the continued existence for proposed species
NLAA	Not Likely to Adversely Affect
NRIS	Natural Resource Information System
NSO	northern spotted owl
NWFP	Northwest Forest Plan
NWR	National Wildlife Refuge
NI	No Impact
ODFW	Oregon Department of Fish and Wildlife
ORBIC	Oregon Biodiversity Information Center
Pacific Connector	Pacific Connector Gas Pipeline, LP
PCT	Pacific Crest Trail
POD	Plan of Development
Project	Pacific Connector Gas Pipeline Project
RFSSS	Regional Forester's Special Status Species
ROW	right-of-way
SBS	Siskiyou BioSurvey, LLC
TEWA	Temporary Extra Work Area
UCSA	Uncleared Storage Area
U.S.C.	United States Code
WOFV	Will Impact Individuals or Habitat with a consequence that the action will contribute to a trend toward Federal listing or cause a loss of viability to the population or species

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1.0 INTRODUCTION

This Biological Evaluation (BE) evaluates potential impacts to U.S. Department of Agriculture, Forest Service (Forest Service) sensitive species on National Forest System (NFS) land from the construction and operation of the Pacific Connector Gas Pipeline Project (Project), proposed by Pacific Connector Gas Pipeline, LP (Pacific Connector). The proposed Project consists of an approximately 229-mile natural gas pipeline, of which about 30.7 miles cross the Umpqua, Rogue River, and Winema national forests in Oregon. Species considered in this BE are those listed by the Forest Service as sensitive species from the July 21, 2015 Regional Forester's Special Status Species (RFSSS) List, that can be found on the Interagency Special Status/Sensitive Species Program (ISSSSP) website (ISSSSP 2015)[1]. Impacts to species that are listed or proposed for listing under the federal Endangered Species Act (ESA; 16 United States Code [U.S.C.] §§ 1531 et seq.) are discussed in FERC's Biological Assessment[2] (BA; FERC 2019a), and are not discussed in this BE, with the exception of the Pacific fisher (*Pekania pennanti*) due to the recent status change of this species. Survey and Manage Species that have the potential to be affected by the Project on NFS land, including species that are also Forest Service sensitive species, are not discussed in this BE, but instead are discussed in the Survey and Manage Species Persistence Evaluation, Appendix F.5 to the Final Environmental Impact Statement (FEIS; FERC 2019b).

2.0 PROPOSED ACTION AND ACTION ALTERNATIVES

As filed with the Federal Energy Regulatory Commission (FERC) on September 21, 2017, under FERC Docket No. CP17-494-000, the Project consists of a new approximately 229-mile, 36-inch-diameter, natural gas pipeline and associated aboveground facilities. The Project extends from the town of Malin in Klamath County, Oregon, traverses Jackson, Douglas, and Coos counties, and terminates at a new liquefied natural gas (LNG) export terminal (Jordan Cove LNG Terminal) on the North Spit of Coos Bay, Oregon (Figure 1). The pipeline would cross approximately 10.8 miles of the Umpqua National Forest, 13.9 miles of the Rogue River National Forest, and 6.0 miles of the Winema National Forest. The pipeline right-of-way (ROW) would generally consist of a 95-foot-wide construction corridor, 65 feet of which would be allowed to revegetate after construction is completed. A more detailed description of the Project, including its Purpose and Need, can be found in Section 2.0 of the FEIS (FERC 2019b).

[1] The 2015 RFSSS list was used for this Biological Evaluation because the Project was initiated prior to transmittal of the 2019 RFSSS list. Per the Instruction Memorandum provided with the transmittal of the 2019 RFSSS list, projects initiated prior to transmittal of the 2019 RFSSS list may use either the 2019 RFSSS list or the RFSSS list that was in effect when the Project was initiated.
[2] Franklin's bumble bee (*Bombus franklini*) is addressed in a supplemental public filing with the FWS because it was proposed as endangered under the federal ESA after FERC published the BA. This species is also addressed in section 4.6 of the FEIS (FERC 2019b).

Figure 1. General Location of the Proposed Project

Alternatives to the proposed action considered on NFS land include the no action alternative, major route alternatives (alternative route segments), and pipeline variations (minor route variations) (FERC 2019b, Pacific Connector 2017). The no action alternative is assumed to have no impact on the species discussed in this BE, and is not discussed further. Major pipeline alternative routes are alternative routes greater than 1 mile in length; no alternatives that avoided NFS land entirely could be identified due to ownership patterns in Southwest Oregon (FERC 2019b, Pacific Connector 2017). Nonetheless, during preliminary route selection and the feasibility analysis, numerous alternative route segments were analyzed, and this selection process is summarized here.

During the course of refining the route alignment for the currently proposed route, Pacific Connector incorporated several minor route variations on NFS lands to avoid impacts to rare Survey and Manage fungi. These minor route variations were included in the September 2017 application (Pacific Connector 2017), and thus have been incorporated into the proposed action. In some instances, the Forest Service determined that Pacific Connector's initial minor realignments were inadequate based on species persistence evaluations and proposed additional realignments. Pacific Connector agreed to make these adjustments, and subsequently filed minor route adjustments that comply with Forest Service requirements. The FERC Draft Environmental Impact Statement (DEIS) additionally recommended that Pacific Connector incorporate into the proposed route a variation that avoids impacts to *Sarcodon fuscoindicus* (a Survey and Manage fungi species; FERC 2019c). As Pacific Connector has since filed this variation as part of the proposed route, the BE has been updated to reflect this change.

Other minor route variations were incorporated into the proposed route to avoid and minimize potential impacts to following: cultural resources, a rock quarry, Riparian Reserves, northern spotted owl (NSO; *Strix occidentalis caurina*) nest sites, waterbody crossings, dispersed recreation areas, late-successional reserves (LSR), wetlands, and visual impacts to the Pacific Crest Trail (PCT).

As the majority of the major and minor route alternatives discussed here have either been discounted or incorporated into the proposed action, impacts to each species discussed in this BE are not evaluated for each of these alternatives; Sections 3.0 through 6.0 of this BE address the proposed action only. In December 2018, Pacific Connector filed two additional[3] pipeline variations on NFS lands at the request of the Forest Service (East Fork Cow Creek Variation and Pacific Crest Trail Variation). The FERC DEIS recommended that Pacific Connector incorporate these variations into the proposed route; as Pacific Connector has since filed these variations as part of the proposed route, the BE has been updated to reflect these changes. A detailed alternatives analysis can be found in Resource Report 10 of the Application for Certificate of Public Convenience and Necessity filed with FERC on September 21, 2017 (Pacific Connector 2017a), and in Section 3 of the DEIS (FERC 2019c) and FEIS (FERC 2019b).

[3] In addition to the Survey and Manage Species Variation discussed above to avoid impacts to *Sarcodon fuscoindicus*, which was also recommended to be incorporated into the proposed route in the DEIS (FERC 2019c).

3.0 PRE-FIELD REVIEW

Species considered in this BE are those considered Forest Service sensitive species that have documented or suspected occurrences in one or more of the national forests crossed by the Project, per the ISSSSP (2015). A documented occurrence means that a species is known to be located on land administered by the Forest Service based on historic or current known sites of a species, reported by a credible source and for which the Forest Service has knowledge of written, mapped, or specimen documentation of the occurrence (ISSSSP 2015). A suspected occurrence means that the species is not documented on land administered by the Forest Service, but may occur on the unit because: 1) the National Forest is considered to be within the species' range and 2) appropriate habitat is present; or 3) there is a known occurrence of the species (historic or current) in close enough vicinity that the species could occur on NFS land (ISSSSP 2015).

Additional desktop information on sensitive species occurrence is based on data from the Oregon Biodiversity Information Center (ORBIC 2017) and the Forest Service Natural Resource Information System [NRIS] database (Forest Service 2017), as well as from aerial photographs and other publicly-available Geographical Information System (GIS) databases (Pacific Connector 2017). Sources of habitat, range, status, threats, and natural history information for each species included: ISSSSP species fact sheets (ISSSSP 2018), NatureServe (2013), the Atlas of Oregon Wildlife (Csuti et al. 2001), and Wildlife Habitat Relationships in Oregon and Washington (Johnson and O'Neil 2001), as well as additional sources specific to the species (see Sections 6.2.1 to 6.2.8). Results of this review, including expected habitats and documented or suspected occurrences on NFS lands, are presented in Section 6.0 for species potentially impacted by the Project, and in Appendix A for species not expected to be impacted by the Project.

4.0 RESULTS OF FIELD SURVEYS

Biological surveys were conducted in the Project area by Siskiyou BioSurvey, LLC (SBS) and its subcontractors. Initial surveys were conducted in the spring of 2007. Additional surveys were conducted in 2008, 2010, and 2014, as well as between 2014 and 2018, to account for minor route alternatives and to survey access roads and laydown areas, as well as to conduct persistence surveys for Survey and Manage species (Forest Service and BLM 2001, SBS 2011a, SBS 2011b, SBS 2011c, Pacific Connector April 27, 2015 response to FERC data request, Krantz 2018).

Only Forest Service sensitive species are evaluated in this document; however, target species during surveys also included federal and state-listed threatened and endangered species and other special-status species. Special-status species groups included Bureau of Land Management (BLM) Oregon/Washington State Director Special Status Species, and Region 6 Survey and Manage species that included vascular plants, non-vascular plants, fungi, and mollusks. Forest Service sensitive species detected on NFS land during Project surveys conducted in 2007-2018 include two terrestrial invertebrates (mollusks) and four vascular plants:

- Terrestrial Invertebrates:
    - Traveling sideband (*Monadenia fidelis celeuthia*); and
    - Siskiyou hesperian (*Vespericola sierranas*).
- Vascular plants:
    - Umpqua mariposa lily (*Calochortus umpquaensis*);
    - Pine woods cryptantha (*Cryptantha simulans*);
    - California globe mallow (*Iliamna latibracteata*); and
    - Bellinger's meadowfoam (*Limnanthes floccosa* ssp. *bellingeriana*).

Additional, federally listed and proposed and Survey and Manage species that are also Forest Service sensitive species were documented during surveys; however, these species are discussed in FERC’s BA (FERC 2019a), and Survey and Manage Species Persistence Evaluation (Appendix F of FERC’s EIS), respectively. With the exception of the Pacific fisher as described above, they are not discussed in this BE. However, the occurrence and impact determinations for these species are summarized in Section 5.

5.0 SPECIES IMPACT DETERMINATION SUMMARY

Table 1 lists the 271 Forest Service special status species that have been documented or are suspected to occur within the Umpqua, Rogue River, and Winema national forests, based on the July 21, 2015 RFSSS List (ISSSSP 2015). The 2015 RFSSS list was used for this BE because the Project was initiated prior to transmittal of the 2019 RFSSS list. Per the Instruction Memorandum provided with the transmittal of the 2019 RFSSS list, projects initiated prior to transmittal of the 2019 RFSSS list may use either the 2019 RFSSS list or the RFSSS list that was in effect when the Project was initiated. Where suitable habitat was documented for a species, but species-specific surveys were not conducted for that species, this BE assumes the presence of that species, and potential effects of the Project were analyzed based on the criteria presented in Section 6.0.

One of four possible impact determinations are listed for each species:

1. No Impact (NI);
2. May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species (MIIH);
3. Will Impact Individuals or Habitat with a consequence that the action will contribute to a trend toward Federal listing, or cause a loss of viability to the population or species (WOFV); or
4. Beneficial Impact (BI).

Of the 271 Forest Service special status species, 38 had impact determinations of MIIH. Of those, 36 are discussed in detail in Section 6.2, and the remaining 2 are discussed in more detail in the Survey and Manage Persistence Evaluation (Appendix F.5 to the FEIS). Appendix A of this BE includes the species that were dropped from further analysis due to a lack of suitable habitat or because they were not detected during targeted field surveys. Appendix A additionally includes a description of suitable habitat, documented or suspected occurrence by national forest, and a rationale for the impact determination for each species.

Federally listed or proposed species that are documented or suspected to occur on NFS lands are included in Table 1 (four mammals, one bird, one amphibian, three fish, one terrestrial invertebrate, and four plants). These species are addressed in FERC's BA. Preliminary impact determinations in Table 1 are from FERC's BA, and thus do not use Forest Service terminology. Four possible impact determinations are shown for federally listed or proposed species: 1) No effect (NE); 2) Not likely to adversely affect (NLAA); 3) Likely to adversely affect (LAA); and (4) Not likely to jeopardize the continued existence for proposed species (NJ).

Table 1. Forest Service Special Status Species with Potential to Occur near the Project

Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]
Mammals					
Pallid bat *Antrozous pallidus pacificus*	D – UMP [d/] D – RRS D – FWI	Y	N	U	MIIH
Townsend's big-eared bat *Corynorhinus (Plecotus) townsendii*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Fringed myotis *Myotis thysanodes*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Pygmy rabbit *Brachylagus idahoensis*	S – FWI	N	N	U	NI [f/]
Wolverine *Gulo* [a/]	S – UMP S – RRS S – FWI	N	N	N	NE
Gray wolf *Canis lupus* [a/]	D – UMP [d/] D – RRS D – FWI	Y	N	U	NLAA
Pacific fisher (West Coast DPS) *Pekania pennanti* [a/]	D – UMP D – RRS D – FWI	Y	N	U	MIIH/NJ/LAA

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Pacific marten (Coastal population) *Martes caurina*	D – RRS	N	N	U	NJ/LAA [f/]
Sierra Nevada red fox *Vulpes vulpes necator*	D – RRS D – UMP D – FWI [d/]	N	N	N	NI
Birds					
Red-necked grebe *Podiceps grisegena*	D – UMP D – FWI	Y	N	U	MIIH
Horned grebe *Podiceps auritus*	D – UMP	Y	N	U	MIIH
American white pelican *Pelecanus erythrorhynchos*	D – RRS [d/] D – FWI	Y	N	U	MIIH
Harlequin duck *Histrionicus histrionicus*	D – UMP D – RRS	Y	N	U	MIIH
Bufflehead *Bucephala albeola*	D – UMP D – RRS [d/] D – FWI	Y	N	U	MIIH
Yellow rail *Coturnicops noveboracensis*	S – UMP D – FWI	N	N	U	NI
Upland sandpiper *Bartramia longicauda*	S – FWI	Y	N	U	MIIH
White-tailed kite *Elanus leucurus*	S – RRS	Y	N	U	MIIH
Bald eagle *Haliaeetus leucocephalus*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
American peregrine falcon *Falco peregrinus anatum*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Greater sage-grouse *Centrocercus urophasianus*	D – FWI	N	N	N	NI [f/]
Northern spotted owl *Strix occidentalis caurina* [a/]	D – UMP D – RRS D – FWI	Y	Y	Y	LAA

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Great gray owl *Strix nebulosa* [b/]	D – UMP D – RRS D – FWI	Y	Y	Y	MIIH
Black swift *Cypseloides niger*	D – UMP	N	N	U	NI
White-headed woodpecker *Picoides albolarvatus*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Lewis' woodpecker *Melanerpes lewis*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Purple martin *Progne subis*	S – UMP S – RRS S – FWI	Y	N	U	MIIH
Northern waterthrush *Parkesia noveboracensis*	S – RRS	N	N	N	NI
Tricolored blackbird *Agelaius tricolor*	S – RRS D – FWI	Y	N	U	MIIH
Amphibians					
Siskiyou Mountains salamander *Plethodon stormi* [b/]	D – RRS	N	N	N	NI
Black salamander *Aneides flavipunctatus*	D – RRS	N	N	N	NI
California slender salamander *Batrachoseps attenuates*	D – RRS	N	N	N	NI
Foothill yellow-legged frog *Rana boylii*	D – UMP D – RRS	Y	N	U	MIIH
Northern leopard frog *Lithobates pipiens*	S – FWI	N	N	N	NI
Oregon spotted frog *Rana pretiosa* [a/]	D – FWI	Y	N	U	NLAA
Columbia spotted frog *Rana luteiventris*	S – FWI	N	N	U	NI

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Reptiles					
Western pond turtle *Actinemys marmorata* (formerly Pacific pond turtle)	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Non-anadromous Fish					
Umpqua chub *Oregonichthys kalawatseti*	D – UMP	Y	N	U	MIIH
Anadromous Fish					
Pacific lamprey *Entosphenus tridentatus*	D – RRS D – UMP D – FWI	Y	N	N	NI [r/]
Chinook salmon *Oncorhynchus tshawytscha* Southern Oregon /Northern California Coastal ESU, Fall-run, Spring-run; Rogue SMU Spring-run	D – RRS	N	N	N	NI [r/]
Steelhead *Oncorynchus mykiss* Oregon Coast ESU Coastal SMU – Summer-run	D – UMP D – RRS	N	N	N	NI [r/]
Coho salmon *Oncorhynchus kisutch* Southern Oregon/Northern California Coast ESU[a/] Rogue SMU Klamath SMU	D – RRS	Y	N	U	LAA
Coho salmon *Oncorhynchus kisutch* Oregon Coast ESU [a/] Coastal SMU	D – UMP D – RRS	Y	N	U	LAA
Green sturgeon *Acipenser medirostris* Southern DPS [a/]	I – RRS	Y	N	U	LAA
Terrestrial Invertebrates					
Oregon shoulderband *Helminthoglypta hertleini* [b/]	S – RRS D – UMP	Y	Y	N	NI [f/]

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest**[2/]	**Potential Habitat**[3/]	**Surveys Performed**[4/]	**Species Present**[5/]	**Impact Determination**[6/]
Green sideband *Monadenia fidelis beryllica*	D – RRS	Y	Y	N	NI
Traveling sideband *Monadenia fidelis celeuthia*	D – RRS D – FWI [d/] D – UMP [d/]	Y	Y	Y	MIIH
Modoc Rim sideband *Monadenia fidelis* ssp. *nov.*	D – RRS D – FWI	Y	Y	N	NI
Crater Lake tightcoil *Pristiloma crateris* [b/]	D – UMP S – RRS D – FWI	Y	Y	N	NI
Harney Basin duskysnail *Colligyrus depressus*	D – FWI	Y	N	N	NI
Siskiyou hesperian *Vespericola sierranas*	D – UMP [d/] D – RRS D – FWI	Y	Y	Y	MIIH
Franklin's bumble bee *Bombus franklini*	D – UMP [d/] D – RRS	Y	N	U	NJ/LAA
Western bumblebee *Bombus occidentalis*	D – UMP S – RRS D – FWI	Y	N	U	MIIH
Siskiyou short-horned grasshopper *Chloealtis aspasma*	S – UMP D – RRS S – FWI	Y	N	U	MIIH
Gray-blue butterfly *Plebejus podarce klamathensis*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Coastal greenish blue butterfly *Plebeius saepiolus littoralis*	S – RRS	N	N	U	NI
Johnson's hairstreak *Callophrys johnsoni*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Mardon skipper *Polites mardon*	S – UMP D – RRS S – FWI	Y	N	U	MIIH
Leona's little blue butterfly *Philotiella leona*	D – FWI	N	N	N	NI

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Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]
Coronis fritillary *Speyeria coronis*	S – UMP S – RRS	Y	N	U	MIIH
Aquatic Invertebrates					
Turban pebblesnail *Fluminicola turbinformis*	D – FWI	Y	Y	N	NI
California floater mussel *Anodonta californiensis*	S – UMP S – RRS D – FWI	Y	N	U	MIIH
Western ridged mussel *Gonidea angulata*	S – UMP S – RRS D – FWI	Y	N	U	MIIH
Great Basin ramshorn *Helisoma newberryi*	D – FWI	Y	Y	N	NI
Highcap lanx *Lanx alta*	D – UMP S – RRS D – FWI	N	N	N	NI
Scale lanx *Lanx klamathensis*	S – RRS D – FWI	Y	Y	N	NI
Rotund lanx *Lanx subrotunda*	D – UMP S – RRS D – FWI	Y	Y	N	NI
A caddisfly (no common name) *Rhyacophila chandleri*	D – UMP	Y	N	U	MIIH
Montane peaclam *Pisidium ulttramontanum*	D – FWI	N	N	N	NI [f/]
Robust walker *Pomatiopsis binneyi*	D – RRS	Y	Y	N	NI
Pacific walker *Pomatiopsis californica*	S – RRS	N	N	N	NI
Archimedes springsnail *Pyrgulopsis archimedis*	D – FWI	Y	N	U	MIIH
Haddock's Rhyacophilan caddisfly *Rhyacophila haddocki*	S – RRS	Y	N	U	NI
Lined ramshorn *Vorticifex effusa diagonalis*	D – FWI	N	N	U	NI

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Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Vascular Plants					
California maiden-hair *Adiantum jordanii*	S – UMP D – RRS S – FWI	Y	Y	N	NI
Peninsular onion *Allium peninsulare*	S – RRS	Y	Y	N	NI
Rogue Canyon rockcress *Arabis modesta*	D – RRS	Y	Y	N [e/]	NI [f/]
Gasquet (hairy) manzanita *Arctostaphylos hispidula*	D – RRS	N	N	N	NI
Shasta arnica *Arnica viscosa*	D – UMP S – RRS D – FWI	Y	Y	N	NI
Grass-fern *Asplenium septentrionale*	D – UMP D – RRS D – FWI	Y	Y	N	NI
Lemmon's milkvetch *Astragalus lemmonii*	D – FWI	Y	Y	N	NI
Peck's milk-vetch *Astragalus peckii*	D – FWI	N	N	N	NI
Bensonia *Bensoniella oregana*	D – RRS	Y	Y	N [e/]	NI
Crenulate moonwort (Crenulate grape-fern) *Botrychium crenulatum*	S – FWI	Y	Y	N	NI
Pumice grape-fern *Botrychium pumicola*	S – UMP S – RRS D – FWI	N	Y	N	NI
Brewer's reedgrass *Calamagrostis breweri*	S – UMP	Y	Y	N	NI
Greene's mariposa lily *Calochortus greenei*	S – FWI	Y	Y	N	NI
Umpqua mariposa lily *Calochortus umpquaensis*	D – UMP	Y	Y	Y	MIIH
Howell's camassia *Camassia howellii*	D – RRS	N	N	N	NI

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Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Slender-flowered evening primrose *Camissonia graciliflora* (syn. *Tetrapteron graciliflorum*)	D – RRS	Y	Y	N	NI
Washoe suncup *Camissonia pusilla*	S – FWI	Y	Y	N	NI
Capitate sedge *Carex capitata*	D – RRS D – FWI	Y	Y	N	NI
Bristly sedge *Carex comosa*	S – RRS S – FWI	Y	Y	N [e/]	NI [f/]
Cordilleran sedge *Carex cordillerana*	D – FWI	Y	Y	N	NI
Lesser panicled sedge *Carex diandra*	S – UMP S – RRS D – FWI	Y	Y	N	NI
A sedge *Carex klamathensis*	D – RRS	Y	Y	N	NI
Slender sedge *Carex lasiocarpa* var. *americana*	S – UMP S – RRS D – FWI	Y	Y	N	NI
Pale sedge *Carex livida*	D – RRS	Y	Y	N	NI
Spikenard sedge *Carex nardina*	D – UMP	Y	Y	N	NI
Sierra nerved sedge *Carex nervina*	D – RRS	Y	Y	N	NI
Russet sedge *Carex saxatilis*	S – FWI	Y	Y	N	NI
Native sedge *Carex vernacula*	S – UMP D – FWI	Y	Y	N	NI
Green-tinged paintbrush *Castilleja chlorotica*	D – FWI	N	N	N	NI
Split-hair paintbrush *Castilleja schizotricha*	D – RRS	N	N	N	NI

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Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Coville's lip-fern *Cheilanthes covillei*	D – RRS	Y	Y	N	NI
Fee's lip-fern *Cheilanthes feei*	S – FWI	Y	Y	N	NI
Coastal lip-fern *Cheilanthes intertexta*	S – RRS S – FWI	Y	Y	N [e/]	NI [f/]
Narrow-leaved amole *Chlorogalum angustifolium*	S – RRS	Y	Y	N	NI
Oregon timwort *Cicendia quadrangularis*	D – RRS	Y	Y	N	NI
Mt. Mazama collomia *Collomia mazama*	D – UMP D – RRS D – FWI	Y	Y	N	NI
Coldwater corydalis *Corydalis aquae-gelidae*	D – RRS	Y	Y	N	NI
Milo baker's cryptantha *milobakeri*	D – RRS	Y	Y	N	NI
Pine woods cryptantha *Cryptantha simulans*	D – RRS D – FWI	Y	Y	Y	MIIH
Short-pointed cyperus *Cyperus acuminatus*	S – RRS	Y	Y	N	NI
Clustered lady's slipper *Cypripedium fasciculatum* [b/]	D – UMP D – RRS	Y	Y	Y	MIIH
Red larkspur *Delphinium nudicaule*	D – RRS	Y	Y	N	NI
Few-flowered bleedingheart *Dicentra pauciflora*	D – RRS	Y	Y	N	NI
Howell's whitlow-grass *Draba howellii*	D – RRS	Y	Y	N	NI
Short seeded waterwort *Elatine brachysperma*	S – UMP S – FWI	Y	Y	N	NI
Bolander's spikerush *Eleocharis bolanderi*	D – FWI	Y	Y	N	NI
Oregon willow herb *Epilobium oreganum*	D – RRS	N	N	N	NI

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Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Siskiyou willow herb *Epilobium siskiyouense*	D – RRS	N	N	N	NI
Golden fleece *Ericameria arborescens*	D – RRS	Y	Y	N	NI
Siskiyou daisy *Erigeron cervinus*	D – RRS	Y	Y	N	NI
Cliff (rock) daisy *Erigeron petrophilus*	D – RRS	Y	Y	N	NI
Lobb's buckwheat *Eriogonum lobbii*	D – RRS	Y	Y	N	NI
Prostrate buckwheat *Eriogonum prociduum*	D – FWI	Y	Y	N	NI
Green buckwheat *Eriogonum umbellatum* var. *glaberrimum*	D – FWI	Y	Y	N	NI
Acker Rock wild buckwheat *Eriogonum villosissimum*	D – UMP	N	N	N	NI
Howell's adder's tongue *Erythronium howellii*	D – RRS	Y	Y	N	NI
Gold poppy *Eschscholzia caespitosa*	S – RRS	N	N	N	NI
Wayside aster [b/] *Eucephalus vialis* (syn. *Aster vialis*)	S – UMP	Y	Y	N	NI [f/]
Umpqua swertia *Frasera umpquaensis*	D – UMP D – RRS	Y	Y	N	NI
Gentner's fritillary *Fritillaria gentneri* [a/]	D – RRS	Y	Y	N [e/]	LAA
Warner Mt. bedstraw *Galium serpenticum* ssp. *warnerense*	D – FWI	Y	Y	N	NI
Newberry's gentian *Gentiana newberryi* var. *newberryi*	S – UMP D – RRS D – FWI	Y	Y	N	NI
Elegant gentian *Gentiana plurisetosa*	D – RRS	Y	Y	N	NI

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Waldo gentian *Gentiana setigera*	D – RRS	Y	Y	N	NI
Boggs lake hedge-hyssop *Gratiola heterosepala*	S – FWI	Y	Y	N	NI
Beautiful stickseed *Hackelia bella*	D – RRS	Y	Y	N	NI
Purple-flowered rush-lily *Hastingsia bracteosa* var. *atropurpurea*	D – RRS	Y	Y	N	NI
Large-flowered rush-lily *Hastingsia bracteosa* var. *bracteosa*	D – RRS	Y	Y	N	NI
Salt heliotrope *Heliotropium curassavicum*	D – FWI	N	N	N	NI
Baker's cypress *Hesperocyparis bakeri* (syn. *Cupressus bakeri*)	D – RRS	Y	Y	N	NI
Shaggy hawkweed *Hieracium horridum*	S – RRS	Y	Y	N	NI
Henderson's horkelia *Horkelia hendersonii*	D – RRS	N	N	N	NI
Three-toothed horkelia *Horkelia tridentata* ssp. *tridentata*	D – RRS	N	N	N	NI
California globe mallow *Iliamna latibracteata*	D – UMP D – RRS	Y	Y	Y	MIIH
Shockley's ivesia *Ivesia shockleyi*	D – FWI	Y	Y	N	NI
Tiehm's rush *Juncus tiehmii*	D – FWI	Y	Y	N	NI
Fragrant kalmiopsis *Kalmiopsis fragrans*	D – UMP	Y	Y	N	NI
Bush beardtongue *Keckiella lemmonii*	D – RRS	Y	Y	N	NI
Columbia lewisia *Lewisia columbiana* var. *columbiana*	D – UMP	Y	Y	N	NI

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Lee's lewisia *Lewisia leana*	S – UMP D – RRS	Y	Y	N	NI
Bellinger's meadowfoam *Limnanthes floccosa* ssp. *bellingeriana*	D – RRS	Y	Y	Y	MIIH
Slender meadow-foam *Limnanthes gracilis* ssp. *gracilis* (syn. *L. alba* ssp. *gracilis*)	D – RRS	Y	Y	N	NI
Aristulate lipocarpha *Lipocarpha aristulata*	S – FWI	Y	Y	N	NI
Cook's lomatium *Lomatium cookii* [a/]	S – RRS	Y	Y	N	NLAA
Englemann's desert-parsley *Lomatium engelmannii*	D – RRS	N	N	N	NI
Stipuled trefoil *Lotus stipularis*	D – RRS	Y	Y	N	NI
Mt. Ashland lupine *Lupinus aridus* ssp. *ashlandensis* (syn. *L. lepidus* var. *ashlandensis*)	D – RRS	N	N	N	NI
Kincaid's lupine *Lupinus oreganus* var. *kincaidii* [a/] (syn. *L. sulphureus* var. *kincaidii)*	D – UMP	Y	Y	N [e/]	LAA
Tracy's lupine *Lupinus tracyi*	D – RRS	Y	Y	N	NI
Bog club-moss *Lycopodiella inundata*	D – FWI	Y	Y	N	NI
White meconella (fairy poppy) *Meconella oregana*	D – RRS	Y	Y	N	NI
Bolander's monkeyflower *Mimulus bolanderi* (syn. *Diplacus bolanderi*)	D – RRS	Y	Y	N	NI
Congdon's monkeyflower *Mimulus congdonii* (syn. *Diplacus congdonii*)	S – RRS	Y	Y	N	NI

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Disappearing monkeyflower *Mimulus evanescens* (syn. *Erythranthe inflatula*)	D – FWI	N	N	N	NI
Tri-colored monkeyflower *Mimulus tricolor* (syn. *Diplacus tricolor*)	D – FWI	Y	Y	N	NI
Siskiyou monardella *Monardella purpurea*	D – RRS	Y	Y	N	NI
Annual dropseed *Muhlenbergia minutissima*	S – FWI	Y	Y	N	NI
Slender nemacladus *Nemacladus capillaris*	S – RRS	Y	Y	N	NI
Adder's-tongue *Ophioglossum pusilum*	D – UMP D – RRS	Y	Y	N	NI
Coffee fern *Pellaea andromedifolia*	S – UMP S – RRS	Y	Y	N	NI
Bird's-foot fern *Pellaea mucronata* ssp. *mucronata*	S – RRS	Y	Y	N	NI
Blue-leaved penstemon *Penstemon glaucinus*	D – FWI	Y	Y	N	NI
Red-rooted yampah *Perideridia erythrorhiza*	S – UMP D – RRS D – FWI	Y	Y	N	NI
Siskiyou phacelia *Phacelia leonis*	D – RRS	Y	Y	N	NI
American pillwort *Pilularia americana*	S – RRS D – FWI	Y	Y	N	NI
Whitebark pine *Pinus albicaulis*	D – UMP D – RRS D – FWI	Y	Y	N	NI
Coral seeded allocarya *Plagiobothrys figuratus* var. *corallicarpus*	S – RRS	Y	Y	N	NI
Greene's popcorn flower *Plagiobothrys greenei*	S – RRS	Y	Y	N	NI

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Rough popcorn flower *Plagiobothrys hirtus* [a/]	S – UMP	Y	Y	N	NLAA
Desert allocarya *Plagiobothrys salsus*	S – FWI	Y	Y	N	NI
Oregon semaphoregrass *Pleuropogon oregonus* (syn. *Lophoclaena oregana*)	D – FWI	Y	Y	N	NI
Timber bluegrass *Poa rhizomata*	S – UMP D – RRS	Y	Y	N	NI
Profuse-flowered mesa mint *Pogogyne floribunda*	S – FWI	Y	Y	N	NI
California sword-fern *Polystichum californicum*	D – UMP S – RRS	Y	Y	N	NI
Rafinesque's pondweed *Potamogeton diversifolius*	S – FWI	Y	Y	N	NI
Siskiyou fairy bells *Prosartes parvifolia*	D – RRS	Y	Y	N	NI
Toothleaf pyrola *Pyrola dentata*	S – RRS	Y	Y	N	NI
California chicory *Rafinesquia californica*	D – RRS	Y	Y	N	NI
Redberry *Rhamnus ilicifolia*	D – RRS	Y	Y	N	NI
White beakrush *Rhynchospora alba*	D – RRS	Y	Y	N	NI
Straggly gooseberry *Ribes divaricatum* var. *pubiflorum*	S – RRS	Y	Y	N	NI
Thompson's mistmaiden *Romanzoffia thompsonii*	D – UMP D – RRS	Y	Y	N	NI
Columbia cress *Rorippa columbiae*	S – RRS D – FWI	Y	Y	N	NI
Lowland toothcup *Rotala ramosior*	S – UMP S – FWI	Y	Y	N	NI
Joint-leaved saxifrage *Saxifragopsis fragarioides*	D – RRS	Y	Y	N	NI

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Scheuchzeria *Scheuchzeria palustris* ssp. *americana*	D – UMP D – RRS D – FWI	Y	Y	N	NI
Water clubrush *Schoenoplectus subterminalis* (syn. *Scirpus subterminalis*)	D – UMP D – RRS D – FWI	Y	Y	N	NI
Drooping bulrush *Scirpus pendulus*	D – RRS S – FWI	Y	Y	N	NI
California fetid adderstongue *Scoliopus bigelovii*	D – RRS	Y	Y	N	NI
Rogue river stonecrop *Sedum moranii*	D – RRS	Y	Y	N	NI
Verrucose sea-purslane *Sesuvium verrucosum*	S – FWI	Y	Y	N	NI
Coast checkermallow *Sidalcea malviflora* ssp. *patula*	D – RRS	Y	Y	N	NI
Bolander's catchfly *Silene hookeri* ssp. *bolanderi*	S – RRS	Y	Y	N	NI
Parish’s horse-nettle *Solanum parishii*	D – RRS	Y	Y	N	NI
Western sophora *Sophora leachiana*	D – RRS	Y	Y	N	NI
Common jewel flower *Streptanthus glandulosus* ssp. *josephinensis*	D – RRS	Y	Y	N	NI
Howell's streptanthus *Streptanthus howellii*	D – RRS	Y	Y	N	NI
Howell's tauschia *Tauschia howellii*	D – RRS	N	N	N	NI
Siskiyou trillium *Trillium kurabayashii*	D – RRS	Y	Y	N	NI
Lesser bladderwort *Utricularia minor*	D – UMP D – RRS D – FWI	Y	Y	N	NI
Northern bladderwort *Utricularia ochroleuca*	S – UMP S – FWI	Y	Y	N	NI

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Western bog violet *Viola primulifolia* ssp. *occidentalis*	D – RRS	N	N	N	NI
Dotted water-meal *Wolffia borealis*	S – UMP	Y	Y	N	NI
Columbia water-meal *Wolffia columbiana*	S – UMP S – RRS	Y	Y	N	NI
Small-flowered death camas *Zigadenus fontanus*	D-RRS	Y	Y	N	NI
Fungi					
Albatrellus avellaneus [b/ c/]	D – RRS	Y	Y	N	NI
Chamonixia caespitosa [b/ c/]	D – RRS	Y	Y	N	NI
Cortinarius barlowensis (syn. *Cortinarius azureus)* [b/ c/]	D – UMP	Y	Y	N	NI
Dermocybe humboldtensis [b/ c/]	S – UMP S – RRS	Y	Y	N	NI
Gastroboletus vividus [b/ c/]	S – UMP D – RRS S – FWI	Y	Y	N	NI
Gastrolactarius camphoratus [c/]	D – RRS	Y	Y	N	NI
Gymnomyces fragrans [c/]	S – UMP D – RRS	Y	Y	N	NI
Phaeocollybia californica [b/ c/]	D – RRS	Y	Y	N	NI
Pseudorhizina californica (syn. *Gyromitra californica)* [b/ c/]	D – UMP D – RRS D – FWI	Y	Y	N	NI
Ramaria amyloidea [b/ c/]	D – UMP S – RRS D – FWI	Y	Y	N	NI
Ramaria rubella var. *blanda* [b/ c/]	D – RRS	Y	Y	N	NI
Rhizopogon chamaleontinus [b/ c/]	D – RRS	Y	Y	N	NI

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Rhizopogon ellipsosporus [b/ c/]	D – RRS	Y	Y	N	NI
Rhizopogon exiguus [b/ c/]	S – UMP D – RRS	Y	Y	N	NI
Rhizopogon inquinatus [b/ c/]	S – UMP	Y	Y	N	NI
Stagnicola perplexa [b/ c/]	S – UMP D – RRS	Y	Y	N	NI
Lichens					
Bryoria subcana [b/ c/]	D – RRS	Y	Y	N [e/]	NI [f/]
Leptogium cyanescens [b/ c/]	S – RRS	Y	Y	N	NI
Lobaria linita [b/ c/]	D – UMP S – RRS	Y	Y	N	NI
Ramalina pollinaria [b/ c/]	S – UMP S – RRS	Y	Y	N	NI
Woven spore lichen *Texosporium sancti-jacobi*	S – FWI	Y	Y	N	NI
Bryophytes					
Tiny notchwort *Anastrophyllum minutum*	S – UMP S – RRS S – FWI	Y	Y	N	NI
Broad-leaved lantern moss *Andreaea schofieldiana*	S – UMP D – RRS	N	N	N	NI
Spidery threadwort *Blepharostoma arachnoideum*	D – UMP	Y	Y	N	NI
Giant fourpoint *Barbilophozia lycopodioides*	S – FWI	Y	Y	N	NI
Beautiful bryum *Bryum calobryoides*	D – UMP D – RRS	Y	Y	N	NI
Bog pouchwort *Calypogeia sphagnicola*	D – UMP D – RRS	N	N	N	NI
Spiny threadwort *Cephaloziella spinigera*	S – UMP D – RRS D – FWI	Y	Y	N	NI

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Cryptomitrium tenerum [c/]	D – RRS	Y	Y	N	NI
White-mouthed extinguisher-moss *Encalypta brevicollis*	S – UMP D – RRS	Y	Y	N	NI
Candle snuffer moss *Encalypta brevipes*	S – UMP D – RRS	N	N	N	NI
Banded cord-moss *Entosthodon fascicularis*	S – UMP S – RRS	Y	Y	N	NI
Braided frostwort *Gymnomitrion concinnatum*	S – UMP	Y	Y	N	NI
Great mountain flapwort *Harpanthus flotovianus*	S – UMP D – RRS D – FWI	Y	Y	N	NI
Jamesoniella autumnalis var. *heterostipa* [c/]	S – UMP	Y	Y	N	NI
Kurzia makinoana [b/ c/]	S – RRS	Y	Y	N	NI
Gillman's pawwort *Lophozia gillmanii*	S – UMP D – RRS S – FWI	Y	Y	N	NI
Marsupella emarginata var. *aquatica* [b/,c/]	S – UMP	Y	Y	N	NI
Orthodontium gracile [b/, c/]	D – RRS	Y	Y	N	NI
Translucent orthodontium *Orthodontium pellucens*	D – RRS	N	N	N	NI
Tuberous hornwort *Phymatoceros phymatodes*	D – RRS	Y	Y	N	NI
Dwarf rock haircap *Polytrichastrum sexangulare* var. *vulcanicum* (syn. *Polytrichum sphaerothecium*)	S – UMP S – FWI	Y	Y	N	NI
Hummock haircap moss *Polytrichum strictum* [c/]	S – UMP	Y	Y	N	NI

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name1/	**Documented or Suspected Occurrence Within Forest2/**	**Potential Habitat3/**	**Surveys Performed4/**	**Species Present5/**	**Impact Determination6/**
Bolander's scalemoss *Porella bolanderi*	S – UMP D – RRS	Y	Y	N	NI
Blunt water moss *Pseudocalliergon trifarium* (syn. *Calliergon trifarium*)	S – RRS D – FWI	N	N	N	NI
Racomitrium moss *Racomitrium depressum* (syn. *Codriophorus depressus*)	S – UMP S – RRS S – FWI	Y	Y	N	NI
Rivulariella gemmipara (syn. *Chiloscyphus gemmiparus*)	S – UMP D – RRS S – FWI	Y	Y	N	NI
Scapania obscura b/, c/	S – UMP	Y	Y	N	NI
Schistidium moss *Schistidium cinclidodonteum*	D – RRS S – FWI	Y	Y	N	NI
Alpine masterwort *Schofieldia monticola*	S – UMP	Y	Y	N	NI
Tetraphis geniculata b/, c/	S – UMP	Y	Y	N	NI
Mucronleaf tortula moss *Tortula mucronifolia*	D – RRS	Y	Y	N	NI
Asano's trematodon moss *Trematodon asanoi*	S – UMP S – FWI	Y	Y	N	NI

General Notes

1/ Sensitive species located in the Project area were documented by SBS (2008, 2010, 2011a, 2011b, 2011c), presented in Pacific Connector's April 27, 2015 response to FERC data request, and provided by the Forest Service (Krantz 2018). Forest Service sensitive species that are also Survey and Manage species were documented; however, these species are not discussed here but are included in the Survey and Manage Report submitted as a stand-alone document.

ESU = Evolutionarily Significant Unit

2/ Occurrence Key:

National Forest: FWI = Winema National Forest, RRS = Rogue River National Forest, UMP = Umpqua National Forest

D = Documented occurrence – A species located on land administered by the Forest Service based on historic or current known sites of a species reported by a credible source for which the Forest Service has knowledge of written, mapped or specimen documentation of the occurrence.

S = Suspected occurrence – Species is not documented on land administered by the Forest Service, but may occur on the unit because: 1) National Forest is considered to be within the species' range and 2) appropriate habitat is present or 3) known occurrence of the species (historic or current) in vicinity such that the species could occur on FS land.

I = Downstream Influence by Forest Service Actions

Note: ISSSSP 2015 and 2019 lists documented and suspected occurrence status by grouping Fremont-Winema national forests together, and Rogue River-Siskiyou national forests together. We are assuming that this status information pertains to the forests crossed by the Project.

3/ Potential Habitat: Y = Yes, suitable habitat present; N = no suitable habitat present

Table 1. Forest Service Special Status Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]

4/ Surveys Performed: Y = Yes, surveys were conducted; N = No surveys were conducted for the species.

5/ Species Present: Y = Yes; N = No; U = Unknown because no targeted surveys were conducted for the species.

6/ Impact Determination: NI = No Impact, MIIH = May Impact Individuals or Habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species. For federally listed or proposed species: NE=No effect, NLAA= Not likely to adversely affect, LAA= Likely to adversely affect, NJ = not likely to jeopardize the continued existence for proposed species.

Species-Specific Notes

a/ Denotes listing under ESA as endangered or threatened, or a species proposed for ESA listing. Full analysis available in FERC's BA for this project.

b/ Denotes a species on the Survey and Manage list under the Northwest Forest Plan. These species are analyzed in Appendix F.5 of the FEIS, Survey and Manage Species Persistence Evaluation.

c/ No common name found for this species.

d/ Documented based on recent observations.

e/ Detected on private, state, or BLM-managed lands but not on Forest Service-managed lands crossed by the Project.

f/ The Project may impact this species; however, no impacts would occur on Forest Service-managed lands.

6.0 DETAILED EFFECTS OF PROPOSED ACTION ON SPECIES CONSIDERED

6.1 Global Discussion

6.1.1 Analysis Areas and Current Environment

In order to characterize the current environment for each species, buffers of 700 feet, 3,200 feet, and 5 miles were applied to the proposed action, and acreages of each habitat type were calculated. To characterize past actions in forested environments, seral stage (0-40 years, 40-80 years, and greater than 80 years) was assigned to all forested types within the buffer area. In non-forested habitat types, acreages were given for existing habitats within the buffered area. These buffers were analyzed using Johnson and O'Neil (2001) habitat types. Forest seral stage was assigned using available GIS data (BLM FOI database; BLM 2016), Gradient Nearest Neighbor raster data set (developed by Landscape Ecology, Modeling, Mapping & Analysis [LEMMA; Moeur et al. 2005, 2006, and 2011]), and an index called the old-growth structure index that assisted in identifying late seral forest (see Davis et al. 2015).

The 700-foot buffer was used as the analysis area for species that could potentially be impacted by edge effect, but would not likely be impacted by noise or other long-ranging effects (Table 2). The species evaluated using the 700-foot buffer include two terrestrial invertebrates (traveling sideband and Siskiyou hesperian; Section 6.2.6), and vascular plants (Section 6.2.8). Fundamental changes in the microclimate of a stand, humidity and strong winds in particular, have been recorded at distances greater than 700 feet from the forest edge in late-successional

Douglas-fir forests (Chen et al. 1995). Approximately 52 percent of forested National Forest lands within the 700-foot buffer have been harvested within the last 80 years (32.8 percent 0-40 years, 19.6 percent 40-80 years), leaving approximately 48 percent late-successional forest (Table 2).

Table 2. Available Habitat within 700 feet of the Proposed Action

Habitat Category (Johnson and O'Neil, 2001)	Forest-Woodland Age Category[1/]	National Forest Service			Other Federal [2/]	Non-Federal	Overall Total
		Umpqua	Rogue River	Winema			
Forest – Woodland							
Westside Lowland Conifer-Hardwood-Forest	L-O	0	0	0	1,962	534	2,496
	M-S	0	0	0	1,484	3,724	5,208
	C-R	0	0	0	1,166	5,128	6,294
	Total	0	0	0	4,612	9,387	13,998
Montane Mixed Conifer Forest	L-O	0	117	116	0	1	233
	M-S	0	23	69	0	27	119
	C-R	0	529	140	0	93	762
	Total	0	669	325	0	120	1,115
Southwest Oregon Mixed Conifer-Hardwood Forest	L-O	1,122	1,089	269	1,376	363	4,218
	M-S	663	242	90	593	1,038	2,626
	C-R	362	467	237	438	2,380	3,885
	Total	2,147	1,797	597	2,407	3,781	10,729
Ponderosa Pine Forest and Woodlands	L-O	0	0	2	845	104	951
	M-S	0	0	15	13	603	631
	C-R	0	0	30	262	1,448	1,740
	Total	0	0	46	1,121	2,155	3,322
Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O	0	0	0	281	55	336
	M-S	0	0	0	0	535	535
	C-R	0	0	0	0	179	179
	Total	0	0	0	281	769	1,050
Western Juniper and Mountain Mahogany Woodlands	L-O	0	0	0	18	19	36
	M-S	0	0	0	33	823	856
	C-R	0	0	0	0	812	812
	Total	0	0	0	50	1,654	1,704

Table 2. Available Habitat within 700 feet of the Proposed Action							
Habitat Category (Johnson and O'Neil, 2001)	Forest-Woodland Age Category[1/]	National Forest Service			Other Federal [2/]	Non-Federal	Overall Total
		Umpqua	Rogue River	Winema			
Other Forested-Woodland Habitat[3/]	L-O	0	101	9	0	5	116
	M-S	0	42	20	1	63	126
	C-R	11	97	70	1	452	630
	Total	11	239	99	1	521	871
Forest-Woodland Subtotal	L-O	1,122	1,307	396	4,482	1,080	8,387
	M-S	663	306	195	2,124	6,812	10,101
	C-R	373	1,093	477	1,866	10,493	14,302
	Total	**2,158**	**2,706**	**1,067**	**8,473**	**18,385**	**32,789**
Non-Forested Habitat							
Shrub-Steppe	N/A	21	19	0	490	2,169	2,699
Westside Grasslands	N/A	0	11	0	116	1,667	1,794
Eastside Grasslands	N/A	0	1	10	2	580	593
Herbaceous Wetlands	N/A	1	0	20	1	447	468
Westside Riparian Wetlands[4/]	N/A	0	0	0	1	18	19
Eastside Riparian Wetlands[4/]	N/A	0	0	5		5	10
Agriculture, Pastures and Mixed Environs	N/A	0	0	0	119	6,869	6,988
Developed-Urban and Mixed Environs	N/A	14	18	0	4	1,870	1,906
Coastal Dunes and Beaches		0	17	1	14	118	150
Roads	N/A	46	33	47	165	840	1,131
Open Water-Lakes, Rivers, and Streams	N/A	1	6	5	12	1,097	1,122
Bays and Estuaries	N/A	0	0	0	0	48	48
Non-Forest Subtotal	N/A	**82**	**105**	**87**	**925**	**15,729**	**16,929**
Total Overall Habitat	L-O	1,122	1,307	396	4,482	1,080	8,387
	M-S	663	306	195	2,124	6,812	10,101
	C-R	373	1,093	477	1,866	10,493	14,302
	Non-Forest	82	105	87	925	15,729	16,929
	Total	**2,240**	**2,812**	**1,155**	**9,397**	**34,115**	**49,718**

Table 2. Available Habitat within 700 feet of the Proposed Action							
Habitat Category (Johnson and O'Neil, 2001)	Forest-Woodland Age Category1/	National Forest Service			Other Federal 2/	Non-Federal	Overall Total
		Umpqua	Rogue River	Winema			

Sources: BLM 2016, Davis et al. 2015, Johnson and O'Neil 2001, Moeur et al. 2005, Moeur et al. 2006, Moeur et al. 2011

1/ Forest-Woodland Age Categories are L-O, Late Succession/Old Growth assumed to be ≥80 years old; M-S, Mid-Seral assumed to be ≥40 but ≤80 years old; C-R, Clearcut-Regenerating Forest assumed to be ≤40 years old; Age class was assigned using available GIS data (BLM 2016), Gradient Nearest Neighbor ("GNN") raster data set [developed by Landscape Ecology, Modeling, Mapping & Analysis (LEMMA; Moeur et al. 2005, 2006 and 2011), and an index called the old-growth structure index ("OGSI") that assisted in identifying late seral forest (see Davis et al. 2015).

2/ Other Federal Lands include Bureau of Reclamation, U.S. Fish and Wildlife Service Lands, GSA Lands, BLM Lands, and other NFS lands not crossed by the proposed Project.

3/ Other Forest-Woodland Habitat: delineation and available GIS data sources indicate that the area is forested habitats were not affected by the Pipeline project and are included in this category.

4/ Forested wetlands are included in this habitat type but have not been queried out by seral stage; also includes shrub wetlands.

Note: Table represents available habitat within 700 feet of the Project as proposed in March 2019 and thus does not incorporate buffers on route variations incorporated into the proposed action since March 2019.

The 3,200-foot buffer was used as the analysis area for species that could potentially be impacted by noise from construction of the proposed pipeline in addition to edge effects (Table 3). Noise levels are quantified using units of decibels (dB). A-weighted decibels (dBA) are used to account for the relative loudness perceived by the human ear from a noise source. The dBA values are assumed to also apply to most animals. The analysis of noise contained in this BE includes discussions on both sound emissions produced by Project activities and the sound levels perceived by wildlife. The species evaluated using the 3,200-foot buffer included all bats (Section 6.2.1), birds (Section 6.2.2), amphibians (Section 6.2.3), and reptiles (Section 6.2.4), as well as the terrestrial invertebrates, except for the traveling sideband and Siskiyou hesperian (Section 6.2.6). The 3,200-foot buffer was applied as a more than adequate distance at which noise produced from construction of the proposed pipeline would attenuate to background levels. The distance estimate is based on the following assumptions:

- Noise anticipated during construction is 93 dBA at 50 feet (see Section 6.1.2.4).
- Ambient noise within the analysis area is assumed to be 40 dBA, similar to estimates for the Olympic National Forest (FWS 2006).
- Detectability threshold for sensitive species (NSO or marbled murrelet) is 4 dBA above ambient noise level (FWS 2003).
- Noise attenuates by 7.5 dBA per doubling of distance from sources based on soft site reduction assumptions (WSDOT 2018).
- Dense vegetation can reduce noise levels up to 10 dB over 200 feet (WSDOT 2018). More than likely there is 200 feet of dense vegetation within the 3,200-foot buffer that attenuates noise at a greater rate than the soft site reduction assumption.

With these assumptions, the 3,200-foot distance is expected to be adequate to attenuate Project-related construction noise to a sound level of 44 dBA or below at the edge of the construction ROW.

Approximately 57 percent of forested National Forest lands within the 3,200-foot buffer have been harvested within the last 80 years (46 percent 0-40 years, 11 percent 40-80 years), leaving approximately 43 percent late-successional forest (Table 3).

Table 3. Available Habitat within 3,200 feet of the Proposed Action

Habitat Category (Johnson and O'Neil, 2001)	Forest-Woodland Age Category[1/]	National Forest Service			Other Federal[2/]	Non-Federal	Overall Total
		Umpqua	Rogue River	Winema			
Forest – Woodland							
Westside Lowland Conifer-Hardwood-Forest	L-O	0	0	0	7,365	1,250	8,615
	M-S	0	0	0	7,106	11,960	19,066
	C-R	0	0	0	4,414	15,718	20,133
	Total	**0**	**0**	**0**	**18,886**	**28,928**	**47,814**
Montane Mixed Conifer Forest	L-O	19	140	136	36	1	332
	M-S	0	23	88	0	33	145
	C-R	532	659	168	0	114	1,474
	Total	**551**	**823**	**393**	**36**	**149**	**1,951**
Southwest Oregon Mixed Conifer-Hardwood Forest	L-O	4,897	2,711	422	8,090	2,927	19,049
	M-S	1,951	422	141	1,914	2,754	7,182
	C-R	2,237	1,587	335	2,425	16,633	23,215
	Total	**9,085**	**4,720**	**899**	**12,429**	**22,314**	**49,447**
Ponderosa Pine Forest and Woodlands	L-O	0	8	188	4,269	365	4,830
	M-S	0	0	44	358	3,824	4,226
	C-R	0	71	510	677	6,862	8,121
	Total	**0**	**80**	**742**	**5,304**	**11,051**	**17,177**
Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O	0	0	0	651	566	1,216
	M-S	0	0	0	5	838	843
	C-R	0	0	0	13	2,293	2,305
	Total	**0**	**0**	**0**	**668**	**3,697**	**4,365**
Western Juniper and Mountain Mahogany Woodlands	L-O	0	0	0	177	27	204
	M-S	0	0	0	291	3,454	3,745

Table 3. Available Habitat within 3,200 feet of the Proposed Action							
Habitat Category (Johnson and O'Neil, 2001)	Forest-Woodland Age Category[1/]	National Forest Service			Other Federal[2/]	Non-Federal	Overall Total
		Umpqua	Rogue River	Winema			
	C-R	0	0	0	0	2,159	2,159
	Total	**0**	**0**	**0**	**468**	**5,639**	**6,107**
Other Forested-Woodland Habitat[3/]	L-O	0	2,471	540	169	336	3,516
	M-S	14	269	24	48	741	1,096
	C-R	239	4,795	1,473	262	10,242	17,011
	Total	**253**	**7,535**	**2,037**	**479**	**11,319**	**21,623**
Forest-Woodland Subtotal	L-O	4,916	5,331	1,286	20,757	5,472	37,762
	M-S	1,965	715	297	9,722	23,604	36,302
	C-R	3,008	7,112	2,487	7,791	54,021	74,419
	Total	**9,889**	**13,158**	**4,070**	**38,270**	**83,097**	**148,483**
Non-Forested Habitat							
Shrub-Steppe	N/A	33	19	0	1,168	6,348	7,567
Westside Grasslands[4/]	N/A	0	11	0	270	2,616	2,896
Eastside Grasslands[4/]	N/A	0	1	17	2	567	587
Herbaceous Wetlands	N/A	1	0	21	1	679	701
Westside Riparian Wetlands[5/]	N/A	1	0	0	1	361	363
Eastside Riparian Wetlands[5/]	N/A	0	0	205	13	247	465
Agriculture, Pastures and Mixed Environs	N/A	0	0	0	1,108	41,589	42,697
Developed-Urban and Mixed Environs	N/A	14	18	0	20	5,759	5,811
Coastal Dunes and Beaches	N/A	0	16	1	326	289	632
Roads	N/A	86	86	59	344	1,347	1,921
Open Water-Lakes, Rivers, and Streams	N/A	18	50	113	85	6,162	6,428
Bays and Estuaries	N/A	0	0	0	0	806	806
Non-Forest Subtotal	**N/A**	**152**	**201**	**415**	**3,337**	**66,770**	**70,876**
Total Overall Habitat	L-O	4,916	5,331	1,286	20,757	5,472	37,762
	M-S	1,965	715	297	9,722	23,604	36,302
	C-R	3,008	7,112	2,487	7,791	54,021	74,429
	Non-Forest	152	202	415	3,337	66,770	70,876
	Total	**10,041**	**13,359**	**4,485**	**41,607**	**149,867**	**219,360**

Table 3. Available Habitat within 3,200 feet of the Proposed Action							
Habitat Category (Johnson and O'Neil, 2001)	Forest-Woodland Age Category[1/]	National Forest Service			Other Federal[2/]	Non-Federal	Overall Total
		Umpqua	Rogue River	Winema			

1/ Forest-Woodland Age Categories are L-O, Late Succession/Old Growth assumed to be ≥80 years old; M-S, Mid-Seral assumed to be ≥40 but ≤80 years old; C-R, Clearcut-Regenerating Forest assumed to be ≤40 years old; Age class was assigned using available GIS data (BLM 2016), Gradient Nearest Neighbor ("GNN") raster data set [developed by Landscape Ecology, Modeling, Mapping & Analysis (LEMMA; Moeur et al. 2005, 2006 and 2011), and an index called the old-growth structure index ("OGSI") that assisted in identifying late seral forest (see Davis et al. 2015).

2/ Other Federal Lands include Bureau of Reclamation, U.S. Fish and Wildlife Service Lands, GSA Lands, BLM Lands, and other NFS lands not crossed by the proposed Project.

3/ Other Forest-Woodland Habitat: delineation and available GIS data sources indicate that the area is forested habitats were not affected by the Pipeline project and are included in this category.

4/ Grasslands were only delineated within a variable approximately 2,000-foot Pipeline corridor; outside this corridor, grasslands are also included in the Agriculture and Pastures category based on available GIS data used.

5/ Forested wetlands are included in this habitat type but have not been queried out by seral stage; also includes shrub wetlands.

Note: Table represents available habitat within 3,200 feet of the Project as proposed in March 2019 and thus does not incorporate buffers on route variations incorporated into the proposed action since March 2019.

The 5-mile buffer was used as the analysis area for the Pacific fisher, which has a large home range, and could potentially have movement patterns disrupted by construction of the proposed pipeline (Table 4). Approximately 56 percent of forested lands within the three national forests and within the 5-mile buffer have been harvested within the last 80 years (46 percent 0-40 years, 10 percent 40-80 years), leaving approximately 44 percent late-successional forest (Table 4).

Table 4. Available Habitat within 5 miles of the Proposed Action							
Habitat Category (Johnson and O'Neil, 2001)	Forest-Woodland Age Category[1/]	National Forest			Other Federal[2/]	Non-Federal	Overall Total
		Umpqua	Rogue River	Winema			
Forest – Woodland							
Westside Lowland Conifer-Hardwood-Forest	L-O	0	0	0	38,898	13,587	52,485
	M-S	0	0	0	35,712	66,633	102,345
	C-R	0	0	0	26,649	106,741	133,390
	Total	0	0	0	101,259	186,961	288,221
Montane Mixed Conifer Forest	L-O	374	1,226	11,542	1,867	111	15,121
	M-S	0	1,353	1,202	28	34	2,616
	C-R	1,989	4,402	9,443	0	3,263	19,097
	Total	2,363	6,981	22,187	1,896	3,408	36,835
	L-O	24,270	18,668	3,349	82,893	40,674	169,854
	M-S	9,216	5,249	143	24,545	21,833	60,986

Table 4. Available Habitat within 5 miles of the Proposed Action							
Habitat Category (Johnson and O'Neil, 2001)	**Forest-Woodland Age Category[1/]**	**National Forest**			**Other Federal[2/]**	**Non-Federal**	**Overall Total**
		Umpqua	**Rogue River**	**Winema**			
Southwest Oregon Mixed Conifer-Hardwood Forest	C-R	14,670	9,782	517	26,214	172,897	224,080
	Total	48,157	33,699	4,009	133,652	235,404	454,920
Ponderosa Pine Forest and Woodlands	L-O	0	640	2,718	29,798	4,213	37,370
	M-S	0	8	647	10,187	30,913	41,755
	C-R	0	1,315	3,729	4,891	53,692	63,627
	Total	0	1,963	7,095	44,875	88,818	142,752
Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O	0	0	0	6,154	4,091	10,245
	M-S	0	0	0	686	1,827	2,514
	C-R	0	0	0	1,715	16,816	18,532
	Total	0	0	0	8,556	22,734	31,290
Western Juniper and Mountain Mahogany Woodlands	L-O	0	0	0	2,783	72	2,854
	M-S	0	0	2	9,662	30,047	39,711
	C-R	0	0	0	300	8,135	8,435
	Total	0	0	2	12,745	38,254	51,001
Other Forested-Woodland Habitat[3/]	L-O	251	12,137	15,513	5,731	4,729	38,360
	M-S	287	1,828	1,088	2,089	8,971	14,262
	C-R	2,842	26,949	12,101	15,039	144,558	201,490
	Total	3,380	40,914	28,702	22,858	158,258	254,112
Forest-Woodland Subtotal	L-O	24,896	32,672	33,121	168,123	67,477	326,289
	M-S	9,503	8,436	3,083	82,910	160,257	264,189
	C-R	19,501	42,449	25,791	74,808	506,103	668,651
	Total	**53,900**	83,557	61,995	325,841	733,836	1,259,129
Non-Forested Habitat							
Shrub-Steppe	N/A	57	20	44	7,285	27,679	35,084
Westside Grasslands[4/]	N/A	0	11	0	464	3,900	4,375
Eastside Grasslands[4/]	N/A	0	73	253	2	591	919
Herbaceous Wetlands	N/A	1	0	97	425	1,746	2,268
Westside Riparian Wetlands[5/]	N/A	1	0	0	49	5,836	5,886
Eastside Riparian Wetlands[5/]	N/A	0	0	285	128	3,015	3,404

Table 4. Available Habitat within 5 miles of the Proposed Action							
Habitat Category (Johnson and O'Neil, 2001)	**Forest-Woodland Age Category[1/]**	**National Forest**			**Other Federal[2/]**	**Non-Federal**	**Overall Total**
		Umpqua	**Rogue River**	**Winema**			
Agriculture, Pastures and Mixed Environs	N/A	0	0	0	11,347	330,152	341,500
Developed-Urban and Mixed Environs	N/A	14	117	723	433	48,845	50,131
Coastal Dunes and Beaches	N/A	0	17	1	5,188	2,642	7,848
Roads	N/A	256	292	136	1,914	3,903	6,501
Open Water-Lakes, Rivers, and Streams	N/A	52	176	883	1,630	33,248	35,989
Bays and Estuaries	N/A	0	0	0	13	23,728	23,740
Other Non-forest[6/]	N/A	0	725	415	36	30	1,206
Non-Forest Subtotal	N/A	381	1,431	2,837	28,913	485,315	518,876
Total Overall Habitat	L-O	24,896	32,672	33,121	168,123	67,477	326,289
	M-S	9,503	8,436	3,083	82,910	160,257	264,189
	C-R	19,501	42,449	25,791	74,808	506,103	668,651
	Non-Forest	381	1,431	2,837	28,913	485,315	518,876
	Total	**54,281**	84,988	64,832	354,754	1,219,151	1,778,005

1/ Forest-Woodland Age Categories are L-O, Late Succession/Old Growth assumed to be ≥80 years old; M-S, Mid-Seral assumed to be ≥40 but ≤80 years old; C-R, Clearcut-Regenerating Forest assumed to be ≤40 years old; Age class was assigned using available GIS data (BLM 2016), Gradient Nearest Neighbor ("GNN") raster data set [developed by Landscape Ecology, Modeling, Mapping & Analysis (LEMMA; Moeur et al. 2005, 2006 and 2011), and an index called the old-growth structure index ("OGSI") that assisted in identifying late seral forest (see Davis et al. 2015).

2/ Other Federal Lands include Bureau of Reclamation, U.S. Fish and Wildlife Service Lands, GSA Lands, BLM Lands, and other NFS lands not crossed by the proposed Project.

3/ Other Forest-Woodland Habitat: delineation and available GIS data sources indicate that the area is forested habitats were not affected by the Pipeline project and are included in this category.

4/ Grasslands were only delineated within a variable approximately 2,000-foot Pipeline corridor; outside this corridor, grasslands are also included in the Agriculture and Pastures category based on available GIS data used.

5/ Forested wetlands are included in this habitat type but have not been queried out by seral stage; also includes shrub wetlands.

6/ Other Non-Forest Habitat: delineation and available GIS data sources indicate that the area is not forested, but no specific habitat type was provided for the area from available GIS data sources.

Note: Table represents available habitat within 5 miles of the Project as proposed in March 2019 and thus does not incorporate buffers on route variations incorporated into the proposed action since March 2019.

The analysis area for fish (Section 6.2.5) consists of waterbody crossings as described in Appendix C. Most of these waterbodies would be crossed using a dry open cut method, meaning the construction work space across the waterbody would be isolated and dewatered prior to surface disturbance.

In order to assess the cumulative effects of the Project on a broad scale, impacts from the Project combined with impacts from reasonably foreseeable projects were assessed by fifth field watershed. Thus, the cumulative effects analysis area for each species consists of the fifth field watershed(s) where the Project crosses national forests where the species has been documented or is suspected to occur. For example, the pallid bat has been documented on all three national forests crossed by the Project, so the pallid bat cumulative effects analysis area consists of all fifth field watersheds crossed by the Project on those forests.

6.1.2 Impacts

6.1.2.1 Duration of Impact

Construction activities for the proposed pipeline would be initiated by Pacific Connector approximately 1 year after work begins on the LNG terminal in at least eight construction spreads along the proposed 229-mile pipeline. The eight construction spreads (including early works) would include all timber clearing, construction, and restoration activities within a specific milepost (MP) range along the pipeline. The location of each construction spread is provided in Table 5.

Table 5. Construction Spread Locations

Spread	MP Range
Early Works	0.00-7.34R
1	7.34R-29.54
2	29.54-51.58
3	51.58-71.37
4	71.37-94.75
5	94.75-132.52
6	132.52-162.40
7	162.40-228.81

General timing of activities is discussed in more detail in Section 2.0 of the FEIS (FERC 2019b) and is shown schematically in Figure 2, below. Table 6, below, includes additional seasonal timing restrictions associated with bird species. Pacific Connector anticipates that timber clearing would generally occur from mid-July through November in order to avoid timber felling within the core migratory bird breeding period (April 1-July 15). The pipeline construction would occur from early May through November. Exceptions to this timeline would occur where adherence to seasonal restrictions for federally endangered or threatened species is expected and in Spread 7 (MP 162 – 229) where winter construction may occur to comply with Oregon Department of Fish and Wildlife (ODFW) instream construction windows. The average time a given point along the pipeline is estimated to be disturbed by construction would be approximately 8 weeks. This would vary, as the speed at which crews would be able to work would be affected by terrain, construction methods and activities, weather, and environmental construction windows.

During operation of the proposed pipeline, Pacific Connector would maintain a 30-foot-wide ROW corridor, centered over the pipe, for the length of the pipeline. ROW maintenance activities (i.e., mowing, cutting) would occur every 3 to 5 years and would have the potential to impact species associated with habitats within that corridor. To avoid disturbance and destruction of bird eggs and nests, all vegetation maintenance would be conducted in late summer or early autumn, after nesting has generally been completed.

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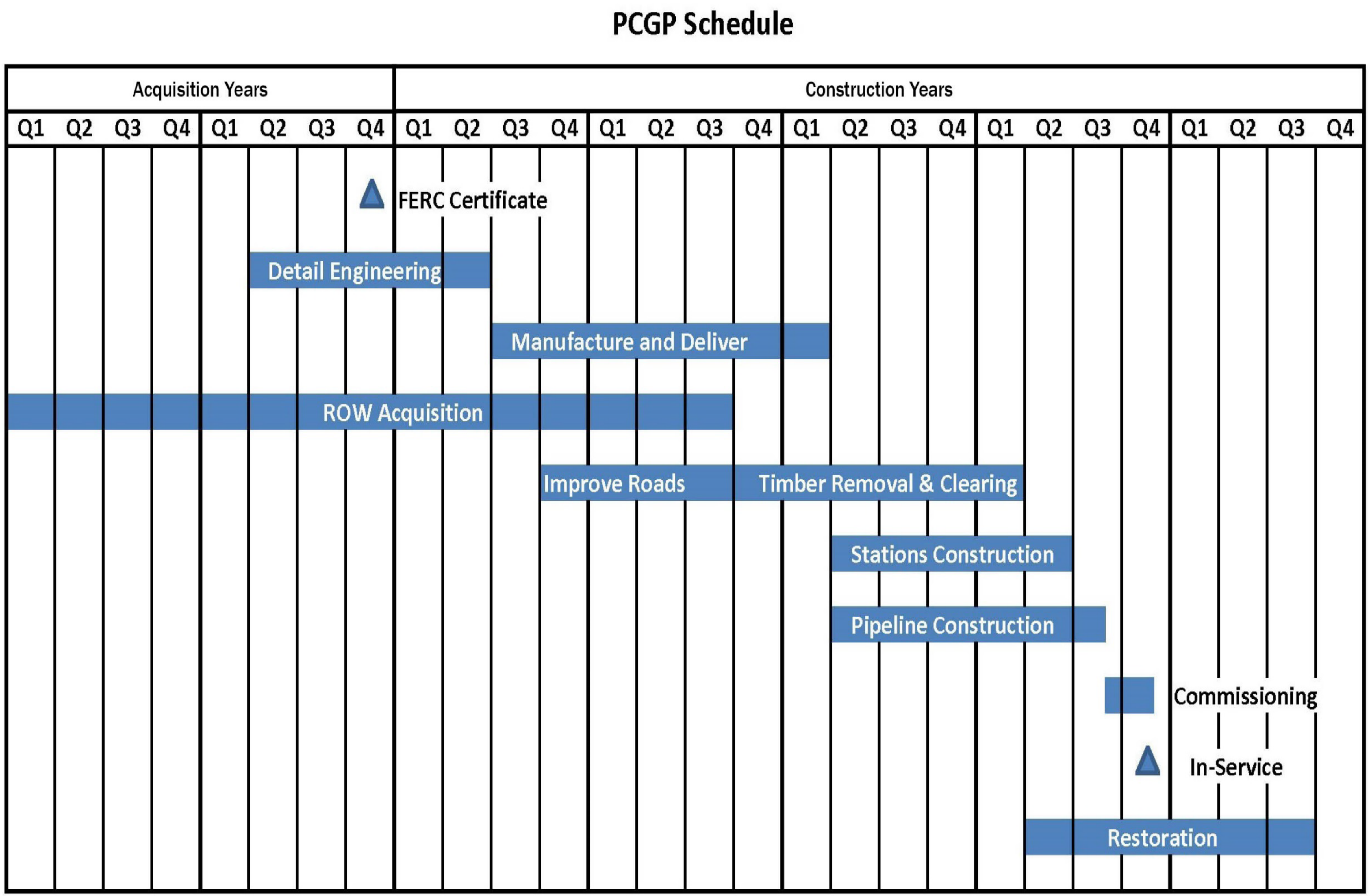

Figure 2. Pipeline Construction Schedule

Table 6. Seasonal Timing Restrictions Associated with Bird Species for Timber Felling, Logging, Clearing, and Construction Activities

Activity	Migratory Birds (Wooded Habitat)[1/]	Northern Spotted Owl[2/]	Marbled Murrelet[2/]	Great Grey Owl[2/]	Bald Eagle[3/]	Golden Eagle[3/]	Peregrine Falcon[4/]
Felling & Brushing[5/]	NO WORK - April 1 - July 15	NO WORK - March 1 - Sept 30	NO WORK - April 1 - Sept 15 within 300-ft buffer from stand	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31
Logging, Skidding & Processing	NO RESTRICTION[6/]	NO WORK[6/] - March 1 - July 15	DTR[6/, 7/]- April 1 - Aug 5;April 1 - Sept 15 for helicopters[8/]	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31
Clearing, Grubbing, & Stump Removal	NO RESTRICTION[6/]	NO WORK[6/] - March 1 - July 15	DTR[6/, 7/] - April 1 - Aug 5	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31
Driving Through Restricted Area on ROW	NO RESTRICTION[6/]	NO RESTRICTION[6/]	DTR[6/, 7/] - April 1 - Aug 5	NO RESTRICTION	NO RESTRICTION	NO RESTRICTION	NO RESTRICTION
Driving Through Restricted Area on Existing Access Road	NO RESTRICTION	NO RESTRICTION	NO RESTRICTION	NO RESTRICTION	NO RESTRICTION	NO RESTRICTION	NO RESTRICTION
Pipeline Construction	NO RESTRICTION[6/]	NO WORK[6/] - March 1 - July 15	DTR[6/, 7/] - April 1 - Aug 5; April 1 - Sept 15 for helicopters[8/]	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31
Maintenance on Existing Access Roads	NO RESTRICTION[6/]	NO WORK[6/] - March 1 - July 15	DTR[6/, 7/] - April 1 - Aug 5	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31
Access Road Improvement & New Road Construction	NO RESTRICTION[6/]	NO WORK[6/] - March 1 - July 15	DTR[6/, 7/] - April 1 - Aug 5	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31

1/ Migratory bird seasonal timing restrictions would apply only to “wooded” habitat (i.e., all forest regenerating areas [not including recent clear-cuts], deciduous tree groves, shrub/brush thickets, etc.); understory and residual slash in felled timbered areas would not be considered migratory bird habitat.
2/ Applies to areas within 0.25 mile of nest site (northern spotted owl, great gray owl) or marbled murrelet stand (presumed occupied, occupied), unless otherwise noted.
3/ Applies to areas within 0.5 mile of nest site (bald eagle, golden eagle).
4/ Applies to areas within 1.5 miles of peregrine falcon eyrie as delineated by the Umpqua National Forest.
5/ Includes all forested areas (not including recent clear-cuts), deciduous tree groves, shrub/brush thickets (i.e., oak).
6/ Applies if trees and brush are previously felled. Otherwise, see restriction for “felling and brushing”.
7/ DTRs - Daily Timing Restrictions stipulate no work until two hours after sunrise and work must stop two hours before sunset.
8/ Where large transport helicopter use is necessary to remove logs or supply pipe.

6.1.2.2 Habitat Effects

Impact to habitats can result in direct effects to organisms (e.g., mortality, displacement, increased energy expense, decreased reproduction) if they inhabit the affected areas while construction or other human-related disturbances occur.

Indirect impacts are related to but removed from the action by an intermediate step or process. For wildlife, indirect impacts are often associated with alteration, elimination, or degradation of habitats. As habitat becomes less suitable and less available, wildlife populations that may have been in equilibrium with the amount of formerly suitable habitat must adjust, through density-dependent mechanisms, to reach new equilibria with habitats (often called carrying capacity). Impacts to wildlife, whether direct or indirect, affect demographic parameters by decreasing survival and/or decreasing reproduction. Such impacts can lead to decreasing population growth rates and smaller populations.

Indirect effects may result from induced changes to wildlife habitats, potentially by conversion of one vegetation cover type to another, by fragmenting existing wildlife habitats and inducing various “edge effects” to interior habitats, and in general by affecting a variety of inter- and intra-specific interactions including competition and predation. Such indirect impact to habitats decreases their functional capacity to support wildlife populations at non-impacted levels. Indirect effects and/or secondary effects of the Project on wildlife may also occur with increased human population base and increased access, whether as a result of the requirements of the action itself (the workforce needed to construct or operate the Project) or as a consequence of the action such as increasing a need for ancillary goods, services, or opportunities resulting from the Project (Comer 1982).

Seventeen broad wildlife habitat classifications coincide with the Project area (Johnson and O’Neil 2001). Affected wildlife habitats classified by Johnson and O’Neil (2001) include: 1) Westside Lowland Conifer-Hardwood-Forest, 2) Montane Mixed Conifer Forest, 3) Southwest Oregon Mixed Conifer-Hardwood Forest, 4) Ponderosa Pine Forest and Woodlands, 5) Westside Oak and Dry Douglas-fir Forest and Woodlands, 6) Western Juniper/Mountain Mahogany Woodlands 7) Sagebrush Steppe, 8) Westside Grasslands, 9) Eastside Grasslands, 10) Herbaceous Wetlands, 11) Westside Riparian-Wetlands, 12) Eastside Riparian-Wetlands, 13) Agriculture, Pastures, and Mixed Environs, 14) Developed-Urban and Mixed Environs, 15) Coastal Dunes and Beaches (Beaches) 16) Open Water-Lakes, River, and Streams, and 17) Oceans, Bays and Estuaries (Bays and Estuaries) (see Table 7). In addition to the Johnson and O’Neil (2001) habitat types, roads have been added as a habitat type to Table 7.

Relative seral development, described as Late Successional-Old Growth (LO), Mid-Seral (MS), and Clearcut-Regenerating (CR) forested types, have been identified for all forest and woodland types in Table 7. Specialized habitat features also occur within the vicinity of the Project area. Such features include cliffs that provide nesting for peregrine falcons and possibly other raptors. Snags provide roosting locations for several bat species and nesting locations for several raptor species and cavity-nesting birds. Large downed woody debris is present with which herpetofauna are often associated, and caves that are used as hibernacula by some bat species.

For other species, use of a specific habitat type included in Table 7 depends on its proximity to water (Johnson and O'Neil 2001). Presence of those habitats and dependent species' potential occurrence has been assumed if habitats occur within Riparian Reserves associated with waterbodies that would be crossed by or are adjacent to the proposed action (Table 8, Table 9).

The acres of each habitat type that would be either removed by construction or modified by use as Uncleared Storage Areas (UCSAs) provide the basis for evaluating effects to the sensitive species included in this BE. Detailed effects to habitats by various Project construction and operational components are provided in Appendix B for each National Forest.

Table 7. Effects to Acres of Johnson and O'Neil Habitat Type by National Forest										
General Habitat Type	Johnson and O'Neil (2001) Habitat Types	Seral Stage[1/]	National Forest						National Forest Total (acres)	
			Umpqua		Rogue River		Winema			
			Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]
Forest-Woodland	Westside-Lowland Conifer-Hardwood-Forest	LO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		MS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		CR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Montane Mixed Conifer Forest	LO	0.00	0.00	12.20	4.54	6.06	3.16	18.26	7.70
		MS	0.00	0.00	6.65	3.90	2.78	0.92	9.44	4.82
		CR	0.00	0.00	29.87	10.82	17.75	3.04	47.61	13.86
		Total	**0.00**	**0.00**	**48.72**	**19.26**	**26.59**	**7.12**	**75.31**	**26.38**
	Southwest Oregon Mixed Conifer-Hardwood Forest	LO	78.15	34.27	68.14	32.33	34.80	3.12	181.08	69.72
		MS	31.48	7.59	10.29	3.76	5.04	0.17	46.81	11.52
		CR	34.33	0.81	46.97	11.97	9.08	0.96	90.39	13.75
		Total	**143.96**	**42.68**	**125.40**	**48.06**	**48.92**	**4.25**	**318.28**	**94.99**
	Ponderosa Pine Forest and Woodlands	LO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		MS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		CR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Westside Oak and Dry Douglas-fir Forest and Woodlands	LO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		MS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		CR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Table 7. Effects to Acres of Johnson and O'Neil Habitat Type by National Forest										
General Habitat Type	Johnson and O'Neil (2001) Habitat Types	Seral Stage[1/]	National Forest						National Forest Total (acres)	
			Umpqua		Rogue River		Winema			
			Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]
Forest-Woodland (cont.)	Western Juniper and Mountain Mahogany Woodlands	LO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		MS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		CR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Forest-Woodland Sub-Total	LO	78.15	34.27	80.34	36.87	40.86	6.28	199.34	77.42
		MS	31.48	7.59	16.95	7.66	7.82	1.09	56.25	16.34
		CR	34.33	0.81	76.84	22.79	26.83	4.00	138.00	27.61
		Total	**143.96**	**42.68**	**174.12**	**67.32**	**75.51**	**11.37**	**393.59**	**121.37**
Grasslands-Shrublands	Shrub-Steppe	N/A	0.00	0.00	7.35	0.59	0.00	0.00	7.35	0.59
	Westside Grasslands	N/A	0.00	0.00	2.53	0.33	0.00	0.00	2.53	0.33
	Eastside Grasslands	N/A	0.00	0.00	0.38	0.00	1.20	0.14	1.59	0.14
Wetland/Riparian	Herbaceous Wetlands	N/A	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00
	Westside Riparian Wetlands	N/A	0.15	0.00	0.00	0.00	0.26	0.00	0.41	0.00
	Eastside Riparian Wetlands	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 7. Effects to Acres of Johnson and O'Neil Habitat Type by National Forest

General Habitat Type	Johnson and O'Neil (2001) Habitat Types	Seral Stage[1/]	National Forest						National Forest Total (acres)	
			Umpqua		Rogue River		Winema			
			Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]
Developed	Agriculture, Pastures and Mixed Environs	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Developed-Urban and Mixed Environs	N/A	12.05	0.00	15.67	0.00	0.00	0.00	27.72	0.00
Barren	Roads	N/A	12.78	0.50	16.02	3.00	2.47	0.06	31.28	3.56
	Beaches	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Water	Open Water-Lakes, Rivers, and Streams	N/A	0.29	0.00	0.14	0.09	0.07	0.00	0.50	0.09
	Bays and Estuaries	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Forest Habitat[4/]		**Total**	25.29	0.50	42.10	4.00	4.00	0.20	71.39	4.70
Total			**194.53**	**43.67**	**258.32**	**75.33**	**83.52**	**11.78**	**536.37**	**130.78**

1/ Forest-Woodland Age Categories Acres are LO, Late Successional/Old Growth assumed to be ≥80 years old; MS, Mid-Seral assumed to be ≥40 but ≤80 years old; CR, Clearcut-Regenerating Forest assumed to be ≤40 years old.

2/ Project components considered in calculation of habitat "Removed": Project construction ROW, temporary extra work areas, aboveground facilities, permanent and temporary access roads (PAR, TAR), pipe storage yards, rock source/disposal sites, and hydrostatic discharge sites.

3/ Project components considered in calculation of habitat "Modified": Project 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 removed and scattered across the ROW after construction during restoration and are considered as temporary insignificant habitat modifications.

4/ Other Non-Forest Habitat: delineation and available GIS data sources indicate that the area is not forested and includes, for example, roads, quarries, lake shorelines, and other non-forested habitats.

Table 8. Total Terrestrial Habitat Affected/Removed[1/] by Construction within Riparian Reserves in Fifth Field Watersheds												
Fifth Field Watershed (Hydrologic Unit Code) and Landowner	Forested Habitat (acres)					Other Habitat (acres)						
	Late Successional - Old Growth	Mid-Seral	Regenerating	Clearcut	Total	Forested Wetland	Non-Forested Wetland	Unaltered Non-Forested Habitat	Agriculture / Pasture	Altered Habitat	Total	Total Riparian Reserves Impact (acres)
Upper Cow Creek (HUC 1710030206)												
Umpqua National Forest	2.65	3.52	3.69	0.00	**9.86**	0.00	0.16	0.00	0.00	0.58	**0.74**	**10.59**
Trail Creek (HUC 1710030706)												
Umpqua National Forest	0.00	1.47	0.00	0.00	**1.47**	0.00	0.00	0.00	0.00	2.45	**2.45**	**3.92**
Little Butte Creek (HUC 17100300708)												
Rogue River National Forest	2.56	0.12	1.76	0.00	**4.44**	0.00	0.00	0.19	0.00	0.12	**0.31**	**4.75**
Spencer Creek (HUC 1801020601)												
Winema National Forest	1.59	0.34	1.82	0.00	**3.75**	0.00	0.26	0.04	0.00	0.13	**0.42**	**4.17**
All Fifth Field Watersheds												
Umpqua National Forest	2.65	4.99	3.69	0.00	**11.33**	0.00	0.16	0.00	0.00	3.02	**3.18**	**14.51**
Rogue River National Forest	2.56	0.12	1.76	0.00	**4.44**	0.00	0.00	0.19	0.00	0.12	**0.31**	**4.75**
Winema National Forest	1.59	0.34	1.82	0.00	**3.75**	0.00	0.26	0.04	0.00	0.13	**0.42**	**4.17**
Fifth Field Watershed Total	**6.80**	**5.44**	**7.28**	**0.00**	**19.51**	**0.00**	**0.42**	**0.23**	**0.00**	**3.27**	**3.92**	**23.43**

1/ Project components considered in calculation of habitat "Removed": Project construction ROW, temporary extra work areas, aboveground facilities, and permanent and temporary access roads (PAR, TAR). Habitat "Modified," i.e., UCSAs, are not considered here because there are no UCSAs in Riparian Reserves so habitat removed is the extent of habitat affected.

2/ Habitat Types within Late Successional Reserves generally categorized as: Late Successional (Mature) or Old Growth Forest (coniferous, deciduous, mixed ≥80 years old); Mid-Seral Forests (coniferous, deciduous, mixed ≥ 40 but ≤ 80 years old); Regenerating Forest (coniferous, deciduous, mixed ≥5 but ≤40 years old); Clearcut Forests; Wetland Forested, Unaltered Nonforested Habitat (grasslands, sagebrush, shrublands), and Altered Habitats (urban, industrial, residential, roads, utility corridors, quarries).

Table 9. Total Terrestrial Habitat Affected in the 30-foot-wide Maintained Corridor within Riparian Reserves in Fifth-Field Watersheds										
Fifth Field Watershed (Hydrologic Unit Code) and Landowner	Forested Habitat (acres)[1/]				Other Habitat (acres)[1/]					Total Riparian Reserves Impact (acres)
	Late Successional-Old Growth	Mid-Seral Forest	Regenerating Forest	Total	Forested Wetland	Non-Forested Wetland	Unaltered Non-Forested Habitat	Altered Habitat	Total	
Upper Cow Creek (HUC 1710030206)										
Umpqua National Forest	0.73	0.95	1.02	**2.70**	0.00	0.03	0.00	0.13	**0.16**	**2.86**
Little Butte Creek (HUC 1710030708)										
Rogue River National Forest	0.61	0	0.47	**1.08**	0.00	0.00	0.06	0.10	**0.16**	**1.24**
Spencer Creek (HUC 1801020601)										
Winema National Forest	0.53	0.09	0.40	**1.03**	0.00	0.10	0.00	0.02	**0.12**	**1.15**
All Fifth Field Watersheds										
Fifth Field Watershed Total	**1.88**	**1.04**	**1.90**	**4.81**	**0.00**	**0.14**	**0.06**	**0.25**	**0.44**	**5.25**

1/ Habitat Types within Late Successional Reserves generally categorized as: Late Successional (Mature) or Old Growth Forest (coniferous, deciduous, mixed ≥80 years old); Mid-Seral Forests (coniferous, deciduous, mixed ≥40 but ≤80 years old); Regenerating Forest (coniferous, deciduous, mixed ≥5 but ≤40 years old); Clearcut Forests; Wetland Forested, Unaltered Nonforested Habitat (grasslands, sagebrush, shrublands), and Altered Habitats (urban, industrial, residential, roads, utility corridors, quarries).

Pacific Connector prepared estimates of snag density (numbers of snags per acre) that would be affected within the construction ROW and Temporary Extra Work Areas (TEWAs) on each of the three national forests based upon timber reconnaissance conducted in 2006, 2007, and 2015 (Chapman 2017). Timber reconnaissance occurred prior to the 2015 Stout's Creek fire on the Umpqua National Forest. Snag density by size category (inches, diameter at breast height [dbh]) and decay class (hard or soft) are provided in Table 10. Within the areas affected by construction, conifer snags less than 13 inches dbh are generally most dense on each forest although there are numerous hardwood snags in that size category on the Rogue River-Siskiyou National Forest. Most of the smaller snags (<13 inches, dbh) were observed as hard wood, rather than softened due to decay.

The number of snags removed by the Project within each National Forest was calculated by multiplying the sum of hard and soft decay-class densities for all size categories by the acreage of forest-woodland removed during construction (Table 7). Loss of snags regardless of decay class is expected to be a long-term impact because recruitment of new snags within the affected areas would take much longer than 3 years. Estimates of snags within removed acres, as well as within the 700-foot, 3,200-foot, and 5-mile analysis areas can be found in Appendix D; these estimates were generated by extrapolating estimates of snag density per acre (Table 10) by acres of forested habitat.

Table 10. Snag Density Estimates on NFS lands

National Forest (acres surveyed)	Tree Type	Decay Class	Estimates of Snag Density (Number per Acre) by Size Category (inches, dbh)			
			<13	13-24	25-36	>36
Umpqua (147 acres)	conifer	Hard	5.7	0.7	1	0
		Soft	0.1	1	1	0.5
Rogue River (181 acres)	conifer	Hard	1.7	0.2	0.1	0
		Soft	0	0.5	0.2	0.1
	hardwood	Hard	1.7	0	0	0
		Soft	0	0.1	0	0
Winema (73 acres)	conifer	Hard	3.3	0.2	0.1	0
		Soft	0	0.4	0.1	0

6.1.2.3 Invasive Species

Invasive species are of concern for all terrestrial and aquatic species. Short- or long-term impacts to fish and wildlife habitat could result if the proposed pipeline causes the establishment and spread of noxious weeds, as well as other invasive species (animals and microbes) not native to a region. Noxious weeds often out-compete native vegetation. They displace native species by spreading rapidly and utilizing resources (nutrients, water, sunlight) that can eventually lead to a weed-dominated monoculture.

Clearing of vegetation from the ROW and soil disturbance from ROW grading could increase the chance of spreading noxious weeds through the removal of native, established species and soil disturbance, which could encourage the establishment of invasive plants. Equipment moving along the ROW could also bring seeds from one place to the next, aiding the spread of these species. Pacific Connector developed an Integrated Pest Management Plan, in consultation with the Oregon Department of Agriculture (Butler 2017), BLM, and the Forest Service, to minimize the potential spread and infestation of weeds along the construction ROW. This plan can be found in Appendix N to the Plan of Development (POD), which is attached to the FEIS (FERC 2019b). This plan includes surveys prior to construction to determine the presence of noxious weeds; cleaning of construction equipment and vehicles prior to moving them into or out of the construction ROW to prevent the import and spread of weeds; and vegetation clearing and grading requirements in areas of noxious weeds. Additionally, disturbed areas would be replanted with appropriate seed mixes to help reduce noxious weed germination. After construction, the ROW would be monitored and any noxious weed infestations would be controlled. Pacific Connector would also investigate noxious weed issues raised by landowners during operation of the pipeline.

6.1.2.4 Noise Disturbance

Noise could potentially impact wildlife during clearing and grading of the construction ROW, during pipeline construction, and during ROW clean up, restoration, maintenance, and travel to and from the site. In some remote and steep areas crossed by the proposed pipeline, helicopters may be used during ROW timber-clearing and during pipe delivery and pipeline surveys. Minimal increase in ambient noise levels would also occur during periodic ROW vegetation maintenance activities (i.e., mowing, chainsaws) during operation. Noise would most likely temporarily displace wildlife some distance away from noise sources if wildlife species are nearby. However, any short-term effects to wildlife by noise would occur simultaneously with human presence and the presence of heavy machinery normally required for pipeline construction. Most likely, any impacts to wildlife due to noise could not be separated from those due to all other construction-related activities occurring concurrently. Noise and human presence would move along the construction ROW, albeit at a rather slow pace. Therefore, impacts to wildlife because of noise during construction would be of relatively short duration (approximately 8 weeks in a given area) and spatially localized (by construction spread as described in Section 6.1.2.1).

Research has demonstrated varying short-term reactions of wildlife to noise. Most research has focused on wildlife reaction to more constant noise generated by roads and high-volume traffic (e.g., Forman and Alexander 1998). However, some research has documented wildlife reaction to airplanes, sonic booms, helicopters, artillery, and blasting that could produce similar reactions from noises associated with construction activities for the proposed Project. Golden et al. (1980) provided the following behavioral and physiological reactions of animals to known noise levels ranging between 75 and 105 dB from various disturbances, including aircraft:

- Fish demonstrate reduced viability, survival, and/or growth (20 dBL increase in ambient underwater sound levels for 11 to 12 days);

- Ungulates become nervous and/or run (82 to 95 dBA) or panic (95 to 105 dBA);
- Waterfowl flock (80 to 85 dBA), move and/or become nervous (85 to 95 dBA), or startle (95 to 105 dBA); and
- Other birds scare (85 dBA).

Raptors and other forest-dwelling bird species have demonstrated more adverse impacts to project-generated sound during nesting and breeding when levels substantially exceed pre-construction ambient conditions (i.e., incremental increases in sound level corresponding to 20 to 25 dBA) and when the total sound level is very high and exceeds 90 dBA. Such impact could potentially result in egg failure or reduced juvenile survival, malnutrition or starvation of the young, or reducing the growth or likelihood of survival of young. In contrast, these effects may be minimal; Awbrey and Bowles (1990) found that raptors that flushed from their nests while incubating did not leave the eggs exposed for more than 10 minutes, and concluded that multiple, closely spaced disturbances would be required to cause lethal egg exposure. Some raptors, for example osprey, refuse to be flushed from their nest despite closely approaching helicopters (Poole 1989).

Pacific Connector anticipates ambient sound levels in much of the proposed pipeline area would be similar to the Arcata Fish and Wildlife Office's projections (FWS 2006). Ambient sound is defined as the background sound level, which is typically composed of contributions from multiple sound sources including natural sound sources (e.g., wind, birds, animals) and anthropogenic sound sources (e.g., vehicular traffic, human activity, airplanes, trains, etc.). The typical ambient sound level for forest habitats ranges from 25 to 44 dBA (FWS 2006).

Noise levels at stream crossings are expected to be within the range of normal construction activity. Pacific Connector anticipates 18 stream crossings on NFS lands (Appendix C). Pacific Connector proposes to use dry open-cut methods to cross the creeks and not horizontal directional drilling (HDD) which typically results in higher noise levels. Dry open-cut methods use a pump and flume procedure to route the water around the pipeline trench area.

Double rotor helicopters may be used during timber clearing and pipeline construction along portions of the proposed Pacific Connector pipeline in areas that would be less accessible to pipeline construction contractors and logging trucks. Noise associated with this size of helicopter (generally >92 dBA) could have negative impacts to species, especially bird species during the breeding season. However, this level of noise attenuates to 92 dBA[4] at distances of 650-700 feet from the aircraft. Conservation measures to reduce noise from helicopters consist of gradual and controlled movement and avoidance of noise sensitive areas. Maintaining optimal flight speeds of 80-90 knots (90 to 104 miles per hour) also reduces sound levels; however, hauling speeds would be below 80 knots and optimal flight speeds could only be maintained during unloaded return flights.

[4] FWS (2006) defined 92 dBA as the "injury threshold" for the listed bird species marbled murrelet and northern spotted owl.

Pacific Connector indicated that it may use helicopters for timber clearing and pipe stringing within locations where there are steep slopes and limited access to the ROW. All of the locations identified in Table 11 occur on the Umpqua National Forest.

Table 11. Helicopter Staging Locations

Begin MP	End MP	Helicopter Staging
101.3	102.30	TEWA 101.62-N, 101.75-N, & 102.19-N
108.5	110.40	TEWA 109.10-W, & 110.34-W TEWA 110.73 Helicopter landing Peavine Quarry
116.30	117.85	TEWA-116.59-W, & 117.67-N
123.30	125.15	TEWAs 123.53-W, 123.71-N, 124.30-N, 124.54-W, 124.71-W, & 124.96-N

Blasting may be required for pipeline trench construction in areas where hard, non-rippable bedrock occurs within the trench profile; however, alternate mechanical methods would first be employed in order to attain the desired trench depth, such as ripping, hydraulic hammers or rock saws. The bedrock units that may require blasting are expected to consist primarily of volcanic and metavolcanic rocks in the Klamath Mountains and volcanic rocks in the Cascade Range and along the ridges in the Basin and Range physiographic province.

Pacific Connector identified areas where blasting may be necessary by reviewing the Natural Resource Conservation Service soils maps and descriptions to identify soil units that typically contain bedrock within 5 feet of the ground surface. Low and high potential blasting areas were identified on and adjacent to Forest Service-managed lands. Specifically, there is high potential for blasting on Forest Service managed lands between MPs 99.3 and 108.9 and between MPs 109.4 and 111.0 on the Umpqua National Forest; low potential for blasting between MPs 111.0 and 113.3 on the Umpqua National Forest; and high potential for blasting between MPs 153.8 and 172.0 on the Rogue River and Winema national forests. Blasting activities may involve a single blast or a repetitive blasting sequence. As reported by the Arcata Fish and Wildlife Office (FWS 2006), noise associated with blasting activities may be in the range of 112 dBA within 50 feet of the trench and may cause alarm in wildlife. Blasting during pipeline construction is expected to generate lower sound levels (approximately 75 – 100 dBA) since all blast charges would be underground and muffled with blasting mats, but could be as high as 112dB.

Table 12 estimates cumulative noise (dBA) at 50 feet associated with each activity in the proposed Project (Figure 3). Table 12 also estimates noise levels at 200 feet and 1,320 feet with or without a buffer of dense vegetation between the noise and the target point. Additionally, the distance at which the noise would attenuate to background (assuming an ambient noise level of 40 dBA) is estimated. Average noise levels over the entire construction sequence would be 85 dBA, regardless of whether trenching occurs in rock-free areas, in rocky areas that may include blasting. If blasting were needed, the maximum attenuation distance to background (40 dBA) would be approximately 2.2 miles if terrain was flat and no trees were present. However, if 100 feet of trees were present, the distance may decrease to approximately 1.4 miles.

Distances at which noise would attenuate to ambient levels would depend on local conditions such as tree cover and density, topography, weather (humidity), and wind, all of which can alter background noise conditions. Consequently, short-term impact to wildlife by noise would vary along the length of the proposed pipeline.

Table 12. Estimated Equipment Noise and Noise Attenuation at Specified Distances During a Typical Pipeline Construction Sequence									
Drawing Number[1/]	Pipeline Construction Sequence[1/]	Equipment Expected[2/]	Estimated Cumulative Noise (dBA) At 50 feet [3/]	Estimated Noise (dBA) at 200 feet[4/]		Estimated Noise (dBA) at 0.25 miles[4/]		Attenuation Distance (feet) to Background[6/]	
				No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]
1	ROW Acquisition and Survey	Pickup Truck Chain Saw	88	73	68	53	48	4,222	2,660
2	Clearing and Grading	Pickup Truck Chain Saw Excavator Dozer Flatbed Truck Loader Shovel Logger-Cutter Skidder Crawler-Chipper	93	78	73	58	53	6,745	4,249
3	Fencing	Pickup Truck Auger Drill Rig	86	71	66	51	46	3,510	2,211
4	Centerline Survey of Ditch	Pickup Truck	80	63	58	45	40	2,016	1,270
5	Ditching (Rock-Free)	Pickup Truck Backhoe Excavator Dozer Flatbed Truck Dump Truck Tracked Ditcher	86	71	66	51	46	3,510	2,211

Table 12. Estimated Equipment Noise and Noise Attenuation at Specified Distances During a Typical Pipeline Construction Sequence

Drawing Number[1/]	Pipeline Construction Sequence[1/]	Equipment Expected[2/]	Estimated Cumulative Noise (dBA) At 50 feet [3/]	Estimated Noise (dBA) at 200 feet[4/]		Estimated Noise (dBA) at 0.25 miles[4/]		Attenuation Distance (feet) to Background[6/]	
				No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]
OR									
6	Ditching (Rock)	Pickup Truck Backhoe Excavator Dozer Flatbed Truck Auger Drill Rig Mounted Impact Hammer Rock Drill Blasting (Mitigated rock fracturing) Dump Truck	99	84	79	64	58	11,670	7,352
7	Padding Ditch Bottom	Pickup Truck Backhoe Excavator Dump Truck	86	71	66	51	46	3,510	2,211
8	Stringing	Pickup Truck Excavator Flatbed Truck Crane	86	71	66	51	46	3,510	2,211
9	Bending	Pickup Truck Excavator Dozer	87	72	67	52	47	3,850	2,425

Table 12. Estimated Equipment Noise and Noise Attenuation at Specified Distances During a Typical Pipeline Construction Sequence									
Drawing Number[1/]	Pipeline Construction Sequence[1/]	Equipment Expected[2/]	Estimated Cumulative Noise (dBA) At 50 feet [3/]	Estimated Noise (dBA) at 200 feet[4/]		Estimated Noise (dBA) at 0.25 miles[4/]		Attenuation Distance (feet) to Background[6/]	
				No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]
10	Line Up, Stringer Bead and Hot Pass	Pickup Truck Excavator Dozer Side-Boom Welder/Torch	86	71	66	51	46	3,510	2,211
11	Fill and Cap Weld	Pickup Truck Welder/Torch	81	66	61	46	41	2,211	1,393
12	As-Built Footage	Pickup Truck Welder/Torch	82	67	62	47	42	2,425	1,528
13	X-Ray and Weld Repair	Pickup Truck Welder/Torch	82	67	62	47	42	2,425	1,528
14	Coating Field and Factory Welds	Pickup Truck Welder/Torch	82	67	62	47	42	2,425	1,528
15	Inspection (Jeeping) and Repair of Coating	Pickup Truck	80	65	60	45	40	2,016	1,270
16	Lowering In and Tie-Ins	Pickup Truck Backhoe Excavator Dozer	87	72	67	52	47	3,850	2,425
17	As-Built Survey	Pickup Truck	80	65	60	45	40	2,016	1,270
18	Pad and Backfill	Pickup Truck Backhoe Excavator Dozer Dump Truck	87	72	67	52	47	3,850	2,425

Table 12. Estimated Equipment Noise and Noise Attenuation at Specified Distances During a Typical Pipeline Construction Sequence									
Drawing Number[1/]	Pipeline Construction Sequence[1/]	Equipment Expected[2/]	Estimated Cumulative Noise (dBA) At 50 feet [3/]	Estimated Noise (dBA) at 200 feet[4/]		Estimated Noise (dBA) at 0.25 miles[4/]		Attenuation Distance (feet) to Background[6/]	
				No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]
19	Test and Final Tie-In	Pickup Truck Backhoe Pumps	86	71	66	51	46	3,510	2,221
20	Replace Topsoil and Cleanup	Pickup Truck Backhoe Excavator Dozer Tractor	88	73	68	53	48	4,222	2,660

Source: de Hoop and Lalonde 2003; WSDOT 2011.

1/ Drawing Number and Pipeline Construction Sequence are shown in Figure 3.

2/ Equipment expected, based on "typical" pipeline construction requirements at a given location.

3/ Estimated Cumulative Noise at 50 feet is based on equipment-specific noise values (WSDOT 2008; de Hoop and Lalonde 2003) and rules for decibel addition specified by Washington State Department of Transportation (WSDOT 2008).

4/ Noise attenuation assumes "soft site" (absorptive ground) conditions and point-source noise reduction of 7.5 dBA for every doubling of distance (WSDOT 2008).

5/ In these estimates, a buffer of 100 feet of dense vegetation is present in line of sight between noise source and receptor. If 200 feet of dense vegetation is present, noise would be reduced by an additional 5 dBA.

6/ Background noise assumed to be 40 dBA during daylight hours, when construction would occur.

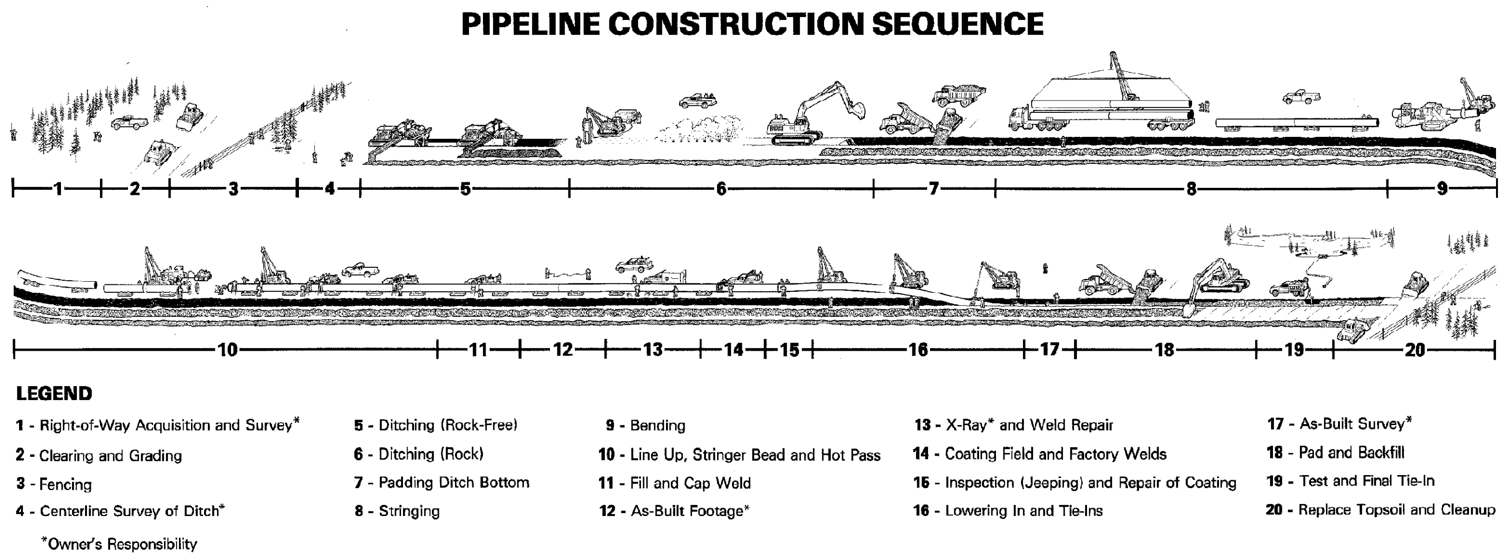

Figure 3. Generalized Pipeline Construction Sequence

6.1.2.5 Cumulative Impacts

In order to understand the contribution of past actions to the cumulative effects of the proposed action, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

Current and reasonably foreseeable projects that may cumulatively impact resources evaluated in this BE that would be affected by construction and operation of the proposed Project on Forest Service-managed lands are listed in Table 13. Note that these activities may include projects that are outside Forest Service-managed lands, but within the fifth-field watersheds crossed by the Project on Forest Service-managed lands.

A Forest Service action must meet two criteria to be a candidate for inclusion in the cumulative effects analysis for this BE. The action must:

- Affect a resource (e.g., forests) or resources potentially affected by the proposed Project on Forest Service-managed lands; and
- Overlap with the Project in time and space.

Current and reasonably foreseeable projects within watersheds where the proposed action crosses NFS lands include a variety of timber, fuel, grazing and biological projects (Table 13). Current and reasonably foreseeable projects on the Umpqua National Forest include 20 projects within the Days Creek, Elk Creek, Upper Cow Creek and Trail Creek Watersheds (Table 13). Forest Service projects include a weed treatment project, livestock grazing, a hazardous fuels reduction project, and various aquatic restoration projects; other projects include several BLM timber sales, commercial and young-stand thinning projects, a fuels treatment project, livestock grazing, and forest management projects (Table 13). On the Rogue River National Forest, there are 13 projects within the Little Butte Watershed and the Big Butte Watershed. Forest Service projects include livestock grazing and a quarry; other projects include several BLM forest management projects, livestock grazing, and a timber sale (Table 13). On the Winema National Forest, there are 6 planned projects within the Spencer Creek Watershed that consist of livestock grazing, a noxious weed treatment, firewood collection, a fuels treatment project, a timber sale, and a forest thinning project (Table 13). Table 13 also includes Project-related mitigation (i.e., compensatory mitigation measures) on NFS land. These compensatory mitigation measures would be required by the Forest Service and were developed based on the objectives/standards in the respective LRMPs, the recommendations of the (2011) NSO recovery plan, the recommendations of the final Southern Oregon/Northern California Coast Coho Salmon Recovery Plan (2014), applicable Late Successional Reserve Assessments, and fifth-field Watershed Analyses for watersheds where impacts of the Pacific Connector Pipeline Project would occur.

Table 13. Forest Service Project-related Mitigation and Recent, Current, or Proposed Actions that May Cumulatively Affect Resources Evaluated in this BE on Forest Service-Managed Lands			
Fifth Field Watershed	**Activity**	**Project Description**	**Estimated Date**
Umpqua National Forest			
Days Creek – South Umpqua	Upper Cow Late Successional Reserve Project (BLM lands)	125 acres of commercial thinning	Ongoing
	Days Creek EA Timber Sales (BLM lands)	1,437 acres of thinning and associated road construction 485 acres of regeneration harvest and associated road construction	Ongoing since 2017
	Shively-Clark EA Timber Sales (BLM lands)	1,000 acres of thinning and associated road construction 250 acres of regeneration harvest and associated road construction	Proposed for 2019
	Days Creek-South Umpqua Matrix Snag Creation (USFS lands)[1]	14 acres of snag creation	Prior to or in conjunction with pipeline construction.
	Days Creek-South Umpqua LSR Snag Creation (USFS lands) [1]	32 acres of snag creation	Prior to or in conjunction with pipeline construction.
	Days Creek-South Umpqua Matrix Integrated Fuels Reduction (USFS lands) [1]	194 acres of fuels reduction activities	Prior to or in conjunction with pipeline construction.
	Days Creek-South Umpqua LSR Integrated Fuels Reduction (USFS lands) [1]	254 acres of fuels reduction activities	Prior to or in conjunction with pipeline construction.
Elk Creek Watershed 1710030204	Noxious Weed Treatment (USFS lands)	50 acres per year. Hand pulling and cutting	Ongoing
	Livestock Grazing (USFS lands)	9,963 acres livestock grazing	Ongoing
	Tiller Aquatic Restoration Project (USFS lands)	Culvert replacements, instream habitat improvement, sump maintenance sites, and Drew Lake habitat improvement; approximately 5 acres	Ongoing
	Elk Creek Watershed Restoration Project (USFS lands)	3,629 acres commercial thin, 551 acres non-commercial thinning, 4,305 acres activity fuels treatment, 513 acres shaded fuel breaks, 3,176 acres prescribed burning, 9 acres temporary road construction and removal, 9.5 acres of road removal, and 22 culvert replacements (<1 acre approximately).	2018-2023
	Elk Creek Road Decommissioning (USFS lands) [1]	5.9 miles of road decommissioning	Prior to or in conjunction with pipeline construction.
	Elk Creek Road Stormproofing (USFS lands) [1]	9.2 miles of stormproofing of existing roads	Prior to or in conjunction with pipeline construction.
	Elk Creek LSR LWD Placement (USFS lands) [1]	99 acres of upland LWD placement	Prior to or in conjunction with pipeline construction.
	Elk Creek Roadside Noxious Weeds (USFS lands) [1]	6.7 miles of noxious weed control	Prior to or in conjunction with pipeline construction.
	Elk Creek LSR Snag Creation (USFS lands) [1]	68 acres of snag creation	Prior to or in conjunction with pipeline construction.
	Elk Creek Matrix Integrated Fuels Reduction (USFS lands) [1]	176 acres of fuel reduction activities	Prior to or in conjunction with pipeline construction.
	Elk Creek Lupine Meadow Restoration (USFS lands) [1]	101 acres of meadow restoration activities such burning, removal of encroaching conifers, and noxious weed control	Prior to or in conjunction with pipeline construction.
	Elk Creek Fish Passage Culverts (USFS lands) [1]	Restoration of stream crossings at 5 sites	Prior to or in conjunction with pipeline construction.
	Elk Creek LSR Enhancement (USFS lands) [1]	91 acres of LSOG habitat enhancement	Prior to or in conjunction with pipeline construction.
	Elk Creek LSR Off-site Pine Removal (USFS lands) [1]	300 acres of stand-density management in pine plantations	Prior to or in conjunction with pipeline construction.
	Elk Creek Pump Chance (USFS lands) [1]	2 pump chance sites	Prior to or in conjunction with pipeline construction.
Upper Cow Creek Watershed 1710030205	Livestock Grazing (USFS lands)	8,250 acres	Ongoing
	Upper Cow Creek Hazardous Fuels Project (USFS lands)	Thinning of 1,038 acres of roadside fuels on both USFS and private land	2017-2018
	Tiller Aquatic Restoration Project (USFS lands)	Approximately 5 acres of culvert replacements, sump maintenance, and private firewise treatments	Expected to begin in 2019

Table 13. Forest Service Project-related Mitigation and Recent, Current, or Proposed Actions that May Cumulatively Affect Resources Evaluated in this BE on Forest Service-Managed Lands			
Fifth Field Watershed	Activity	Project Description	Estimated Date
	Upper Cow Late Successional Reserve Project (BLM lands)	376 acres of commercial thinning	Ongoing
	Young Stand Management (BLM lands)	300 – 500 acres mechanical young stand thinning	2018-2028
	Fuels Treatments (BLM lands)	300 – 500 acres fuels reduction and prescribed burn/handpile burn	2018-2028
	Upper Cow Creek Road Closure (USFS lands) [1]	1.2 miles of road closure	Prior to or in conjunction with pipeline construction.
	Upper Cow Creek Road Decommissioning (USFS lands) [1]	1.0 mile of road decommissioning	Prior to or in conjunction with pipeline construction.
	Upper Cow Creek LSR LWD Placement (USFS lands) [1]	65 acres of upland LWD placement	Prior to or in conjunction with pipeline construction.
	Upper Cow Creek Matrix Snag Creation (USFS lands) [1]	11 acres of snag creation	Prior to or in conjunction with pipeline construction.
	Upper Cow Creek LSR Snag Creation (USFS lands) [1]	90 acres of snag creation	Prior to or in conjunction with pipeline construction.
	Upper Cow Creek Matrix Integrated Fuels Reduction (USFS lands) [1]	730 acres of fuels reduction activities	Prior to or in conjunction with pipeline construction.
	Upper Cow Creek Fish Passage Culverts (USFS lands) [1]	Restoration of stream crossings at 6 sites	Prior to or in conjunction with pipeline construction.
	LSR 223 Addition (USFS lands) [1]	Reallocation of 585 acres of Matrix Lands to LSR	Prior to or in conjunction with pipeline construction.
	Upper Cow Creek LSR Integrated Fuels Reduction (USFS lands) [1]	635 acres of fuels reduction activities	Prior to or in conjunction with pipeline construction.
	Upper Cow Creek LSR Enhancement (USFS lands) [1]	197 acres of thinning for forest stand density management	Prior to or in conjunction with pipeline construction.
	Elk Creek LSR Pacific Crest Trail Enhancement (USFS lands) [1]	116 acres of thinning for forest stand density management	Prior to or in conjunction with pipeline construction.
	Upper Cow Creek LSR Road Shaded Fuel Break (USFS lands) [1]	378 acres of road shaded fuel breaks to lower risk of loss of valuable habitats to high intensity fire	Prior to or in conjunction with pipeline construction.
	Upper Cow Creek Pump Chance (USFS lands) [1]	1 pump chance site	Prior to or in conjunction with pipeline construction.
	Upper Cow Creek Lupine Meadow Restoration (USFS lands) [1]	23 acres of meadow restoration activities such burning, removal of encroaching conifers, and noxious weed control	Prior to or in conjunction with pipeline construction.
Trail Creek	Livestock Grazing (USFS lands)	4,230 acres livestock grazing.	Ongoing
	Proposed Trail Creek Forest Management (BLM lands)	4,575 acres of timber harvest, precommercial thinning, meadow restoration, small diameter thinning, and of hazardous fuels reduction.	Implementation in 2015, current status unknown
	Proposed Trail Creek Forest Management (BLM lands)	336 acres restoration thinning, 13 acres riparian thinning, 414 acres hazardous fuels treatment, 263 acres precommercial thinning, 8 pump chances restored, block 4 roads, replace 1 culvert, decommission (<1 acre), 0.5 mile of road decommissioning, and 0.5 mile of stream restoration.	Implementation in 2015
	Proposed Trail Creek Forest Management (BLM lands)	714 acres restoration thinning, 75 acres riparian thinning, 1,075 acres hazardous fuels treatment, 282 acres meadow restoration, 50 acres small diameter thinning, 6 pump chances restored (<1 acre), 259 acres roadside firewood cutting, 0.8 miles temporary road construction.	Implementation in 2015
	Proposed Trail Creek Forest Management (BLM lands)	20 acres restoration thinning, 1,044 acres hazardous fuels treatment, 2 pump chances restored (<1 acre)	Implementation in 2015
	Mouse Trail Timber Sale (BLM lands)	477 acres of stand thinning with slash disposal at multiple small areas on either side of Highway 227 north of Highway 62	As of 1st Quarter 2017, 266 acres are uncut
	Livestock Grazing (BLM lands)	802 acres of livestock grazing	Ongoing
	Trail Creek Stormproofing (USFS lands) [1]	2.2 miles of stormproofing of existing roads	Prior to or in conjunction with pipeline construction.
	Trail Creek Road Decommissioning (USFS lands) [1]	0.3 mile of road decommissioning	Prior to or in conjunction with pipeline construction.
	Trail Creek Matrix Snag Creation (USFS lands) [1]	109 acres of snag creation	Prior to or in conjunction with pipeline construction.
	Trail Creek Matrix Integrated Fuels Reduction (USFS lands) [1]	500 acres of fuels reduction activities	Prior to or in conjunction with pipeline construction.
	Trail Creek LSR Pacific Crest Trail Enhancement (USFS lands) [1]	112 acres of thinning for forest stand density management	Prior to or in conjunction with pipeline construction.
	Trail Creek LSR Road Shaded Fuel Break (USFS lands) [1]	175 acres of road shaded fuel breaks	Prior to or in conjunction with pipeline construction.

Table 13. Forest Service Project-related Mitigation and Recent, Current, or Proposed Actions that May Cumulatively Affect Resources Evaluated in this BE on Forest Service-Managed Lands			
Fifth Field Watershed	**Activity**	**Project Description**	**Estimated Date**
Rogue River National Forest			
Big Butte Creek Watershed 1710030704	Livestock Grazing (USFS lands)	63,364 acres of grazing.	Ongoing
	Big Butte Forest Management Project (BLM lands)	46 acres disease management, 18 acres shelterwood retention, 103 acres structural retention, 1,191 acres proportional thin, 7 acres overstory removal, 134 acres thin from below, 78 acres variable density thinning, 12 acres riparian thinning, 762 acres small diameter thinning, 1.2 miles of temporary route construction/reconstruction.	Implementation by 2020
	Proposed Obenchain Forest Management Project (BLM lands)	181 acres selection harvest, 43 acres commercial thinning, 24 acres regeneration harvest, 11 acres riparian commercial thinning, 2 acres pre-commercial thin, 0.4 miles permanent road construction, 0.8 miles temporary route construction, and 0.5 miles temporary route reconstruction.	Expected implementation 2018-2022
	Livestock Grazing (BLM lands)	28,348 acres of grazing	Ongoing
	Friese Camp Forest Management Project (BLM lands)	1,145 acres density management, 177 acres commercial thinning, 26 acres regeneration harvest, 37 acres select cut, 3.1 miles temporary route construction, and 2.2 miles road decommissioning	Implemented 2013-2017
	Double Bowen Forest Management Project (BLM lands)	42 acres shelterwood, 507 acres density management, 233 acres selection harvest, 14 acres riparian thinning, 76 acres small diameter thinning, and 0.6 miles temporary route construction/reconstruction	Implementation 2015-2019
	Elk Camel Forest Management Project (BLM lands)	72 acres selection harvest, pre-commercial thinning, and underburning, 0.5 mile temporary route construction, and 1.5 miles road reconstruction	Implementation 2018-2022
	LSR 227 Addition (USFS lands) [1]	Reallocation of 497 acres of Matrix Lands to LSR	Prior to or in conjunction with pipeline construction.
Little Butte Creek Watershed 1710030708	Livestock Grazing (USFS lands)	87,620 acres of grazing.	Ongoing
	Proposed Obenchain Forest Management Project (BLM lands)	90 acres selection harvest, 2 acres commercial thinning, 5 acres regeneration harvest, 11 acres pre-commercial thinning, and 0.6 mile temporary route construction	Implementation 2018-2022
	Livestock Grazing (BLM Lands)	46,382 acres of grazing	Ongoing
	South Fork Little Butte Timber Sale (BLM lands)	3,657 acres commercial thinning, non-commercial fuels thinning, and non-commercial fuels treatments, 3.0 miles of temporary road construction, and 0.8 miles of new permanent road construction.	Ongoing
	2013 Big Elk Cinder Pit CE (USFS lands)	5 acres of excavation of cinders from existing cinder quarry.	Unknown
	South Fork Little Butte Creek LWD (USFS lands) [1]	1.5 miles of instream LWD placement	Prior to or in conjunction with pipeline construction.
	Little Butte Creek Stream Crossing Decommissioning (USFS lands) [1]	Restoration of stream crossings at 32 sites	Prior to or in conjunction with pipeline construction.
	Little Butte Creek Road Decommissioning (USFS lands) [1]	57.5 miles of road decommissioning	Prior to or in conjunction with pipeline construction.
	Little Butte Creek LSR Precommercial Thin (USFS lands) [1]	618 acres of precommercial thinning for forest stand density management	Prior to or in conjunction with pipeline construction.
	Little Butte Creek Mardon Skipper Butterfly (USFS lands) [1]	20 acres of habitat planting on the Dead Indian Plateau to improve habitat for Mardon skipper butterflies and Siskiyou short-horned grasshoppers	Prior to or in conjunction with pipeline construction.
	Little Butte Creek LSR LWD Placement (USFS lands) [1]	511 acres of upland LWD placement	Prior to or in conjunction with pipeline construction.
	Little Butte Creek LSR Snag Creation (USFS lands) [1]	622 acres of snag creation	Prior to or in conjunction with pipeline construction.
	LSR 227 Addition (USFS lands) [1]	Reallocation of 25 acres of Matrix Lands to LSR	Prior to or in conjunction with pipeline construction.

Table 13. Forest Service Project-related Mitigation and Recent, Current, or Proposed Actions that May Cumulatively Affect Resources Evaluated in this BE on Forest Service-Managed Lands			
Fifth Field Watershed	**Activity**	**Project Description**	**Estimated Date**
Winema National Forest			
Spencer Creek Watershed 1801020601	Lake of the Woods VVUI Project (USFS lands)	100 acres of fuel treatments for private home protection	2020
	Roadside Firewood Collection (USFS lands)	1,000 acres downed or dead firewood collection within 300 feet of open roads	Ongoing annually
	Livestock Grazing (USFS lands)	30,646 acres of grazing	Ongoing
	Dead Indian Memorial and Clover Creek Highways Noxious Weed Treatment (USFS lands)	7 miles of weed treatment per year (70 acres)	Ongoing annually
	North Landscape Timber Sales (BLM lands)	3,000 acres of vegetation treatment, timber sales, and small diameter thinning	2018-2028
	Spencer Creek Thinning (BLM lands)	300 acres of small diameter thinning	2015-2020
	Spencer Creek Riparian Planting (USFS lands) [1]	0.5 mile of riparian planting along Spencer Creek	Prior to or in conjunction with pipeline construction.
	Spencer Creek Fencing (USFS lands) [1]	6.5 miles of fencing to divide the Buck Indian Allotment into pastures north and south at Clover Creek Road	Prior to or in conjunction with pipeline construction.
	Spencer Creek Instream LWD (USFS lands) [1]	1.0 mile of instream LWD placement	Prior to or in conjunction with pipeline construction.
	Spencer Creek Ford Hardening and Interpretive Sign (USFS lands) [1]	Stream crossing repair at 1 site	Prior to or in conjunction with pipeline construction.
	Spencer Creek Stream Crossing Decommissioning (USFS lands) [1]	Restoration of stream crossings at 25 sites	Prior to or in conjunction with pipeline construction.
	Spencer Creek Road Decommissioning (USFS lands) [1]	29.2 miles of road decommissioning	Prior to or in conjunction with pipeline construction.
	Clover Creek Visual Management (USFS lands) [1]	114 acres of thinning for forest stand density management	Prior to or in conjunction with pipeline construction.

1/ Project-related mitigation.

The cumulative effects analysis for each species takes into consideration the effects of the proposed Project, including Project-related mitigation on NFS lands, in conjunction with the reasonably foreseeable projects described above. Table 14 below lists the acreage impacted by the Project, proposed mitigation, and other identified projects by watershed.

Table 14. Cumulative Acres Impacted by Watershed by the Project, Related Mitigation Projects, and Other Projects [1/, 2/, 3/]

Activity, Fifth Field Watershed	Acres	Percent of Watershed
UMPQUA NATIONAL FOREST		
Watershed: Days Creek South Umpqua	141,569	
Other Identified Projects	3,297	2.3
Pacific Connector Pipeline and Associated Facilities	567	0.4
Project-related Mitigation on Forest Service Lands	494	0.3
Cumulative Area Impacted	***4,358***	***3.1***
Watershed: Elk Creek South Umpqua	54,356	
Other Identified Projects	12,248	22.5
Pacific Connector Pipeline and Associated Facilities	40	<0.1
Project-related Mitigation on NFS lands	835	1.5
Cumulative Area Impacted	***13,123***	***24.1***
Watershed: Upper Cow Creek	47,499	
Other Identified Projects	2,419	5.1
Pacific Connector Pipeline and Associated Facilities	89	0.2
Project-related Mitigation on NFS lands	2,830	6.0
Cumulative Area Impacted	***5,338***	***11.2***
Watershed: Trail Creek	35,338	
Other Identified Projects	9,597	27.2
Pacific Connector Pipeline and Associated Facilities	217	0.6
Project-related Mitigation on NFS lands	896	2.5
Cumulative Area Impacted	***10,710***	***30.3***
Total Umpqua National Forest	278,762	
Subtotal Other Identified Projects	27,561	9.9
Subtotal Pacific Connector Pipeline and Associated Facilities	913	0.3
Subtotal Project-related Mitigation on NFS lands	5,055	1.8
Umpqua Total Cumulative Area Impacted	***33,529***	***12.0***
ROGUE RIVER NATIONAL FOREST		
Watershed: Big Butte Creek	158,243	
Other Identified Projects	4,941	3.1
Pacific Connector Pipeline and Associated Facilities	89	<0.1
Project-related Mitigation on NFS lands	497	0.3

Table 14. Cumulative Acres Impacted by Watershed by the Project, Related Mitigation Projects, and Other Projects [1/, 2/, 3/]		
Activity, Fifth Field Watershed	**Acres**	**Percent of Watershed**
Cumulative Area Impacted	***5,527***	***3.5***
Watershed: Little Butte Creek	238,879	
Other Identified Projects	3,770	1.6
Pacific Connector Pipeline and Associated Facilities	633	0.3
Project-related Mitigation on NFS lands	1,796	0.8
Cumulative Area Impacted	***6,199***	***2.6***
Total Rogue River National Forest	397,122	
Subtotal Other Identified Projects	8,711	2.2
Subtotal Pacific Connector Pipeline and Associated Facilities	722	0.2
Subtotal Project-related Mitigation on NFS lands	2,293	0.6
Rogue River Total Cumulative Area Impacted	***11,726***	***3.0***
WINEMA NATIONAL FOREST		
Watershed: Spencer Creek	54,247	
Other Identified Projects	4,470	8.2
Pacific Connector Pipeline and Associated Facilities	231	0.4
Project-related Mitigation on NFS lands	114	0.2
Cumulative Area Impacted	***4,815***	***8.9***
Total Winema National Forest	54,247	
Subtotal Other Identified Projects	4,470	8.2
Subtotal Pacific Connector Pipeline and Associated Facilities	231	0.4
Subtotal Project-related Mitigation on NFS lands	114	0.2
Winema Total Cumulative Area Impacted	***4,815***	***8.9***
Grand Total: Umpqua, Rogue River, Winema National Forests	730,131	
Grand Total Other Identified Projects	40,742	5.6
Grand Total Pacific Connector Pipeline and Associated Facilities	1,866	0.3
Grand Total Project-related Mitigation on NFS lands	7,462	1.0
Grand Total Cumulative Area Impacted	**50,070**	***6.9***

1/ Watershed acres and acres associated with "Other Identified Projects" and "Pacific Connector Pipeline and Associated Facilities" adapted from Table 4.14.1-1 of the FEIS (FERC 2019b). Numbers are not exact, columns do not sum correctly due to rounding.

2/ Other Identified Projects include only those resulting in new disturbance (e.g., continued grazing on existing allotments is not included).

3/ Acres are not known or identified for every "other identified projects" or project-related mitigation action (e.g., acres for repair or restoration of stream crossings are not known at this time); therefore, only those project-related mitigation projects listed in Table 13 with known acres are included.

Wetlands

Wetlands covered as much as 2.3 million acres (3.6 percent) of what is now Oregon as of the late 1700s (Dahl 1990). Since that time, wetland acreage has decreased by more than one-third, mostly owing to conversion of wetlands to agricultural uses by diking, draining, or both. Other causes of wetland loss or degradation have been urbanization, industrial development, flood-control projects, surface-water diversion and ground-water pumping for irrigation, stream snagging, land clearing, livestock grazing, and beaver trapping (ODSL and WCSW 1995). The greatest losses were of estuarine marshes, eastern Oregon riparian wetlands, Willamette River Valley wet prairies and riparian wetlands, and Klamath Basin marshes (ODSL and OPRD 1989).

In addition to general area wetland losses, the quality of remaining wetlands has also decreased, primarily due to human activities, with complex wetlands such as riverine wetlands losing connectivity with their water sources due to roads and similar construction. A third feature, wetland plants, also indicates that wetlands are declining. ORBIC reports that 29 percent of Oregon's wetland plants are imperiled (OPB 2000). Current regulatory programs to slow wetland loss, as well as creating incentives to increase wetland health and acreage, have the potential to stop and possibly reverse current trends.

Based on Johnson and O'Neil habitat classifications (herbaceous wetlands, eastside riparian wetlands, westside riparian wetlands), there are 26 acres of wetlands within the 700-foot analysis area, and 228 acres within the 3,200-foot analysis area (Tables 2 and 3). Of those, less than an acre would be impacted by the Project (0.42 acres; Table 7).

Riparian Areas

There are about 114,500 miles of rivers and streams in Oregon, and their surrounding riparian areas make up almost 15 percent of the state (Oregon Water Resources Department as cited in OPB 2000). Like wetlands, the hydrologic function of streams and rivers has been altered, reducing the connection between the river and the riparian zones. Agricultural and livestock grazing practices on private lands have reduced vegetation along streams to a large extent, and increased flow rates while reducing water quality and habitat for threatened fish species (Matthews and Barnhard 1996). Human settlement and land development have drastically reduced the ecological functions of these habitats (OPB 2000). Additionally, non-native vegetation has been invading these corridors, with up to 50 percent non-native species in the Willamette riparian forests (Tabacchi et al. 1996).

Intensive human activity along the most impacted riparian corridors makes the restoration of these areas particularly difficult. Slightly more success is possible in more rural areas where conservation easements and evolving agricultural and livestock grazing practices can be more easily altered.

Based on Johnson and O'Neil habitat classifications (riparian wetlands), there are 6 acres of riparian habitat within the 700-foot analysis area, and 206 acres within the 3,200-foot analysis area (Tables 2 and 3). Of those, less than half an acre would be impacted by the Project (Table 7).

6.1.3 *Conservation Measures and Mitigation*

Project conservation measures can be categorized into one of five “mitigation” applications, described by the Council on Environmental Quality (43 FR 55990 §1508.20, 1978):

1. Avoiding the impact altogether by not taking a certain action or parts of an action;
2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or
5. Compensating for the impact by replacing or providing substitute resources or environments.

Categories 1 through 4 have been implemented or would be implemented by Pacific Connector for the Project, and include design features and best management practices (BMPs). The fifth category would be implemented by the Forest Service if applicable, and consist of off-site compensatory mitigation designed to compensate for impacts of the Project that cannot be avoided, further minimized, or otherwise mitigated.

Pacific Connector’s proposed avoidance and minimization measures include re-routing the Project to avoid sensitive resources, restricting the pipeline corridor width in environmentally sensitive areas (e.g., riparian areas), utilizing UCSAs within forested habitats to reduce forest clearing, and maintaining large snags and trees with cavities on the edge of the construction ROW or TEWAs where feasible. Pacific Connector would also restore affected habitats to the maximum extent practicable including restoring habitat diversity features such as cavities and snags, large woody debris (LWD), and rock and brush piles. Pacific Connector would reduce impact over time by minimizing disturbances during Project operation, including waiting until late summer or early autumn to conduct routine vegetation maintenance. By avoiding, minimizing, rectifying, and reducing Project impacts to sensitive habitats, Pacific Connector would minimize impacts to the species that utilize those habitats, including many of the Forest Service sensitive species discussed in this BE.

Specific Project conservation measures, including measures proposed for construction, post-construction restoration, and operation are listed in Appendix N of FERC’s BA, and are detailed in the following plans: Pacific Connector’s Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD), Waterbody Crossing Plans (Appendix BB of the POD), Fish Salvage Plan (Appendix L of the POD), Blasting and Helicopter Noise Analysis and Mitigation Plan (Appendix P of FERC’s BA), Erosion Control and Revegetation Plan (ECRP; Appendix I of the POD), Integrated Pest Management Plan (Appendix N of the POD), Air, Noise and Fugitive Dust Control Plan (Appendix B of the POD), Right-of-Way Clearing Plan for Federal Lands (Appendix U of the POD), and FERC’s Upland Erosion Control, Revegetation, and Maintenance

Plan and Waterbody and Wetland Construction and Mitigation Procedures (Attachments A and B to Appendix I of the POD).

Many of the measures proposed by the Forest Service in response to the proposed Project to mitigate for impacts to federal land allocations such as Riparian Reserves and LSRs, listed species and their habitats, and aquatic and riparian habitats would also benefit the Forest Service sensitive species discussed here. These measures are briefly described below.

The Forest Service has proposed the re-allocation of approximately 1,100 acres of forested lands within the matrix land allocation be added to existing LSRs to replace the habitat impacted by the Project. This reallocation would address the "neutral to beneficial" standard for new developments in LSRs (Forest Service and BLM 1994) to offset the long-term loss of acres and habitat from the construction and operation of the Project. This reallocation of matrix land to LSR would benefit Forest Service sensitive species associated with LO forests over time by providing additional habitat that is managed to create late successional–old growth stand conditions.

As re-allocations do not specifically mitigate for direct habitat losses or indirect effects within LSRs, the Forest Service has proposed additional projects to mitigate for Project-related habitat losses within LSRs, in other NWFP allocated lands, and within specific habitats utilized by species listed under the ESA. These potential projects include aquatic and riparian habitat restoration (including in-stream LWD, road surfacing and drainage repair, road decommissioning, fish passage, restoration of stream crossings, culvert replacement, and riparian fencing and planting) and terrestrial habitat restoration (including fuel breaks, fuel reduction projects, stand density management, snag creation, upland LWD placement, weed control and treatments, habitat planting, road closure and decommissioning, and meadow restoration). These proposed mitigation projects would benefit Forest Service sensitive species by improving habitat and reducing future disturbance. These mitigation projects are listed in Table 13. As described above, these compensatory mitigation measures would be required by the Forest Service and were developed based on the objectives/standards in the respective LRMPs, the recommendations of the (2011) NSO recovery plan, the recommendations of the final SONCC Coho Salmon Recovery Plan (2014), applicable Late Successional Reserve Assessments, and fifth-field Watershed Analyses for watersheds where impacts of the Pacific Connector Pipeline Project would occur.

6.2 Species Accounts and Analysis of Impacts

Species presented in this section were determined to require a detailed analysis of impacts based on a preliminary impact analysis. The impact determination for all species discussed here is MIIH, as defined above. Where suitable habitat was documented for a species but species-specific surveys were not conducted for that species, presence was assumed and the potential effects of the Project are analyzed here. Sensitive species observed within the Project area during surveys are also discussed here. Species that were not detected during species-specific surveys, or did not receive targeted surveys but were determined not to have any suitable habitat within the Project area, were assumed to be absent from the Project area; these species are not discussed in this section, but are listed in Table 1 and discussed in Appendix A.

Each species-specific section below is organized as follows:

1. *Species Status in the Project Area*

This section provides information on the species' range, habitat, life history, and potential presence in the Project area. *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil 2001) was used as a guide to provide habitat associations for mammals, birds, amphibians, and reptiles; for fish, invertebrates, vascular plants, bryophytes, fungi, and lichens, habitat associations were inferred from the data sources described above in Section 3.0. Additionally, if the species was not listed in Johnson and O'Neil (2001) then primary or peer-reviewed literature was used to describe the life history characteristics and determine habitat associations. These inferred habitat associations provide the basis for the impact analysis for each species by allowing quantification of the amount of habitat potentially impacted by the Project (Table 7). Johnson and O'Neil (2011) use two definitions to describe wildlife-habitat associations:

> ***Closely Associated.*** *A species is widely known to depend on a habitat or structural condition for part or all of its life history requirements. Identifying this association implies that the species has an essential need for this habitat or structural condition for its maintenance and viability.*
>
> ***Generally Associated.*** *A species exhibits a high degree of adaptability and may be supported by a number of habitat or structural conditions. In other words, the habitats or structural conditions play a supportive role for its maintenance and viability.*

Johnson and O'Neil (2001) also include "Present" as a degree of association between wildlife and habitats. This association was not included in this analysis as it indicates that a species demonstrates only occasional use of a habitat or structural condition and the habitat or structural conditions provides marginal support to the species for its maintenance and viability.

Observations of species discussed in this section were also reviewed to determine the extent of each species within each National Forest and with respect to the Project (Forest Service 2017, ORBIC 2017). An ORBIC Element Occurrence or Forest Service Wildlife Observation is defined as evidence that an animal or group of animals was present within a certain location at a point in time; the number of individuals per observation ranges from one to many, and the same individual may elicit several observations over time (Forest Service 2017, ORBIC 2017). Similarly, plant sites in the Forest Service and ORBIC database reflect locations containing one to many individuals. These records were analyzed to determine the proportion of each species' known locations that have the potential to be impacted by the Project, and thus the likelihood of population-level impacts resulting from the Project.

If a species was documented during field surveys for the Project, those field observations are included in the Forest Service database and discussed here. The location of each observation in relation to the Project is presented, where applicable, in order to determine the effect the Project would have on the species.

2. *Analysis of Effects*

This section provides an analysis of direct, indirect, and cumulative effects to each species in addition to the global discussion of impacts above.

3. *Conservation Measures*

This section describes the proposed minimization and other conservation measures that apply to each species. These measures conform to applications 2 through 5 in Section 6.1.3, above and do not reiterate the avoidance measures (application measure 1) discussed in the action alternatives Section 2.0. For additional discussion of conservation measures, see the Conservation Measures included in Appendix N of FERC's BA. These measures as they apply to the Forest Service sensitive species are also summarized above in Section 6.1.3, including a list of the various environmental plans developed to guide construction, post-construction restoration, and operation practices.

4. *Impact Determination*

This section lists the impact determination made for each species based on the above analysis. There are four possible outcomes for each sensitive species. No Impact (NI), May Impact Individuals or Habitat but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species (MIIH), Will Impact Individuals or Habitat with a consequence that the action will contribute to a trend toward Federal listing or cause a loss of viability to the population or species (WOFV), or Beneficial Impact (BI).

6.2.1 Mammals

Surveys were not conducted specifically for sensitive mammals. The information on sensitive species occurrence is based on several GIS data sources including ORBIC occurrence records (ORBIC 2017), Johnson and O'Neil (2001) habitat associations, and the Forest Service NRIS database (Forest Service 2017).

6.2.1.1 Pallid Bat (Antrozous pallidus)

Species Status in the Project Area

The pallid bat ranges from central Mexico and north to the southern Okanagan Valley of British Columbia (Orr 1954, Hermanson and O'Shea 1983, Verts and Carraway 1998). In Oregon, pallid bats have been documented in the western interior valleys and east of the Cascades excluding the Blue Mountains (McLaren 2001). As shown in Table 1, the species has been documented on the Umpqua, Winema, and Rogue River national forests. One occurrence of the pallid bat exists within 3 miles of the Project in the Umpqua National Forest.

The pallid bat inhabits arid regions, and is less abundant in evergreen and mixed conifer woodlands. Pallid bats typically use cliff-faces, caves, mines, or buildings for roosts (Csuti et al.

2001). While night roosts can include buildings, rock overhangs, bridges, caves and mines, Lewis (1994) found a high proportion of her study individuals in Oregon under bridges. Pallid bat maternity roosts have been found in ponderosa pine snags (Rabe et al. 1998), in rock crevices, within spaces behind exfoliating rock, and “potholes” in rock-overhangs (Lewis 1996). Young are born in May and June, fly at 6 weeks, and are weaned in 6 to 8 weeks. This species is thought to hibernate in the winter (NatureServe 2013).

Habitat loss from urbanization, conversion of sagebrush-steppe, and agricultural expansion is likely a limiting factor on pallid bats, particularly due to reduction of foraging habitats (Chapman et al. 1994). In addition to direct habitat loss, the indirect effects from fire suppression modify the forest-valley transition area.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable pallid bat habitats within 3,200 feet of the proposed pipeline, within the three national forests crossed by the Project. While pallid bats are particularly associated with habitats that include edges where snags, cliffs, caves, and tree cavities are present, Table 15 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 15. Pallid Bat Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Southwest Oregon Mixed Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	318.28	94.99	14,704	2.81%
Ponderosa Pine Forests and Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	821	0.00%
Western Juniper/Mountain Mahogany Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Shrub-steppe	Closely Associated	Feeds and Breeds	7.35	0.59	52	15.40%
Eastside Grasslands[3]	Generally Associated	Feeds and Breeds	1.59	0.14	18	9.80%
Herbaceous wetlands	Closely Associated	Feeds	0.01	0.00	21	0.03%
Westside Riparian Wetlands	Generally Associated	Feeds	0.41	0.00	1	32.88%
Eastside Riparian-Wetlands	Closely Associated	Feeds and Breeds	0.00	0.00	205	0.00%
Agriculture, Pastures, and Mixed Environs	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%

Table 15. Pallid Bat Habitat Associations						
Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.50	0.09	181	0.33%
Total			**328.14**	**95.81**	**16,003**	**2.65%**

1/ Totals taken from Table 7 for all three national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Overall, about 3 percent of available habitat within the analysis area would be impacted by the Project (Table 15). There are no known hibernacula or maternity colonies near the Project. As noted above, pallid bats have been documented using ponderosa pine snags as maternity colonies. No ponderosa pine habitat would be impacted by the Project so loss of undocumented maternity roost sites is expected to be negligible. Pallid bats are also associated with other forested habitats that would experience greater impacts. It is possible that timber clearing in these areas could cause loss of potential roost trees.

ROW clearing could cause direct mortality of roosting bats if bats were in a tree that was cleared. Bats could also be disturbed by noise during timber clearing and construction if they were roosting nearby. This disturbance could have negative energetic effects if bats needed to relocate to avoid the disturbance, especially if disturbed during hibernation. As timber clearing would be restricted to outside the core migratory bird breeding season (April 1–July 15), removal of active maternity colonies is not expected.

As described in Section 6.1.2.1 above, construction in a given location would take approximately 8 weeks including all phases. Although timber clearing would be restricted to outside the core migratory bird breeding season (April 1–July 15), construction could occur any time of the year. Pallid bats could partially benefit from ROW clearing as they forage in open areas.

Cumulative Effects

The pallid bat cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 14). Past harvest techniques removed large trees that may have served as pallid bat roosts, maternity colonies and winter hibernacula. Suitable foraging habitat may also have decreased due to past clearcut forest management.

Construction of the pipeline and associated facilities would affect 1,866 acres within the pallid bat cumulative effects analysis area (Table 14). This reflects 0.3 percent of the total watershed area. Although trees and snags would be cleared during Project construction, these represent a small portion of the species' overall available roost sites, and these would be replaced through 946 acres of snag creation. Replacement would be immediate, though there would be up to a 10-year delay as snag decay occurs. Approximately 479 acres outside of the 30-foot maintenance corridor would be restored following construction and allowed to return to pre-construction conditions where not on Matrix lands. Forested areas impacted during construction, including potential roosting habitat, would take decades to recover, while open habitats such as grasslands would recovery relatively quickly. Of the 479 acres that would be restored after construction, 86 percent are forested, and the remaining 14 percent are grassland or otherwise non-forested. Construction noise disturbance to roost sites, though of short duration (approximately 8 weeks at a given location), could impact individuals locally. However, as no known communal roost sites or colonies have been documented within the Project area, impacts to large numbers of roosting bats are not expected.

Project-related mitigation actions proposed by the Forest Service on NFS lands that would affect resources used by the pallid bat include snag creation, road closure and decommissioning, fuels reduction, reallocation of matrix to LSR, riparian vegetation planting, and LWD upland placement projects. Mitigation actions on NFS lands would affect 7,462 acres within the pallid bat cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14). There could be some negative short-term impacts of these actions, including disturbance during implementation, such as during fuels reduction projects. However, overall, these projects would benefit the pallid bat through habitat improvements and a reduction in disturbance over the long term. Snag creation projects would result in the creation of potential roost sites, road closures and decommissioning would reduce disturbance to individuals if present, fuels reduction projects would result in a reduction of potential habitat loss through fire, and planting of riparian vegetation would improve habitat quality for the pallid bat at these sites.

Other planned projects within the pallid bat cumulative effects analysis area include a variety of timber, fuel, grazing, and biological projects (Table 13). They would affect 40,742 acres, or 5.6 percent of the cumulative effects analysis area. The pre-commercial thinning and timber projects in the national forests would most likely contribute to the long term health of the forest ecosystems; similarly, the fuels treatment projects would improve habitat quality for pallid bats through improved fire management. Under the NWFP, LSRs and Riparian Reserves in the area are likely to improve habitat for this species over time.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the pallid bat cumulative effects analysis area includes 50,070 acres, or 6.9 percent of the total watershed area (Table 14). The proposed action, as well as reasonably foreseeable actions, would not result in additional habitat loss from urbanization, conversion of sagebrush-steppe, and agricultural expansion, which are likely the limiting factors for pallid bats (Chapman et al. 1994). Therefore, cumulative impacts on the pallid bat are expected to be insignificant, because the combined impacts to the 6.9 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts include revegetating the understory with grasses and shrubs, restoring wetlands, and encouraging insect recolonization (see Appendix I of the POD). Noise disturbance from blasting would be minimized with the use of blast mats or other devices. Timber removal would be avoided within 0.25 miles of an NSO activity center between March 1 and September 30, and all timber would be removed outside of the core migratory bird breeding season (April 1–July 15). Pipeline construction, including blasting and helicopter activity, would occur after the NSO critical breeding period (March 1– July 15) within 0.25 miles of an NSO activity center. These seasonal restrictions would benefit any roosting bats and maternity colonies in those areas. Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the pallid bat are also described above under cumulative effects.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the pallid bat because of the minimal percentage of available habitat to be impacted (about 3 percent) with which the species is associated.

6.2.1.2 Townsend's Big-Eared Bat (Corynorhinus townsendii)

Species Status in the Project Area

The Townsend's big-eared bat occurs throughout western North America (Woodruff and Ferguson 2005). Townsend's big-eared bats are a common species in Oregon and can be found wherever suitable habitat exists, excluding the Blue Mountains and West Basin Range (McLaren 2001). As shown in Table 1, the species has been documented in all three national forests crossed by the Project. Townsend's big-eared bat has been observed twice within 1 mile and once within 1-3 miles of the Project in the Rogue River National Forest; there have been no observations of the Townsend's big-eared bat within 3 miles of the Project in either the Winema or the Umpqua National Forest (Forest Service 2006, ORBIC 2012).

Use of roost sites by Townsend's big-eared bats is variable within seasons and among years (Piaggio 1998). Townsend's big-eared bats roost primarily in caves, cracks or crevices in rocks, abandoned mines, abandoned buildings and open attics (Barbour and Davis 1969, Nagorsen and Brigham 1993, Pierson et al. 1996). Although caves and mines are considered to be preferred day roosts (Pierson et al. 2001), Keely and Tuttle (1999) reported high use of bridges as day and night roosts by Townsend's big-eared bats in southwestern Oregon. Townsend's big-eared bats show little fidelity to interim roosts, but the species is highly loyal to maternity roosts (Fellers and Pierson 2002). In Washington and Oregon, this species is known to utilize individual caves for both maternity roosts and winter hibernation (Woodruff and Ferguson 2005). Young are born from mid-April through late July, fly within a month, and are weaned within two months. This species hibernates from early fall through early spring (NatureServe 2013).

The primary threat to the Townsend's big-eared bat is disturbance and destruction of roost sites through recreational caving, mine exploration, mine reclamation and renewed mining in historical districts. Studies in Oregon and California indicate that current and historical colonies exhibited moderate to sizable decreases in numbers following human visitation and renewed mining (Piaggio 1998). Additionally, the loss of old buildings, barns, warehouse, silos and other buildings and the physical closure or reactivation of mines reduces available roost sites (Woodruff and Ferguson 2005).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable Townsend's big-eared bat habitats within 3,200 feet of the proposed pipeline, in the three national forests crossed by the Project. While Townsend's big-eared bats are particularly associated with habitats that include ecotones where cliffs and caves are present, Table 16 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 16. Townsend's Big-eared Bat Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Lowland Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Montane Mixed Conifer Forests	Generally Associated	Feeds and Breeds	75.31	26.38	1,766	5.76%
Southwest Oregon Mixed Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	318.28	94.99	14,704	2.81%
Ponderosa Pine Forests And Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	821	0.00%
Westside Oak-Dry Douglas-fir Forests and Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Western Juniper/Mountain Mahogany Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Shrub-Steppe	Generally Associated	Feeds and Breeds	7.35	0.59	52	15.40%
Westside Grasslands[3]	Generally Associated	Feeds	2.53	0.33	11	25.99%
Eastside Grasslands[3]	Generally Associated	Feeds and Breeds	1.59	0.14	18	9.80%
Herbaceous Wetlands	Generally Associated	Feeds	0.01	0.00	21	0.03%
Westside Riparian Wetlands	Generally Associated	Feeds	0.41	0.00	1	32.88%

Table 16. Townsend's Big-eared Bat Habitat Associations						
Habitat Type	**Association**	**Activities**	**Total Acres Removed[1/]**	**Total Acres Modified[1/]**	**Total Acres in Analysis Area[2/]**	**Percentage Impacted**
Eastside Riparian Wetlands	Generally Associated	Feeds	0.00	0.00	205	0.00%
Agriculture, Pastures, and Mixed Environs	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.50	0.09	181	0.33%
Total			**405.98**	**122.51**	**17,780**	**2.97%**

1/ Totals taken from Table 7 for all three national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

There are no known hibernaculum or maternity roosts within the analysis area, but they could potentially occur and not be documented. Approximately 3 percent of the habitat available to this species within the analysis area would be impacted by the Project (Table 16). Cave roost sites are sparsely located across the Project area and are not likely to be encountered during construction activities.

Construction noise could disturb roosting bats. Particularly sensitive to disturbance, females have been known to permanently abandon summer roosts when disturbed. Nursery colonies, located in caves, mines, or buildings, can contain up to several hundred bats, and thus a large number of individuals could potentially be affected if noise disturbance causes a group to abandon its roost, particularly the young which may not yet be able to live independently of their mothers (Nagorsen and Brigham 1993). Noise disturbance would only be temporary, however, and habitat would become suitable once the noise ceased. Due to this species' mobility and wide habitat preferences, it should be able to temporarily relocate to other areas during construction fairly easily and without population-scale impacts. Townsend's big-eared bats could be directly affected during pipeline construction if hibernating bats are disturbed and aroused from torpor as this could possibly lower their fitness during winter, potentially increasing mortality, and decreasing fecundity.

Cumulative Effects

The Townsend's big-eared bat cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 14). Suitable habitat for this species, including forested and wetland habitats, have decreased in complexity and abundance from historical conditions due to widespread timber clearing, settlement patterns, and fire suppression.

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Approximately 479 acres disturbed during pipeline construction would be revegetated following construction, and be allowed to return to its pre-construction condition outside of the 30-foot maintenance corridor (excluding Matrix lands). Construction noise disturbance to roost sites, though of short duration (approximately 8 weeks at a given location), could impact individuals locally. However, as no known communal roost sites or colonies have been documented within the Project area, impacts to large numbers of roosting bats are not expected.

Mitigation actions proposed for NFS lands that affect resources used by the Townsend's big-eared bat include road closure and decommissioning, fuels reduction, reallocation of matrix to LSR, riparian vegetation planting, and LWD upland placement projects. Mitigation actions on Forest Service lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14). Potential negative impacts include disturbance during implementation of these projects, such as during fuels reduction projects. However, these projects would overall benefit the Townsend's big-eared bat through habitat improvements and a reduction in disturbance over the long term. Road closures and decommissioning would reduce disturbance to individuals if present; fuels reduction projects would result in a reduction of potential habitat loss through fire; and planting of riparian vegetation would improve habitat quality for the Townsend's big-eared bat at these sites.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). They would affect 40,742 acres, or 5.6 percent of the watersheds. The pre-commercial thinning and timber projects in the national forests would most likely contribute to the long term health of the forest ecosystems; similarly, the fuels treatment projects would improve habitat quality for Townsend's big-eared bats through improved fire management. Under the NWFP, LSR's and Riparian Reserves in the area are likely to improve habitat for this species over time.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,070 acres within the cumulative effects analysis area would be affected, or 6.9 percent of the total watershed area (Table 14). The proposed action as well as the actions described above would not contribute to disturbance of caves which is the primary threat to this species. Additionally, impacts to unidentified roost sites, if any, would be short term, lasting a maximum of approximately 8 weeks through Project construction. Therefore, cumulative impacts on the Townsend's big-eared bat are expected to be insignificant because the combined impacts to the 6.9 percent of the watershed area, including short-term disturbance effects, are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts include revegetating the understory with grasses and shrubs, restoring wetlands, and encouraging insect recolonization (see Appendix I of the POD). Noise disturbance from blasting would be minimized with the use of blast mats or other devices. Timber removal would be avoided within 0.25 miles of an NSO activity center between March 1 and September 30, and all timber would be removed outside of the core migratory bird breeding season (April 1–July 15). Pipeline construction, including blasting and helicopter activity, would occur after the NSO critical breeding period (March 1–July 15) within 0.25 miles of an NSO activity center. These seasonal restrictions would benefit any roosting bats and maternity colonies in those areas. Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the Townsend's big-eared bat are also described above under cumulative effects.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Townsend's big-eared bat because of the minimal percentage of available habitat to be impacted (about 3 percent) with which the species is associated, and the lack of impact to caves which is the primary threat to this species.

6.2.1.3 Fringed Myotis (Myotis thysanodes)

Species Status in the Project Area

The fringed myotis ranges throughout much of western North America from southern British Columbia to Mexico, and from California, east to South Dakota (Bradley and Ports 1998, Rabe et al. 1998, Cryan et al. 2000). In Oregon, fringed myotis can be found in the Coast Range and in the northeastern corner of the state (McLaren 2001). Although widely distributed throughout western North America, the fringed myotis is considered rare in the northern portion of its range (Barbour and Davis 1969, USDA and USDI 1993, McLaren 2001). As shown in Table 1, the species has been documented in all three national forests crossed by the Project. The fringed myotis has been observed three times within 1 mile and once within 1-3 miles of the Project in the Rogue River National Forest and once within 1-3 miles of the Project in the Winema National Forest; it has not been observed within 3 miles of the Project in the Umpqua National Forest (Forest Service 2006, ORBIC 2012).

Fringed myotis roost in crevices in buildings, underground mines, rocks, cliffs faces, and bridges (Bradley and Ports 1998, Cryan et al. 2001). Roosting in decadent trees and snags, particularly large ones, is common throughout its western range. In the Pacific Northwest, the fringed myotis is not considered a tree-roosting bat (Nagorsen and Brigham 1993). Fringed myotis in the Pacific Northwest generally roost in more abundant albeit less permanent abandoned buildings and caves (Lewis 1995), although Weller and Zabel (2001) found fringed myotis roosted primarily in snags in northern California. Maternity roosts are colonial with colonies ranging from 10 to 2,000 individuals, though large colonies are exceedingly rare. Much less information is available on roosts of males, but it is thought that they roost singly or in small groups (Weller 2005). Fringed myotis move within roost sites, maximizing their thermoregulation and reproductive behavior (O'Farrell and Studier 1980). Young are born in late June to mid-July and young can fly at 16-17 days. Colonies begin to disperse by October, and bats are likely hibernating after mid-October (NatureServe 2013).

Threats to the fringed myotis primarily consist of loss or modification of roosting habitat, including closure or renewed activity at abandoned mines, recreational caving and mine exploration, loss of large, decadent trees and replacement of buildings and bridges with non-bat-friendly structures (Bradley and Ports 1998). Removal of large blocks of forest habitat also threatens the fringed myotis by removing foraging habitat (Bradley and Ports 1998).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable fringed myotis habitats within 3,200 feet of the proposed pipeline, in the three national forests crossed by the Project. While fringed myotis are particularly associated with habitats that include edges, snags, cliffs, caves, and tree cavities, Table 17 shows the habitat types in the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 17. Fringed Myotis Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside-Lowland-Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Southwest Oregon Mixed Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	318.28	94.99	14,704	2.81%
Ponderosa Pine Forests and Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	821	0.00%
Westside Oak-Dry Douglas-Fir Forests and Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Shrub-Steppe	Generally Associated	Feeds and Breeds	7.35	0.59	52	15.40%
Eastside Grasslands[3]	Generally Associated	Feeds	1.59	0.14	18	9.80%
Herbaceous Wetlands	Generally Associated	Feeds	0.01	0.00	21	0.03%
Westside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.41	0.00	1	32.88%
Eastside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.00	0.00	205	0.00%

Table 17. Fringed Myotis Habitat Associations						
Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Open Water-Lakes, Rivers, and Streams	Generally Associated	Feeds	0.50	0.09	181	0.33%
Total			**328.14**	**95.81**	**16,003**	**2.65%**

1/ Totals taken from Table 7 for all three national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat on other federal or non-federal lands.

3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

There are no known hibernaculum or maternity roosts within the analysis area, but they could potentially occur and not be documented. Cave roost sites are sparsely located across the Project area and are not likely to be encountered during construction activities. Approximately 3 percent of the habitat available to this species within the analysis area would be impacted by the Project (Table 17). In terms of potential roosting habitat, approximately 2.4 percent of late-successional old-growth in the analysis area would be impacted (Tables 3 and 7), and 1.45 percent of snags present within the analysis area would be impacted by the Project (Appendix D). About 1.9 percent of forested habitats available in the analysis area would be impacted that could serve as potential foraging habitat. Individuals could be killed or injured if snags are removed or destroyed while occupied by roosting bats. These percentages of habitats impacted represent a small portion of habitat available in the analysis area. Additionally, trees and snags are not typically primary roost habitats for fringed myotis, as they more typically use caves, buildings, and bridges for roosting.

Construction of the Project and associated noise would extend approximately 8 weeks at any given location, and could occur at any time of the year. Fringed myotis are sensitive to disturbance, particularly at maternity colonies. Disturbance of hibernating bats could cause a reduction in fitness during winter when they must use their body reserves to survive. While disturbance could render habitat temporarily unsuitable or have adverse energetic impacts on bats; these impacts would be temporary and occur in a narrow swath of otherwise suitable habitat.

Cumulative Effects

The fringed myotis cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 14).This species is widespread in western North America and population trend is stable, but its abundance appears to be low (NatureServe 2013). Suitable habitat for this species including forested and wetland habitats have decreased from historical conditions due to widespread timber clearing and settlement patterns in the region.

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Although trees and snags would be cleared during Project construction, these represent a small portion of the species' overall available roost sites and would be replaced through mitigation efforts. Specifically, as described above under the pallid bat, snag creation would be implemented across 946 acres as mitigation for snags removed by the Project. Forested areas impacted by construction of the pipeline, including potential roosting habitat, are expected to take decades to recover, while open habitats such as grasslands would recovery relatively quickly. Approximately 479 acres outside of the 30-foot maintenance corridor would be restored following construction and allowed to return to pre-construction conditions where not on Matrix lands. This area consists primarily of forested habitat (86 percent), as well as some non-forested habitat (14 percent). Construction noise disturbance to roost sites, though of short duration, could impact individuals locally. However, as no known communal roost sites or colonies have been documented within the Project area, impacts to large numbers of roosting bats are not expected.

Mitigation actions proposed for NFS lands that affect resources used by the fringed myotis include snag creation, road closure and decommissioning, fuels reduction, reallocation of matrix to LSR, riparian vegetation planting, and LWD upland placement projects. Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effect analysis area, or 1.0 percent of the total watershed area (Table 14). Potential negative impacts include disturbance during implementation of these projects, such as during fuels reduction projects. However, these projects would overall benefit the fringed myotis through habitat improvements and a reduction in disturbance over the long term. Snag creation projects would result in the creation of potential roost sites; road closures and decommissioning would reduce disturbance to individuals if present; fuels reduction and fire suppression projects would result in a reduction of potential habitat loss through fire; and planting of riparian vegetation would improve habitat quality for the fringed myotis at these sites.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). They would affect 40,742 acres, or 5.6 percent of the watersheds. The pre-commercial thinning and timber projects in the national forests would most likely contribute to the long term health of the forest ecosystems, although they could represent additional loss of habitat for this species through loss of large trees and snags. Under the NWFP, LSR's and Riparian Reserves in the area are likely to improve habitat for this species over time.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,070 acres within the cumulative effects analysis area, or 6.9 percent of the total watershed area (Table 14). The proposed action as well as the actions described above would not contribute to the closure or renewed activity at abandoned mines, recreational caving and mine exploration, and replacement of buildings and bridges with non-bat-friendly structures, which are threats to this species (Bradley and Ports 1998). The proposed Project as well as planned projects would contribute to the loss of large, decadent trees, as well as result in the removal of foraging habitat which are also threats to this species; however, these impacts would be mitigated through snag creation and other habitat enhancements. Therefore, cumulative impacts on the fringed myotis are expected to be insignificant because the combined impacts to the 6.9 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts include revegetating the understory with grasses and shrubs, restoring wetlands, and encouraging insect recolonization (see Appendices I of the POD). Noise disturbance from blasting would be minimized with the use of blast mats or other devices. Timber removal would be avoided within 0.25 miles of an NSO activity center between March 1 and September 30, and all timber would be removed outside of the core migratory bird breeding season (April 1–July 15). Pipeline construction, including blasting and helicopter activity, would occur after the NSO critical breeding period (March 1–July 15) within 0.25 miles of an NSO activity center. These seasonal restrictions would benefit any roosting bats and maternity colonies in those areas.

Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the fringed myotis are described above under cumulative effects. In the Umpqua and Rogue River national forests snag creation would be implemented across 946 acres of land. Snags would be created in LSR and matrix lands by blasting the tops off live trees or inoculating trees with heart rot decay fungi. Increased snags densities would provide bats with more roost opportunities.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **“may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species”** for fringed myotis because of the low percentage of potential habitat in the analysis area being impacted (about 3 percent) and mitigation efforts to create snags.

6.2.1.4 Pacific Fisher (Pekania pennanti)

Species Status in the Project Area

The West Coast Distinct Population Segment (DPS) of the Pacific fisher was proposed for listing as threatened in October 2014 (79 FR 60419). In April 2016, the U.S. Fish and Wildlife Service (FWS) determined that the fisher does not warrant listing under the ESA (81 FR 22710). However, on September 21, 2018 the decision to deny the fisher protected status was vacated and the comment period for the proposed rule to list the West Coast DPS was reopened (84 FR 644). The FWS is scheduled to prepare a new determination by September 21, 2019 (84 FR 644). The West Coast DPS includes fishers in Washington, Oregon, and California. Fishers are known to occur in southwest Oregon, northwest California, and southern Sierra Nevada in California (FWS 2014). Counties where the fisher is currently known to occur in Oregon include Curry, Douglas, Jackson, Josephine, and Klamath (FWS 2014). As shown in Table 1, the species has been documented in all three of the national forests crossed by the Project. Recent telemetry studies in the southern Oregon Cascades identified fisher home ranges that overlap with the Project on the Winema National Forest (Cummins 2018). Location databases show one observation within 1 mile and one observation within 1 to 3 miles of the Project on the Winema National Forest.

Currently, there are two documented populations in southern Oregon which were believed to be genetically isolated from each other (Aubry et al. 2004). This was due to the presence of potentially strong ecological and anthropogenic barriers including the white oak savanna habitat of the Rogue Valley and Interstate 5. Individuals in the southern Oregon Cascades are descendants of animals re-introduced from British Columbia (primarily) and Minnesota during the late 1970s and early 1980s by the Oregon Department of Fish and Wildlife (Drew et al. 2003). Fishers located in the eastern Siskiyou Mountains of Oregon are genetically related to indigenous individuals in the northwestern California population (Farber and Franklin 2005, Wisely et al. 2004). However, recent research shows that the two populations are not genetically isolated; individuals from the indigenous population have crossed Interstate 5 and reproduced with the reintroduced population (Barry et al. 2018).

Fishers prefer large tracts of contiguous interior forest and typically avoid thinned or open forests, including areas where there is significant human disturbance. In the southern Oregon Cascades, average home range sizes for females were approximately 25 km^2 (9.7 mi^2), 62 km^2 for males during the non-breeding season and 147 km^2 for males during the breeding season (from 24 to 57 mi^2), based on locations of radio telemetered study animals (Aubry and Raley 2006). Fishers likely avoid open areas because the reduced hiding cover increases vulnerability to predators, and because in winter open areas have deeper snowpack which can make travel and hunting inefficient (CBD 2000). Fishers use fragmented patches of preferred forest types if those patches are connected by other forest types rather than separated by large open areas or clearcuts (Buskirk and Powell 1994). Fishers are negatively associated with clearcuts and forests that are nearly or completely surrounded by clearcuts, as well as with small forest patches less than 50 ha (124 acres) (Rosenberg and Raphael 1986).

Loss and fragmentation of habitat due to timber harvest and thinning, roads, urban development, recreation and wildfire are the main reasons for the decline of the fisher in the west (FWS 2018). Habitat loss, modification, and fragmentation continue to occur as a result of forest management practices and stand replacing wildfire, and appear to pose a substantial threat to fishers (FWS 2012). In addition to removing forage, rest, and den sites, fragmentation can increase predation risk, impede population-level movements, and affect prey species composition, abundance, and availability (FWS 2012). Fragmentation can also increase energetic costs to fishers, which may result in nutritional stress that can reduce animal condition, ultimately affecting survival, reproduction, and recruitment (Lofroth et al. 2010).

Analysis of Effects

Direct and Indirect Effects

The analysis area for this species includes all suitable fisher habitats within 5 miles of the proposed pipeline, on the national forests crossed by the Project. Table 18 shows the habitat types in the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 18. Pacific Fisher Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside-Lowland-Conifer-Hardwood Forests	Closely Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Montane Mixed Conifer Forest	Closely Associated	Feeds and Breeds	75.31	26.38	31,531	0.32%
Southwest Oregon Mixed Conifer-Hardwood Forest	Generally Associated	Feeds and Breeds	318.28	94.99	85,864	0.48%
Westside Riparian Wetlands	Closely Associated	Feeds and Breeds	0.41	0.00	1	32.88%
Eastside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.00	0.00	285	0.00%
Total			**394.00**	**121.37**	**117,682**	**0.44%**

1/ Totals taken from Table 7 for all three national forests in which the species has been documented to occur.

2/ Totals taken from Table 4 for all three national forests in which the species has been documented to occur; does not include habitat on other federal or non-federal lands.

The Project could affect this species by disturbing animals. Fishers are sensitive to disturbance and will avoid areas used by humans (CBD 2000). Disturbance from noise and human activity would only be temporary; however, and habitat would become suitable once those activities ceased. Due to this species' mobility, it should be able to temporarily relocate to portions of its home range that would not experience noise above ambient during construction. Pipeline construction could also negatively impact the fisher by modifying habitat, particularly by removing snags and large woody debris during ROW clearing. The Project would disturb 0.44 percent of the total suitable habitat within 5 miles of the Project (Table 18). The cleared ROW could also fragment habitat, which is detrimental to fishers because they prefer large areas of contiguous, unfragmented forest (CBD 2000). The cleared ROW also has the potential to act as a barrier to dispersal, similar to the barriers posed by highway 140 and Interstate 5. However, the pipeline is likely to be a porous or soft barrier as it will remain vegetated. Additionally, fishers have been documented crossing more extensive or hard barriers, including highway 140 and Interstate 5 (Barry et al. 2018, Cummins 2018).

Cumulative Effects

The Pacific fisher cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 14). Historically, the fisher was common throughout the Oregon Coast Range and Klamath Region of Oregon in low elevation closed canopy forests with large trees for denning. The fisher's range has been reduced due to prior trapping, settlement, and the removal of large areas of contiguous late-successional forests. Current threats to the fisher include habitat loss and fragmentation.

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Approximately 479 acres disturbed during pipeline construction would be revegetated following construction, and be allowed to return to its pre-construction condition outside of the 30-foot maintenance corridor (excluding Matrix lands). This area consists primarily of forested habitat (86 percent), as well as some non-forested habitat (14 percent).

Mitigation actions proposed for NFS lands that affect resources used by the Pacific fisher include road closure and decommissioning, fuels reduction, commercial and pre-commercial thinning, reallocation of matrix to LSR, riparian vegetation planting, and upland LWD placement projects. Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14). Potential negative impacts include disturbance during implementation of these projects, such as during fuels reduction projects. However, these projects would overall benefit the Pacific fisher through habitat improvements and a reduction in disturbance over the long term. Road closures and decommissioning would reduce disturbance to individuals if present and fuels reduction projects would result in a reduction of potential habitat loss through fire.

Other planned projects within watersheds where the proposed action crosses NFS lands include a variety of timber, fuel, grazing and biological projects (Table 13). They would affect 40,742 acres, or 5.6 percent of the cumulative effects analysis area. The pre-commercial thinning and timber projects in the National Forests would most likely contribute to the long term health of the forest ecosystems. Although 2,550 snags (Table D-1, Appendix D) would potentially be cleared from the analysis area, these snags represent a small portion of the species' overall available denning and resting sites within the analysis area and would be replaced through mitigation efforts. These projects would be consistent with the NWFP and the large number of thinnings, reclamation of road systems, would most likely contribute to the long term health of the forest ecosystems. However, due to the sensitivity of the species to human disturbance and the Project being located within known fisher home ranges, it is likely that expected modification to habitat and disturbance in the analysis area would contribute to cumulative impacts to this species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts include replanting conifer trees outside of the 30-foot-wide maintenance corridor (see Appendix I of the POD). Downed logs, unmerchantable woody debris, slash greater than 16-inches in diameter, and large rocks and boulders would be redistributed along the ROW following construction to provide terrestrial habitat diversity features, which would reduce fragmentation effects on fishers (see Appendix I of the POD). Noise disturbance from blasting would be minimized with the use of blast mats or other devices. Timber removal would be avoided within 0.25 miles of an NSO activity center between March 1 and September 30, and all timber would be removed outside of the core migratory bird breeding season (April 1–July 15). Pipeline construction, including blasting and helicopter activity, would occur after the NSO critical breeding period (March 1–July 15) within 0.25 miles of an NSO activity center. These seasonal restrictions would benefit any denning fisher in those areas.

Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit fisher are described above under cumulative effects. In the Umpqua and Rogue River national forests snag creation would be implemented across 946 acres of land. Snags would be created in LSR and matrix lands by blasting the tops off live trees or inoculating trees with heart rot decay fungi. Increased snags densities would provide fisher with more denning and resting opportunities.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Pacific fisher because only 0.44 percent of habitat available within the analysis area would be impacted by the Project.

6.2.2 Birds

Surveys were not conducted specifically for special status birds except for the great gray owl (*Strix nebulosa*); however, special status species were documented if observed during other survey activities. The great gray owl is designated as a Survey and Manage species and discussed in a separate report. The information on special status species occurrence is based on several GIS data sources including ORBIC occurrence records (ORBIC 2017), Johnson and O'Neil (2001) habitat associations, and the Forest Service NRIS databases (Forest Service 2017).

6.2.2.1 Red-necked Grebe (Podiceps grisegena)

Species Status in the Project Area

This waterbird breeds throughout southern and central Alaska and much of Canada, to the northern U.S. Their winter range is along the Pacific coast from the Aleutian Islands to Los Angeles, California, the Atlantic coast from Newfoundland to North Carolina, and the shores of Lake Ontario. The only consistent breeding in Oregon is by a group of 5 – 20 birds in Upper

Klamath Lake National Wildlife Refuge (NWR). During the winter, red-necked grebes can be found in larger numbers along the coast, and are rarely found away from the coast (Spencer 2003a). As shown in Table 1, the species has been documented in the Umpqua and Winema national forests; and has not been documented and is not suspected to occur in the Rogue River National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the red-necked grebe within 3 miles of the Project on NFS lands. Red-necked grebes have been recorded on Breeding Bird Survey (BBS) routes within 50 miles of the Project in Bird Conservation Region (BCR) 9 (Great Basin, from MP 168 to MP 228.1) during the past 20 years, but not within BCR 5 (Northern Pacific Rainforest, from MP 1.5R to MP 168) (Pardieck et al. 2017).

Historical information on this species is limited; breeding populations in Oregon were first documented in 1945 (Marshall et al. 2003). Breeding habitat consists of clear, deep marshy lakes and ponds in timbered regions (Table 19; Johnson and O'Neil 2001). At Upper Klamath Lake, emergent vegetation is dominant, and pondweed and waterweed are common (Spencer 2003a). Winter habitat consists of estuaries and protected waters along the coast (Spencer 2003a). Fish make up 50 to 75 percent of adults' diets. Other important foods are insects, crustaceans, and occasionally vegetation (Spencer 2003a).

As predators, red-necked grebes are susceptible to bioaccumulation of pollutants such as organochlorides and heavy metals, and they are also vulnerable to oil spills. A potentially important source of mortality to this diving bird is bycatch in commercial fishing nets. Other threats to red-necked grebes are degradation of habitat and disturbance. Farming, road-building, and development have destroyed breeding habitat, while pollution is a problem at some wintering areas. Disturbance has associated with reduced productivity at some sites (Stout and Neuchterlein 1999). Within the western region, populations have decreased 0.27 percent annually between 2005 and 2015 (Sauer et al. 2017).

Analysis of Effects

Direct and Indirect Effects

The analysis area for this species includes all suitable red-necked grebe habitat within 3,200 feet of the proposed pipeline, in Umpqua and Winema national forests. Table 19 shows the habitat types in the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 19. Red-necked Grebe Habitat Associations						
Habitat Type	Association	Activities	Total Acres Removed1/	Total Acres Modified1/	Total Acres in Analysis Area2/	Percentage Impacted
Herbaceous Wetlands	Closely Associated	Feeds and Breeds	0.01	0.00	21	0.03%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds and Breeds	0.36	0.00	131	0.28%
Total			**0.37**	**0.00**	**153**	**0.24%**

1/ Totals taken from Table 7 for the Umpqua and Winema national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for the Umpqua and Winema national forests in which the species has been documented to occur; does not include habitat located in the Rogue River National Forest or on other federal or non-federal lands.

While this table represents impacts to general habitats that red-necked grebe may use that would be impacted by the Project, areas of known use by red-necked grebes would not be impacted by the Project. Specifically, the population at Upper Klamath Lake NWR and the few records from Howard Prairie Reservoir would not be impacted by the Project because both of these locations occur well away (greater than 10 miles) from any Project impacts. One bird summered on Fish Lake in Jackson county in 1989, but this lake would also be avoided by about 2 miles by the Project centerline. The Project should also not contribute to pollution of either of these waterbodies, which could pose an added threat to the species.

If red-necked grebes were to occur near the Project, they could be disturbed by pipeline construction that could render habitats temporarily unsuitable. However, because grebes are a mobile species, they should be able to move away from Project construction activities and not be directly affected.

Cumulative Effects

The red-necked grebe cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua and Winema national forests (Table 14). Development activities that degrade foraging and nesting habitat as well as indirect effects such as noise disturbance continue to threaten the red-necked grebe. Development has concentrated around bodies of water, increasing disturbance, eliminating habitat, and encouraging the spread of mesopredators. Though one-third of Oregon wetlands are estimated to have been lost since the late 1700s, wetlands are now protected under federal law, and loss of estuarine wetlands has slowed substantially since the mid-1900s (ODSL and OPRD 1989, Dahl 1990). Additionally, although the Klamath Basin has lost nearly 80 percent of its wetlands, 15,000 acres of wetlands and open water within the Upper Klamath NWR where this species is known to occur are protected. FWS manages the site for the conservation and recovery of endangered, threatened, sensitive species and the habitats on which they depend, including the red-necked grebe.

Construction of the pipeline and associated facilities would affect 1,144 acres within the cumulative effects analysis area (Table 14). However, no red-necked grebe nesting or overwintering sites are known from within these fifth field watersheds, so Project effects are expected to be limited.

Mitigation actions proposed for NFS lands that affect resources used by the red-necked grebe include fish passage, road storm proofing, road decommissioning, in stream LWD placement, stream crossing repair, and riparian planting projects. Mitigation actions on NFS lands would affect 5,169 acres the cumulative effects analysis area, or 1.5 percent of the total watershed area (Table 14). Potential negative impacts include noise disturbance and the potential for increased sediment during implementation. However, these projects would overall benefit the red-necked grebe, if present, through habitat improvements and a reduction in disturbance over the long term. Fish passage and riparian planting projects would reconnect aquatic habitats and restore riparian vegetation, which would reduce sediment and restore shade over time. Road storm proofing and decommissioning, and stream crossing repair projects would reduce future sediment inputs; road decommissioning would additionally reduce future noise disturbance by limiting human access. Placement of LWD in streams would add structural complexity to aquatic systems, trap fine sediments, and contribute to reductions in stream temperatures over time which would improve habitat quality for the horned grebe.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). They would affect 32,031 acres, or 9.6 percent of the watersheds. The aquatic restoration projects include in-stream restoration activities that benefit water quality, bank stability and road decommissioning actions that would benefit grebe habitat within the watershed. Under the NWFP, Riparian Reserves in the area are likely to improve habitat for this species over time. Further, standards and guidelines within the NWFP limit livestock grazing around aquatic areas and provide measures to minimize impacts from timber harvest. These actions would likely lead to improved quantity and quality of suitable red-necked grebe habitat on NFS lands.

The proposed Project, including mitigation actions, would affect approximately 6,313 acres. Combined with 32,031 acres of overlapping reasonably foreseeable activities, approximately 38,344 acres within the cumulative effects analysis area would be affected, or 11.5 percent of the total watershed area (Table 14). The proposed action as well as the actions described above could affect a minimal amount of potential habitat, but would not impact known red-necked grebe use areas. Therefore, cumulative impacts on the red-necked grebe are expected to be insignificant because the combined impacts to the 11.5 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize any potential Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B of Appendix I of the POD). Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the red-necked grebe are also described above under cumulative effects.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the red-necked grebe because all known breeding sites are being avoided, and 0.24 percent of habitat available within the analysis area would be impacted by the Project.

6.2.2.2 Horned Grebe (*Podiceps auritus*)

Species Status in the Project Area

This small grebe breeds in Alaska and parts of western Canada south to eastern Oregon and Idaho. During winter, in the west, it can be found along the Pacific coast from the Aleutians to Mexico, and inland to New Mexico and Colorado. In Oregon, horned grebes have been present in late June at Upper Klamath Lake, uncommonly along lakes, reservoirs, and large rivers in the spring and fall, and commonly along the coast in winter (Marshall et al. 2006). As shown in Table 1, the species has been documented on the Umpqua National Forest; it has not been documented and is not suspected to occur in the Rogue River or Winema national forests. Neither the Forest Service nor ORBIC location database records contained observations of the horned grebe within 3 miles of the Project on NFS lands. No horned grebes have been recorded on BBS routes within 50 miles of the Project in BCR 5 during the past 20 years, and 2 horned grebes were recorded on routes in BCR 9 during the past 20 years (Pardieck et al. 2017).

Breeding habitat consists of small (less than 25 acres), semi-permanent, shallow freshwater ponds and marshes with emergent vegetation, especially sedges, rushes, and cattails, and areas of open water (Table 20; Stedman 2000, Johnson and O'Neil 2001, Spencer 2003b). Slightly brackish areas can also be used. During winter, they are usually found on saltwater, often inshore, though also on fresh water (Stedman 2000). In the summer, horned grebes eat aquatic arthropods, and in the winter they eat fish and crustaceans.

The most serious threats to winter range suitability are oil spills and pesticide accumulation. Losses of breeding habitat are also serious in some areas due to mowing of aquatic vegetation and eutrophication due to fertilizer runoff (Stedman 2000). Horned grebes will also abandon lakes heavily used by humans for recreation. Substantial losses are reported due to incidental take in fishing nets, and some losses have been reported due to toxins including pesticides, and oil spills (Stedman 2000). Within the western region, populations have declined 4.13 percent annually between 2005 and 2015 (Sauer et al. 2017).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable horned grebe habitats within 3,200 feet of the proposed pipeline, on the Umpqua National Forest. Table 20 shows the habitat types in the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 20. Horned Grebe Habitat Associations						
Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Herbaceous Wetlands	Closely Associated	Feeds and Breeds	0.01	0.00	1	1.03%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds and Breeds	0.29	0.00	18	1.63%
Total			**0.30**	**0.00**	**19**	**1.61%**

1/ Totals taken from Table 7 for the Umpqua National Forest in which the species has been documented to occur.

2/ Totals taken from Table 3 for the Umpqua National Forest in which the species has been documented to occur; does not include habitat located in the Rogue River National Forest or on other federal or non-federal lands.

While this table represents impacts to general habitats that horned grebe may use that would be impacted by the Project, areas of known use by horned grebes would not be impacted by the Project. Specifically, the potentially breeding population at Upper Klamath Lake NWR is about 15 miles from the Project. The Project should also not contribute to pollution of waterbodies, which could contribute to existing threats to the species.

Wintering birds could potentially be disturbed by Project construction; however, they should be able to move away from Project construction activities and would only be temporarily affected. Disturbance at any given location would last approximately 8 weeks over the entire construction period, and could occur at any time of year (Section 6.1.2.1).

Cumulative Effects

The horned grebe cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua National Forest (Table 14). Breeding habitat in Oregon has been decreased from historical levels due to filling of wetlands and development. Though one-third of Oregon wetlands are estimated to have been lost since the late 1700s, wetlands are now protected under federal law, and loss of estuarine wetlands has slowed substantially since the mid-1900s (ODSL and OPRD 1989, Dahl 1990). Additionally, similarly to the red-necked grebe, the wetland conservation and species management at the Upper Klamath NWR has, and should continue to benefit the horned grebe (FWS 2013).

Construction of the pipeline and associated facilities would affect 913 acres within the 5th field watersheds where the Project crosses the Umpqua National Forest where this species has been documented, or 0.3 percent of the total watershed area (Table 14). However, no areas of known horned grebe use occur within these fifth field watersheds.

Mitigation actions proposed for NFS lands that affect resources used by the horned grebe include fish passage, road storm proofing, road decommissioning, in stream LWD placement, stream crossing repair, and riparian planting projects. Mitigation actions on NFS lands would affect 5,055 acres within the cumulative effects analysis area, or 1.8 percent of the total watershed area (Table 14). Potential negative impacts include noise disturbance and the potential for increased sediment during implementation. However, these projects would overall benefit the horned grebe, if present, through habitat improvements and a reduction in disturbance over the long term. Fish passage and riparian planting projects would reconnect aquatic habitats and restore riparian vegetation, which would reduce sediment and restore shade over time. Road storm proofing and decommissioning, and stream crossing repair projects would reduce future sediment inputs; road decommissioning would additionally reduce future noise disturbance by limiting human access. Placement of LWD in streams would add structural complexity to aquatic systems, trap fine sediments, and contribute to reductions in stream temperatures over time which would improve habitat quality for the horned grebe.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). They would affect 27,561 acres, or 9.9 percent of the watersheds. The aquatic restoration projects include in-stream restoration activities that benefit water quality, bank stability and road decommissioning actions that could potentially benefit grebe habitat within the watershed. The NWFP protects streams, rivers, and wetlands, and land use designations including Riparian Reserves and associated management practices on NFS land would likely increase the amount and integrity of these habitats used by horned grebes.

The proposed Project, including mitigation actions, would affect approximately 5,968 acres. Combined with 27,561 acres of overlapping reasonably foreseeable activities, approximately 33,529 acres within the cumulative effects analysis area would be affected, or 12.0 percent of the total watershed area (Table 14). The proposed action as well as the actions described above could affect a minimal amount of potential habitat, but would not impact known horned grebe use areas.

Therefore, cumulative impacts on the horned grebe are expected to be insignificant given the distance away from the forests at which breeding or wintering horned grebes would typically spend time, and because the combined impacts to the 12.0 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

As noted above, contamination of waterbodies is a noted threat to horned grebes. Specific conservation measures that Pacific Connector would implement that would help minimize any potential Project-related impacts from spills are described in Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD). Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the horned grebe are also described above under cumulative effects.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for horned grebe because they are not known to breed near the Project, and less than 2 percent of potential habitat in the analysis area where birds could experience winter disturbance would be impacted.

6.2.2.3 American White Pelican (Pelecanus erythrorhynchos)

Species Status in the Project Area

The breeding range of the American white pelican includes scattered locations in the Great Plains region of Canada and the U.S. During winter, they are found in California south of the San Francisco Bay, and along the coast south to the Yucatan peninsula. In Oregon, they regularly breed at Malheur, Lower Klamath, and Upper Klamath NWRs. Post breeding, birds are found throughout eastern Oregon and occasionally in western Oregon. As shown in Table 1, the species has been documented in the Rogue River and Winema national forests; it has not been documented and is not suspected to occur in the Umpqua National Forest. Multiple observations of the American white pelican have been documented within 3 miles of the Project in the Rogue River National Forest near Fish Lake (Colyer 2014) and within 3 miles of the Project in the Winema National Forest. White pelicans have been recorded on BBS routes within 50 miles of the Project in BCR 5 and BCR 9 during the past 20 years (Pardieck et al. 2017).

During breeding, typical habitat is isolated islands or floating reed mats in freshwater lakes (Table 21; Johnson and O'Neil 2001). Nesting has been recorded on islands vegetated with greasewood, saltgrass, and Great Basin wild rye (Paullin et al. 1988). The diet of the American white pelican is largely made up of fish. Foraging habitat is shallow marshes, lakes, rivers, and canals, especially near dams, gates, and pipes, where fish congregate (Knopf and Evans 2004).

There are many threats to this species; deaths at Malheur NWR resulted from botulism, power line strikes, and possibly starvation (Herziger and Ivey 2003). Fluctuating water levels have caused chick stranding, nest flooding, and can contribute to erosion of nesting islands (Herziger and Ivey 2003). Pelicans are also highly sensitive to disturbance; over 800 nests were abandoned at Malheur Lake in 1988 after trespassers visited a colony by canoe (Herziger and Ivey 2003). In Oregon, populations have declined 3.26 percent annually between 2005 and 2015 (Sauer et al. 2017).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable American white pelican habitats within 3,200 feet of the proposed pipeline, in the Rogue River and Winema national forests. Table 21 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 21. American White Pelican Habitat Associations						
Habitat Type	**Association**	**Activities**	**Total Acres Removed[1/]**	**Total Acres Modified[1/]**	**Total Acres in Analysis Area[2/]**	**Percentage Impacted**
Herbaceous Wetlands	Generally Associated	Feeds	0.00	0.00	21	0.00%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds and Breeds	0.21	0.09	163	0.18%
Total			**0.21**	**0.09**	**184**	**0.16%**

1 Totals taken from Table 7 for the Rogue River and Winema national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for the Rogue River and Winema national forests in which the species has been documented to occur; does not include habitat located in the Umpqua National Forest or on other federal or non-federal lands.

While this table represents impacts to general habitats that the American white pelican may use that would be impacted by the Project, areas of known use by pelicans would not be impacted by the Project. Specifically, known breeding locations are about 3 and 11 miles from the Project (Lower Klamath and Upper Klamath NWR, respectively), so no impacts would be expected.

Pelicans have also been observed multiple times at Fish Lake (Colyer 2014) which is located about 2 miles north of the Project centerline. Nonbreeding American white pelicans could be disturbed by pipeline construction if they are present in the area. However, they should be able to move away from Project construction activities and would only be temporarily affected. Disturbance at any given location would last approximately 8 weeks over the entire construction period, and could occur at any time of year (Section 6.1.2.1). Of habitat that American white pelicans could potentially use in the analysis area, about 0.2 percent would be impacted by the Project (Table 21).

Cumulative Effects

The American white pelican cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Winema and Rogue River national forests (Table 14). Though one-third of Oregon wetlands are estimated to have been lost since the late 1700s, loss of estuarine wetlands has slowed substantially since the mid-1900s with increased protection (ODSL and OPRD 1989, Dahl 1990). Areas near lakes, rivers, and streams have historically been among the most intensively developed, for easy access to water. Coastal rivers and estuaries have been highly altered by humans; they have been drained, had their natural hydrologic processes such as tides and flows altered, and have been generally reduced in complexity. Streams and rivers have also been degraded by timber clearing practices (OPB 2000).

Construction of the pipeline and associated facilities would affect 953 acres within the cumulative effects analysis area, or 0.2 percent of the total watershed area (Table 14). The only location where the American white pelican has been observed within these watersheds is at

Fish Lake; as they are not known to breed at this site, impacts to breeding individuals are not expected.

Mitigation actions proposed for NFS lands that affect resources used by the American white pelican include fish passage, road storm proofing, road decommissioning, in stream LWD placement, stream crossing repair, and riparian planting projects. Mitigation actions on NFS lands would affect 2,407 acres within the cumulative effects analysis area, or 0.5 percent of the total watershed area (Table 14). Potential negative impacts include noise disturbance and the potential for increased sediment during implementation. However, these projects would overall benefit the American white pelican, if present, through habitat improvements and a reduction in disturbance over the long term. Fish passage and riparian planting projects would reconnect aquatic habitats and restore riparian vegetation, which would reduce sediment and restore shade over time. Road storm proofing and decommissioning, and stream crossing repair projects would reduce future sediment inputs; road decommissioning would additionally reduce future noise disturbance by limiting human access. Placement of LWD in streams would add structural complexity to aquatic systems, trap fine sediments, and contribute to reductions in stream temperatures over time which would improve habitat quality for the American white pelican.

Other planned projects within watersheds where the proposed action crosses the cumulative effects analysis area include livestock grazing, a variety of forest management projects, and fuels and weed treatment projects (Table 13). They would affect 13,181 acres, or 2.9 percent of the watersheds. These projects would not likely have additional harmful or beneficial impacts to American white pelican. Additionally, federal laws protect streams, rivers, and wetlands, and land use designations such as Riparian Reserves, and associated management practices on NFS land would likely increase the amount and integrity of these habitats used by American white pelicans over time.

The proposed Project, including mitigation actions, would affect approximately 3,360 acres. Combined with 13,181 acres of overlapping reasonably foreseeable activities, approximately 16,541 acres within the cumulative effects analysis area would be affected, or 3.7 percent of the total watershed area (Table 14). The proposed action as well as the actions described above would not result in fluctuating water levels or disturbance at nest sites, which have been identified as threats to the American white pelican. Therefore, cumulative impacts on the American white pelican are expected to be insignificant because the combined impacts to the 3.7 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize any potential Project-related impacts are described in the Wetland and Waterbody Construction and Mitigation Procedures (Attachment B of Appendix I of the POD). Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the American white pelican are also described above under cumulative effects.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for American white pelican because breeding areas would be avoided by at least 3 miles, and other areas that could experience disturbance from Project construction represent less than 0.2 percent of habitat available in the analysis area. Additionally, the Project should not contribute to known threats to American white pelican, such as fluctuating water levels.

6.2.2.4 Harlequin Duck (Histrionicus histrionicus)

Species Status in the Project Area

In the west, harlequin duck breeding occurs in Alaska, Yukon, western Northwest Territories, British Columbia, western Washington, Idaho, western Montana, and northwestern Wyoming. Wintering areas are from the Aleutians along the coast down to northern California (Robertson and Goudie 1999). In Oregon, they are found in the Willamette River basin and along the coast during winter. As shown in Table 1, the species has been documented in the Umpqua and Rogue River national forests; it has not been documented and is not suspected to occur in the Winema National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the Harlequin duck within 3 miles of the Project on NFS lands. No harlequin ducks have been recorded on BBS routes within 50 miles of the Project in BCR 5 or BCR 9 during the past 20 years (Pardieck et al. 2017).

Habitat for the harlequin duck is unique among ducks. They can be found along turbulent, fast-flowing rivers and streams during the breeding season, and shallow intertidal zones of rocky coastlines during winter (Table 22; Robertson and Goudie 1999, Johnson and O'Neil 2001). In the west Cascades, they are most often associated with fast-moving, unbraided, low to moderate (1–7 percent) gradient, third- to fifth-order streams in western hemlock forests (Dowlan 2003). Rocky streams are preferred, as in-stream rocks can be used as resting sites. Eggs are laid in scrapes on the ground under stumps, logs, or cliff ledges, lined with needles, mosses, and down. Nests are built from mid-April to early June, and eggs hatch from late May to late June (Dowlan 2003). Winter habitat is along rocky headlands, offshore rocks, jetties, and occasionally sandy beaches on the coast. Their diet is varied, and consists of amphipods, snails, small crabs, barnacles, and fish eggs (Robertson and Goudie 1999).

Although it has a wide global distribution, this species has experienced declines over most of its range, including substantial declines in the Pacific population. Harlequin ducks may be vulnerable to local extirpations due to high breeding and wintering site fidelity and small local breeding populations (NatureServe 2013). Hunting has historically been a factor decreasing populations, though harvest rates are currently low. Several environmental toxins affect this species, including creosote leaking from piers, diesel soot, oil spills, and bioaccumulating heavy metals (Robertson and Goudie 1999). Timber clearing activities degrade harlequin duck habitat by altering suitable riparian habitat, disrupting stream flow, and increasing silt loads (Robertson and Goudie 1999). Because of their low population numbers, statistically reliable population trends are difficult to calculate, but the population trend in Oregon appears stable to increasing (Wiggins 2005).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable harlequin duck habitats within 3,200 feet of the proposed action in the Umpqua and Rogue River national forests. Table 22 shows the habitat types within the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 22. Harlequin Duck Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Riparian Wetlands	Closely Associated	Feeds and Breeds	0.15	0.00	1	12.38%
Eastside Riparian Wetlands	Closely Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.43	0.09	68	0.77%
Bays and Estuaries	Generally Associated	Feeds	0.00	0.00	0	0.00%
Total			**0.59**	**0.09**	**69**	**0.98%**

1/ Totals taken from Table 7 for the Rogue River and Umpqua and national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for the Rogue River and Umpqua national forests in which the species has been documented to occur; does not include habitat located in the Winema National Forest or on other federal or non-federal lands.

While harlequin ducks have been documented on the Rogue River and Umpqua forests, no locations have been documented within 3 miles of the Project. Given that harlequin ducks have high fidelity to breeding locations, we can assume that no breeding locations would be impacted by the Project. Of available non-breeding habitat within the analysis area, approximately 1.0 percent would be impacted by the Project.

Harlequin ducks could potentially be disturbed by Project construction if they were in the area of a stream or river crossing. Construction activities are estimated to last about 8 weeks at a given location and could occur at any time of the year. We assume that while birds may be disturbed, as these birds would not be associated with a nearby nest, they would be able to move away from the disturbance.

Project construction could negatively impact potential breeding habitat by altering suitable riparian habitat; however, this impact would be mitigated as described below.

Cumulative Effects

The harlequin duck cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua and Rogue River national forests (Table 14). Harlequin duck habitat in the cumulative effects analysis area has been degraded by development and alteration since European settlement began in the late 1700s. Development has concentrated around lakes, rivers, streams, and coasts and an estimated one-third of historical wetlands in Oregon have been lost, largely due to draining for agricultural use (ODSL and OPRD 1989, Dahl 1990). Harlequin duck habitat is currently threatened by timber clearing activities which modify stream flow and riparian habitat and increase sediment. Within the last few decades, federal laws have been enacted that protect waters and wetlands. The NWFP identifies restoration and maintenance of Riparian Reserves as a goal on NFS land. Riparian Reserves include the hydrologic, geologic or ecological features within a watershed that affect stream processes. These protections and management practices would likely enhance the quantity and quality of nesting habitat available to harlequin ducks in the cumulative effects analysis area in the future.

Construction of the pipeline and associated facilities would affect 1,635 acres within the cumulative effects analysis area, or 0.2 percent of the total watershed area (Table 14). However, no areas of known harlequin duck use occur within these fifth field watersheds.

Mitigation actions proposed for Forest Service lands that affect resources used by the harlequin duck include fish passage, road storm proofing, road decommissioning, in stream LWD placement, stream crossing repair, and riparian planting projects. Mitigation actions on NFS lands would affect 7,348 acres within the cumulative effects analysis area, or 1.1 percent of the total watershed area (Table 14). Potential negative impacts include noise disturbance and the potential for increased sediment during implementation. However, these projects would overall benefit the harlequin duck, if present, through habitat improvements and a reduction in disturbance over the long term. Fish passage and riparian planting projects would reconnect aquatic habitats and restore riparian vegetation, which would reduce sediment and restore shade and riparian structure over time. Road storm proofing and decommissioning, and stream crossing repair projects would reduce future sediment inputs; road decommissioning would additionally reduce future noise disturbance by limiting human access. Placement of LWD in streams would add structural complexity to aquatic systems, trap fine sediments, and contribute to reductions in stream temperatures over time which would improve habitat quality for the harlequin duck.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). They would affect 36,272 acres, or 5.4 percent of the watersheds. The aquatic restoration projects include in-stream restoration activities that benefit water quality, bank stability and road decommissioning actions that would benefit harlequin duck nesting habitat within the watershed.

The proposed Project, including mitigation actions, would affect approximately 8,983 acres. Combined with 36,272 acres of overlapping reasonably foreseeable activities, approximately 45,255 acres within the cumulative effects analysis area would be affected, or 6.7 percent of the total watershed area (Table 14). The proposed action would contribute to effects from timber clearing activities that degrade harlequin duck habitat by altering suitable riparian habitat, disrupting stream flow, and increasing silt loads (Robertson and Goudie 1999); however, the mitigation actions proposed would offset these impacts as described above. The Project is not expected to contribute environmental toxins, which is also noted as a threat to this species (Robertson and Goudie 1999). Additionally, neither the Project nor reasonably foreseeable Projects are expected to impact breeding harlequin ducks. Therefore, cumulative impacts on the harlequin duck are expected to be insignificant because the combined impacts to the 6.7 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B of Appendix I of the POD), the Erosion Control and Revegetation Plan (Appendix I of the POD), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of FERC's BA).

Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the harlequin duck are described above under cumulative effects). Projects within the Rogue River and Umpqua national forests that would benefit the species include the repair of stream crossings, riparian plantings and in-stream placement of woody debris that would provide nesting cover and improve stream integrity.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Harlequin duck because no known breeding areas would be impacted, and other areas that could experience disturbance from Project construction represent less than one percent of habitat available in the analysis area.

6.2.2.5 Bufflehead (Bucephala albeola)

Species Status in the Project Area

The breeding range for buffleheads is interior Alaska, southern Northwest Territories, northeast and southern British Columbia, northern Alberta and Saskatchewan, and at scattered, isolated locations in Washington, Oregon, California, Idaho, Montana, and Wyoming. The highest breeding densities recorded are in central British Columbia (Gauthier 1993). During the nonbreeding season, buffleheads range from southern Alaska, down the Pacific coast, and throughout most of the continental U.S. In Oregon, they are found at scattered locations throughout the state, and they could potentially be found along most of the proposed pipeline route (Scheuering 2003). Breeding is recorded in the central and south Cascades, including in Klamath County (Scheuering 2003). As shown in Table 1, the species has been documented in all three national forests. The bufflehead has been observed multiple times within 1-3 miles of the Project centerline in the Rogue River National Forest near Fish Lake (Colyer 2014); it has not been documented in Forest Service or ORBIC databases within 3 miles of the Project in the Umpqua or Winema national forests. No buffleheads have been recorded on BBS routes within 50 miles of the Project in BCR 5 during the past 20 years but have been recorded on routes in BCR 9 during the past 20 years (Pardieck et al. 2017).

The species breeds at high-elevation forested lakes, with nests built in cavities or artificial nests boxes in trees next to water (Table 23; Johnson and O'Neil 2001, Scheuering 2003). During migration and winter, buffleheads use small freshwater lakes and ponds with little or no vegetation, sewage treatment ponds, and slow-moving rivers. Food habits consist of diving for aquatic invertebrates such as insects, crustaceans, and mollusks, and seeds (Gauthier 1993).

Numbers of buffleheads had decreased by 1930 due to overshooting. Once the species gained protection under the Migratory Bird Treaty Act, its numbers began to increase. However, human disturbance from recreation and a decrease in suitable nesting cavities due to forestry practices are believed to be contributing to its continued low population numbers in Oregon, which show a decline of 7.3 percent annually between 2005 and 2015 (Scheuering 2003, Sauer et al. 2017).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable bufflehead habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 23 shows the habitat types within the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 23. Bufflehead Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Riparian Wetlands	Closely Associated	Feeds and Breeds	0.41	0.00	1	32.88%
Eastside Riparian Wetlands	Closely Associated	Feeds and Breeds	0.00	0.00	205	0.00%
Herbaceous Wetlands	Closely Associated	Feeds	0.01	0.00	21	0.03%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.50	0.09	181	0.33%

Table 23. Bufflehead Habitat Associations						
Habitat Type	**Association**	**Activities**	**Total Acres Removed1/**	**Total Acres Modified1/**	**Total Acres in Analysis Area2/**	**Percentage Impacted**
Bays and Estuaries	Closely Associated	Feeds	0.00	0.00	0	0.00%
Total			**0.92**	**0.09**	**409**	**0.25%**

1/ Totals taken from Table 7 for all three national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

While bufflehead have been documented on the all three national forests, no locations have been documented within 1 mile of the Project centerline. On the Rogue River National Forest, this species has been documented multiple times near Fish Lake, which occurs about 2 miles from the Project centerline. Based on the lack of documented occurrences and lack of ideal high-mountain lake habitat being impacted, we assume that no breeding locations would be impacted by the Project. Of available non-breeding habitat within the analysis area, less than 0.3 percent would be impacted by the Project.

Bufflehead could potentially be disturbed by Project construction if they were in the area of a stream or river crossing during construction. Construction activities are estimated to last about 8 weeks at a given location and could occur at any time of the year. We assume that while birds may be disturbed, as these birds would not be associated with a nearby nest, they would be able to move away from the disturbance.

Project construction could negatively impact potential breeding habitat by removing snags. In the analysis area, approximately 1.45 percent of snags estimated to be present would be impacted by the Project (Appendix D).

Cumulative Effects

The bufflehead cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 14). Potential bufflehead habitat in this analysis area has been degraded by development and alteration since European settlement began in the late 1700s. Human development has a pattern to concentrate around lakes, rivers, streams, and coasts. An estimated one-third of historical wetlands in Oregon have been lost, largely due to draining for agricultural use (ODSL and OPRD 1989, Dahl 1990). Streams and rivers have been degraded by timber clearing practices, hydrologic processes such as tides and floods have been altered, and the complexity of aquatic habitats in Oregon has generally been reduced (OPB 2000). However, within the last few decades, federal laws have been enacted that protect waters and wetlands. The NWFP identifies restoration and maintenance of Riparian Reserves as a goal on NFS land. Riparian Reserves include the hydrologic, geologic or ecological features within a watershed that affect stream processes.

These protections and management practices should enhance the quantity and quality of habitat available to buffleheads in the analysis area in the future.

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). No known breeding areas have been identified within these fifth field watersheds. Project effects would primarily be from disturbance during construction, removal of non-breeding habitat, and removal of potential breeding habitat through snag removal. However, disturbance during construction would be short-term, lasting approximately 8 weeks at any given location. Removal of non-breeding habitat would be minimal, as only approximately 0.3 percent of the cumulative effects analysis area would be affected. Additionally, snags removed during construction would be replaced through approximately 946 acres of snag creation on the Rogue River and Umpqua national forests.

Other mitigation actions proposed for NFS lands that would benefit buffleheads include aquatic restoration and riparian planting projects, as well as road decommissioning projects. The restoration projects would improve potential nesting habitat, and the road decommissioning projects would result in decreased disturbance long-term. Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14).

The aquatic restoration projects include in-stream restoration activities that benefit water quality, bank stability and road decommissioning actions that would benefit bufflehead nesting habitat within the watershed.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,070 acres within the cumulative effects analysis area would be affected, or 6.9 percent of the total watershed area (Table 14). The proposed action could contribute to a decrease in suitable nesting cavities similar to the forestry practices that currently threaten this species. However, no known nest sites would be impacted by the Project, and snag creation would increase suitable nest sites. The Project could also increase human disturbance similar to the effects of recreation that are believed to be contributing to its continued low population numbers in Oregon. However, disturbance from construction would be short-term, and would be mitigated through road decommissioning. Additionally, neither the Project nor reasonably foreseeable Projects are expected to impact breeding buffleheads. Therefore, cumulative impacts on the bufflehead are expected to be insignificant because the combined impacts to the 6.9 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B to Appendix I of the POD), the Erosion Control and Revegetation Plan (Appendix I of the POD), and the Spill Prevention, Containment, and Countermeasures Plan

(Appendix X of the POD). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of FERC's BA).

Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the bufflehead are described above under cumulative effects. Projects within the Rogue River and Umpqua national forests that would benefit the species include the repair of stream crossings, riparian plantings and in-stream placement of woody debris that would provide nesting cover and improve stream integrity.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for bufflehead because no breeding locations would be impacted by the Project, and of available non-breeding habitat within the analysis area, less than 0.3 percent would be impacted by the Project.

6.2.2.6 Upland Sandpiper (Bartramia longicauda)

Species Status in the Project Area

The upland sandpiper breeds within a contiguous area in the Great Plains and Great Lakes regions of the U.S. and Canada, as well as some locations in Alaska, the Yukon Territory, and a small relict population in Oregon and Idaho. Upland sandpipers winter in South America (Houston and Bowen 2001). This species has been documented in Klamath County, and is a rare breeder in large montane meadows within forests of eastern Oregon. Upland sandpipers are almost never observed away from the breeding grounds in Oregon (Marshall et al. 2006). As shown in Table 1, the species is suspected to occur in the Winema National Forest; it has not been documented and is not suspected to occur in the Rogue River nor the Umpqua National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the upland sandpiper within 3 miles of the Project on NFS lands. No upland sandpipers have been recorded on BBS routes within 50 miles of the Project in BCR 5 or BCR 9 during the past 20 years (Sauer et al. 2014).

The upland sandpiper is an obligate grassland species often found in native prairie (Vickery et al. 1999). In Oregon, this sandpiper is found in large montane meadows at 3,400-5,060 feet elevation, generally surrounded by lodgepole and sometimes ponderosa pine forest. Upland sandpipers mostly eat small invertebrates, especially insects, but a small percentage of their diet consists of weed seeds (Houston and Bowen 2001, Stern 2003). Foraging habitat consists of vegetation shorter than 2.5 inches (Stern 2003). Nesting takes place in 6 to 12-inch tall vegetation that provides concealment cover (Kirsch and Higgins 1976). In Oregon, birds appear on breeding grounds during the first week of May, egg-laying occurs from mid-May until mid-June, and fledging takes place from mid-July until mid-August.

Initial declines in upland sandpiper populations were caused by hunting in the late 1800s. The species' continued decline has been linked to conversion of prairie habitat to agriculture and rangeland, encroachment of pine onto meadows, and the use of herbicides that reduce forb cover in nesting habitats (Stern 2003). Because of their low population numbers, statistically reliable population trends are difficult to calculate, but the population trend in the western region shows an increase of 1.37 percent annually between 2005 and 2015 (Sauer et al. 2017).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes suitable habitat within 3,200 feet of the proposed action within the Winema National Forest. Table 24 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 24. Upland Sandpiper Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed1/	Total Acres Modified1/	Total Acres in Analysis Area2/	Percentage Impacted
Eastside Grasslands3	Closely Associated	Feeds and Breeds	1.20	0.14	17	8.08%
Herbaceous Wetlands	Generally Associated	Feeds and Breeds	0.00	0.00	21	0.00%
Total			**1.20**	**0.14**	**38**	**3.58%**

1/ Totals taken from Table 7 for the Winema National Forest in which the species is suspected to occur.

2/ Totals taken from Table 3 for the Winema National Forest in which the species is suspected to occur; does not include habitat located in the Rogue River and Umpqua national forests or on other federal or non-federal lands.3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

While this table represents impacts to general habitats that the upland sandpiper may use that would be impacted by the Project, areas of known use by upland sandpiper would not be impacted by the Project. Specifically, the closest known breeding location, Sycan Marsh, is approximately 50 miles from the Project. Additionally, ODFW maps the closest potential habitat for the upland sandpiper approximately 40 miles northeast of the Project, in the vicinity of Sycan Marsh (INR 2011).

If upland sandpipers were to occur near the Project, we assume that they would be non-breeders, and they could be disturbed by pipeline construction that could render habitats temporarily unsuitable. However, because upland sandpipers are a mobile species, they should be able to move away from Project construction activities.

Cumulative Effects

Native grasslands are one of the most imperiled habitats in the western U.S., including Oregon, due to conversion to agriculture, development, invasion by non-native plant species, and fire suppression (Vickery et al. 1999). In the Coast Range and West Cascades of Oregon, grassland loss since historical times is estimated at 99 percent (ODFW 2006). Sustainable grazing practices help maintain existing grasslands. Allotment management plans within national forests control the number of cattle and available forage, thus minimizing the degradation of suitable upland sandpiper habitat.

The upland sandpiper cumulative effects analysis area includes the only fifth field watershed crossed by the Project on the Winema National Forests: Spencer Creek (Table 14). Overall, construction of the Project and associated facilities would affect 231 acres within the Spencer Creek watershed, or 0.4 percent of the watershed. Other than these minor potential habitat effects, potential impacts to upland sandpipers are expected to be limited to disturbance of nonbreeding individuals as no known breeding sites have been documented within 3 miles of the Project. No mitigation projects that would benefit upland sandpiper habitat on the Winema National Forest directly, although restoration of grassland areas following construction could benefit the upland sandpiper through habitat creation and/or restoration if the species is present. Mitigation actions on NFS lands would affect 114 acres within the cumulative effects analysis area, or 0.2 percent of the total watershed area (Table 14).

The proposed Project, including mitigation actions, would affect approximately 345 acres. Combined with 4,470 acres of overlapping reasonably foreseeable activities, approximately 4,815 acres within the cumulative effects analysis area would be affected, or 8.9 percent of the total watershed area (Table 14). Livestock grazing on the Winema National Forest (Table 13) could further degrade potential upland sandpiper habitat; however, given the very limited range of the upland sandpiper in Oregon at this time, this would likely be a minimal impact. Additionally, sustainable grazing practices can actually help maintain grasslands by limiting forest succession of meadow habitats. The Project would not contribute to the conversion of prairie habitat to agriculture and rangeland, encroachment of pine onto meadows, or the use of herbicides that reduce forb cover in nesting habitats which currently threaten this species (Stern 2003). Therefore, cumulative impacts on the upland sandpiper are expected to be insignificant.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize any potential Project-related impacts include the use of native grass mixes during site restoration and habitat enhancements. These measures and other conservation measures are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B of Appendix I of the POD), the Erosion Control and Revegetation Plan (Appendix I of the POD), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD). The Blasting and Helicopter Noise Analysis and Mitigation Plan identifies measures to minimize noise disturbance if the species was present (Appendix P of the BA).

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a**

trend toward federal listing or loss of viability of the species" for upland sandpiper because of the low likelihood of encountering this species as the nearest breeding location is approximately 50 miles from the Project and this species is rarely documented outside of those areas in Oregon (Marshall et al. 2006).

6.2.2.7 White-tailed Kite (Elanus leucurus)

Species Status in the Project Area

In the 1930s, the white-tailed kite range was reduced to areas in California and was in danger of becoming extinct (Combs 2003). Recovery of this species and subsequent range expansion brought white-tailed kites into Oregon beginning in the 1970s, and they have been seen in the state every year since 1972. They are now found year-round along the west coast from southwest Washington into Baja, Mexico, in the central valley of California, large areas of Mexico, southwest Texas, and at scattered locations in Florida (Dunk 1995). White-tailed kites in Oregon breed rarely, in the Willamette, Umpqua, Rogue, Illinois, and Applegate Valleys, and along the coast. Along the counties crossed by the pipeline route, they are confirmed in Douglas, north of the proposed right-of-way, in Jackson along the right-of-way, and they are probable in Coos County along the coast (Combs 2003). As shown in Table 1, the species is suspected to occur in the Rogue River National Forest; it has not been documented and is not suspected to occur in the Winema nor the Umpqua National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the white-tailed kite within 3 miles of the Project on NFS lands. No white-tailed kites have been recorded on BBS routes within 50 miles of the Project in BCR 5 during the past 20 years but have been recorded on routes in BCR 9 during the past 20 years (Pardieck et al. 2017).

Nesting occurs in trees near fields and agricultural areas. During the nonbreeding season, kites typically occupy uncultivated open lowlands, prairie, and coastal estuaries and dunes (Combs 2003). Reported winter roost sites include dense second-growth spruce-hemlock stands, the ecotone between wetlands and uplands, abandoned orchards, and marshes (Combs 2003). Preferred foraging habitat is ungrazed grasslands, grassy wetlands, and fencerows (Dunk 1995). Habitat degradation is a significant threat to white-tailed kite populations, especially loss of nesting trees and suitable foraging habitat (Dunk 1995). The extent of their sensitivity to disturbance is unknown. The white-tailed kite has a close association with agriculture and pastureland, especially at ecotones. In the western region, populations have declined 2.47 percent annually between 2005 and 2015 (Sauer et al. 2017).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes suitable habitat within 3,200 feet of the proposed action within the Rogue River National Forest. Table 25 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 25. White-tailed Kite Habitat Associations						
Habitat Type	**Association**	**Activities**	**Total Acres Removed**[1/]	**Total Acres Modified**[1/]	**Total Acres in Analysis Area**[2/]	**Percentage Impacted**
Westside Grasslands[3]	Generally Associated	Feeds and Breeds	2.53	0.33	11	25.99%
Coastal Dunes and Beaches	Generally Associated	Feeds	0.00	0.00	16	0.00%
Agriculture, Pastures, and Mixed Environs	Closely Associated	Feeds and Breeds	0.00	0.00	0.00	0.00%
Total			**2.53**	**0.33**	**27**	**10.59%**

1/ Totals taken from Table 7 for the Rogue River National Forest in which the species is suspected to occur.

2/ Totals taken from Table 3 for the Rogue River National Forest in which the species is suspected to occur; does not include habitat located on other federal or non-federal lands.

3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Pipeline construction could negatively impact white-tailed kites by disturbing nesting, incubating, roosting, or wintering birds. Western Oregon is at the northern periphery of this species' range, and these birds are rare to very rare breeders in Oregon, but the highest concentration of known nest locations in the state is near Medford in Jackson County. During winter they are uncommon to locally common. Disturbance at nest sites could cause adults to abandon eggs or chicks. Disturbance during winter could lead to increased utilization of bodily energy reserves, which are necessary to survive during cold weather and when prey is scarce. Right-of-way-clearing could also alter habitat by removing roost trees.

Cumulative Effects

The white-tailed kite cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River National Forest (Table 14). The removal of habitat characteristics such as roost trees could be detrimental. The proposed Project could remove roost trees if they occur within the construction area; however, the primary habitat type used by this species is agriculture and pastureland, which would not be affected on the Rogue River National Forest. As a result, this is not expected to have a significant effect on population-level viability. Grassland habitats have experienced drastic declines in western Oregon (losses estimated to be 99 percent in the Coast Range and West Cascades), but more modern management practices, including sustainable grazing models, removal of encroaching trees, and replanting with native grassland species, are attempting to arrest this reduction (ODFW 2006).

Construction of the pipeline and associated facilities would affect 722 acres within the cumulative effects analysis area, or 0.2 percent of the total watershed area (Table 14). Approximately 479 acres disturbed during pipeline construction would be revegetated following construction, and be allowed to return to its pre-construction condition outside of the 30-foot maintenance corridor (excluding Matrix lands). Removal of potential nest sites could occur, although no known sites have been documented within the Project ROW.

Mitigation actions on NFS lands would affect 2,293 acres within the cumulative effects analysis area, or 0.6 percent of the total watershed area (Table 14). Other planned projects within the cumulative effects analysis area include livestock grazing and a variety of forest management projects (Table 13). Grazing would likely maintain open areas on the Rogue River National Forest that could be used for foraging by white-tailed kites.

The proposed Project, including mitigation actions, would affect approximately 3,015 acres. Combined with 8,711 acres of overlapping reasonably foreseeable activities, approximately 11,726 acres within the cumulative effects analysis area would be affected, or 3.0 percent of the total watershed area (Table 14). The proposed action as well as the actions described above could contribute to habitat loss and human disturbance. However, these effects would be avoided, minimized and otherwise mitigated as described above. Additionally, only approximately 3.0 percent of the cumulative effects analysis area would be affected by the proposed Project and other planned projects. Therefore, cumulative impacts on the white-tailed kite are expected to be insignificant.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts include revegetating the understory with grasses and shrubs and restoring wetlands (see Appendix I of the POD). Noise disturbance from blasting would be minimized with the use of blast mats or other devices. Timber removal would be avoided within 0.25 miles of an NSO activity center between March 1 and September 30, and all timber would be removed outside of the core migratory bird breeding season (April 1–July 15), which would ensure no active white-tailed kite nests would be removed. Pipeline construction, including blasting and helicopter activity, would occur after the NSO critical breeding period (March 1–July 15) within 0.25 miles of an NSO activity center. These seasonal restrictions would benefit any nesting white-tailed kite in those areas. Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the white-tailed kits are also described above under cumulative effects.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for white-tailed kite because of the low likelihood of encountering this species and the small amount of potential habitat being affected, including no habitat with which this species is closely associated.

6.2.2.8 Bald Eagle (Haliaeetus leucocephalus)

Species Status in the Project Area

Bald eagles occur throughout the state and nest in 32 of 36 Oregon counties including the countries crossed by the Project. As shown in Table 1, the species has been documented in all three national forests crossed by the Project. One bald eagle nest has been observed within 1 mile of the Project in the Rogue River National Forest and two bald eagle nests occur within approximately 1 mile of the Project in the Winema National Forest. No observations of the bald eagle have been documented within 3 miles of the Project in the Umpqua National Forest.

Bald eagles primarily nest in forested areas near the ocean, along rivers, and at estuaries, lakes, and reservoirs (Table 26; Johnson and O'Neil 2001). Consequently, shoreline is an important component of nesting habitat; 84 percent of Oregon nests were within 1 mile of water (Isaacs and Anthony 2001). Nest building and repair occur any time of year, but are most often observed from February-June (Isaacs and Anthony 2001). The usual clutch size is two. Eggs are incubated by both parents for 35-46 days. Young are usually flying at about 3 months of age (Csuti et al. 2001). Eagles consume a variety of prey that varies by location and season. Fish, carrion, birds, and mammals are among the most common prey.

Although delisted, the bald eagle remains protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) that prohibits "take" of bald and golden eagles, which includes disturbance. Oregon has over 550 breeding pairs which ranks seventh highest in the continental U.S. (Isaacs and Anthony 2011). Of the current threats to the bald eagle, removal of trees used for nesting or roosting or disturbance-related impacts during construction are relevant to the Project. Contaminants have been implicated in reduced productivity of nesting pairs on the Columbia River downstream of Portland (Anthony et al. 1993, Buck 1999). BBS data (Sauer et al. 2017) indicate increasing trends for bald eagle populations in BCR 5 (3.06 percent annually) and BCR 9 (7.78 percent annually).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable bald eagle habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 26 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 26. Bald Eagle Habitat Associations						
Habitat Type	**Association**	**Activities**	**Total Acres Removed1/**	**Total Acres Modified1/**	**Total Acres in Analysis Area2/**	**Percentage Impacted**
Westside-Lowlands Conifer-Hardwood Forest	Generally Associated	Reproduces	0.00	0.00	0	0.00%
Montane Mixed Conifer Forest	Generally Associated	Reproduces	75.31	26.38	1,766	5.76%
Southwest Oregon Mixed Conifer-Hardwood Forest	Generally Associated	Reproduces	318.28	94.99	14,704	2.81%
Ponderosa Pine Forest and Woodlands	Generally Associated	Reproduces	0.00	0.00	821	0.00%
Westside Oak and Dry Douglas-fir Forest and Woodlands	Generally Associated	Reproduces	0.00	0.00	0	0.00%
Herbaceous Wetlands	Generally Associated	Feeds	0.01	0.00	21	0.03%
Westside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.41	0.00	1	32.88%
Eastside Riparian-Wetlands	Generally Associated	Feeds and Breeds	0.00	0.00	205	0.00%
Agriculture, Pastures and Mixed Environs	Generally Associated	Feeds	0.00	0.00	0	0.00%
Developed-Urban and Mixed Environs	Generally Associated	Feeds and Breeds	27.72	0.00	32	87.20%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.50	0.09	207	0.29%
Bays and Estuaries	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Total			**422.23**	**121.46**	**17,758**	**3.06%**

1/ Totals taken from Table 7 for all three national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

This table represents impacts to general habitats that bald eagles may use that would be impacted by the Project; however, areas of known use by bald eagles would not be impacted by the Project. Specifically, the closest known bald eagle nests on NFS lands is approximately 0.5 mile from the Project. Of potential habitat within the analysis area, about 3 percent would be impacted by the Project. While some inactive or potential nest trees could be removed, this represents a small portion of available habitat within the analysis area.

Aerial surveys for bald eagles would be conducted within 0.5 miles of the ROW and other areas subject to ground disturbances during spring prior to timber clearing or pipeline construction. Any occupied nests observed would be subject to spatial and temporal buffers; no surface disturbance would be performed within 0.25 mile of an occupied bald eagle nest from January 1 to August 31 (Table 6).

If nonbreeding bald eagles were to occur near the Project, they could be disturbed by pipeline construction that could render habitats temporarily unsuitable. However, they should be able to move away from Project construction activities to nearby suitable habitat.

Cumulative Effects

The bald eagle cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 14). Threats to bald eagles include habitat loss and human disturbance. The proposed Project could contribute to these threats, although disturbance to breeding individuals and removal of known nest sites are not anticipated.

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Approximately 479 acres disturbed during pipeline construction would be revegetated following construction, and be allowed to return to its pre-construction condition outside of the 30-foot maintenance corridor (excluding Matrix lands). Removal of potential nest sites could occur, although no known sites have been documented within the Project ROW. Additionally, any potential nest sites removed during construction would be replaced through 946 acres of snag creation.

Mitigation actions proposed for NFS lands that affect resources used by the bald eagle include road closure, fuels reduction, reallocation of matrix to LSR, riparian vegetation planting, and snag creation projects. Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14). Potential negative impacts include disturbance during implementation of these projects, such as during fuels reduction projects. However, these projects would overall benefit bald eagles through habitat improvements and a reduction in disturbance over the long term. Road closures would reduce disturbance to individuals if present; fuels reduction projects would result in a reduction of potential habitat loss through fire; and planting of riparian vegetation would improve habitat quality for bald eagles at these sites.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). Projects could potentially remove potential nesting habitat, although this would be unlikely as any silvicultural treatments conducted by the Forest Service would likely leave any large trees that eagles would potentially use. Projects on NFS lands would comply with the Bald and Golden Eagle Protection Act which would include avoiding disturbance of breeding eagles.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately

50,070 acres within the cumulative effects analysis area would be affected, or 6.9 percent of the total watershed area (Table 14). The proposed action as well as the actions described above could contribute to habitat loss and human disturbance which have been identified as threats to bald eagles. However, these effects would be avoided, minimized and otherwise mitigated as described above. Additionally, only approximately 6.9 percent of the cumulative effects analysis area would be affected by the proposed Project and other planned projects. Therefore, cumulative impacts on the bald eagle are expected to be insignificant.

Conservation Measures and Mitigation

Pacific Connector would avoid known nests, thereby eliminating potential impact. Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts are identified in the Blasting and Helicopter Noise Analysis and Mitigation Plan, which identifies measures to minimize noise disturbance (Appendix P of the BA).

Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit bald eagles are described above under cumulative effects. Projects within the Rogue River, Winema and Umpqua national forests that would benefit the species include road closure and decommissioning, fuels reduction plantings, riparian planting, and repair of stream crossings.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for bald eagle because of its increasing population and because of the low likelihood of encountering this species as known nests will be avoided and about 3 percent of potential habitat in the analysis area would be impacted by the Project.

6.2.2.9 American Peregrine Falcon (Falco peregrinus anatum)

Species Status in the Project Area

Peregrine falcons breed on every continent except Antarctica (Henny and Pagel 2003). Distribution is increasing rapidly, and in North America the American peregrine falcon is found locally across most of the continent (White et al. 2002). In Oregon, species presence has been confirmed in the southern Cascade Mountains, the Coast Range in southwest Oregon, and in the Wallowa Mountains in the northeast corner of the state (Henny and Pagel 2003). As shown in Table 1, the species has been documented in all three national forests crossed by the Project. The peregrine falcon has been observed once within 1 mile of the Project in the Umpqua National Forest; there have been no documented observations of the peregrine falcon within 3 miles of the Project in the Winema or Rogue River national forests.

Global use of pesticides, especially DDT, from the late 1940s to early 1970s, reduced eggshell thickness among peregrine falcons, causing massive population declines. With the ban of DDT in 1972 in the United States and federal protection of remnant populations under the ESA, the peregrine falcon population began increasing in the late 1970s. The American peregrine falcon was de-listed in 1999 (64 FR 46541).

Habitat preferences for this species are very diverse. They use or pass through all terrestrial ecosystems and nearby waters, making generalizations about habitat use difficult. The species is generally associated with woodlands, grassland and aquatic systems (Table 27; Johnson and O'Neil 2001, Henny and Pagel 2003). In some circumstances, individuals have adapted well to urban environments, using buildings and bridges as nest structures and preying on feral pigeons. A common feature of nesting habitat is cliffs, although peregrines also use nests constructed by other raptor species (Henny and Pagel 2003). Prey species are also extremely diverse, and include birds, mammals, reptiles, insects, and fish, and ranging in size from mayflies to mountain beavers (Henny and Pagel 2003).

In 1998, there were at least 3,400 breeding American peregrine falcon individuals range wide, and their short-term trend indicates that the global population as stable to increasing (NatureServe 2013). Primary threats to American peregrine falcons are habitat loss, human disturbance, illegal take, and environmental contaminants (NatureServe 2013). Although DDT, the pesticide responsible for the initial decline in American peregrine falcon populations in the 1940s, has been outlawed in the U.S. since 1972, eggshell thickness of this species is still affected by environmental contaminants (Steidl et al. 1991, Court 1993), which is possibly due to the pesticide's continued use in Latin America where the birds winter (NatureServe 2013). BBS data (Sauer et al. 2017) indicate significant increasing trends for peregrine falcon populations in BCR 5 (9.13 percent annually) and BCR 9 (9.05 percent annually).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable American peregrine falcon habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 27 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 27. American Peregrine Falcon Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed1/	Total Acres Modified1/	Total Acres in Analysis Area2/	Percentage Impacted
Westside Lowlands Conifer-Hardwood Forest	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Montane Mixed Conifer Forest	Generally Associated	Feeds and Breeds	75.31	26.38	1,766	5.76%
Southwest Oregon Mixed Conifer-Hardwood Forest	Generally Associated	Feeds and Breeds	318.28	94.99	14,704	2.81%

Table 27. American Peregrine Falcon Habitat Associations						
Habitat Type	Association	Activities	Total Acres Removed1/	Total Acres Modified1/	Total Acres in Analysis Area2/	Percentage Impacted
Ponderosa Pine Forest and Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	821	0.00%
Westside Oak and Dry Douglas-fir Forest and Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Western Juniper and Mountain Mahogany Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Shrub-Steppe	Generally Associated	Feeds and Breeds	7.35	0.59	52	15.40%
Westside Grasslands3	Generally Associated	Feeds	2.53	0.33	11	25.99%
Eastside Grasslands3	Generally Associated	Feeds and Breeds	1.59	0.14	18	9.80%
Herbaceous Wetlands	Generally Associated	Feeds	0.01	0.00	21	0.03%
Westside Riparian Wetlands	Generally Associated	Feeds	0.41	0.00	1	32.88%
Eastside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.00	0.00	205	0.00%
Developed-Urban and Mixed Environs	Generally Associated	Feeds and Breeds	27.72	0.00	32	87.20%
Coastal Dunes and Beaches	Generally Associated	Feeds	0.00	0.00	17	0.00%
Open Water-Lakes, Rivers, and Streams	Generally Associated	Feeds	0.50	0.09	181	0.33%
Bays and Estuaries	Generally Associated	Feeds	0.00	0.00	0	0.00%
Total			**433.70**	**122.51**	**17,829**	**3.12%**

1/ Totals taken from Table 7 for all three national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

While this table represents impacts to general habitats that peregrine falcons may use that would be impacted by the Project, areas of known use would not be impacted by the Project. The only known active nest site in the vicinity of the Project is 0.1 mile southwest of the Project on the Umpqua National Forest. The Umpqua Forest Plan includes spatial and temporal restrictions to protect peregrine falcon eyries, and prohibits disturbances within 1.5 miles of active nest sites from January 1 through July 31. Consequently, Pacific Connector has indicated they would not perform timber clearing or construction activities between MP 111.10 and MP 113.43 between January 1 and July 31 to avoid impacts to nesting peregrine falcon.

If nonbreeding peregrine falcons were to occur near the Project, they could be disturbed by pipeline construction that could render habitats temporarily unsuitable. However, they should be able to move away from Project construction activities into nearby suitable habitat and not be directly affected.

Cumulative Effects

The American peregrine falcon cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 14). Two threats to peregrine falcons are habitat loss and human disturbance. The proposed Project could contribute to these threats, although disturbance to breeding individuals and removal of known nest sites are not anticipated as the known eyrie would be avoided as described above. Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Approximately 479 acres disturbed during pipeline construction would be revegetated following construction, and be allowed to return to its pre-construction condition outside of the 30-foot maintenance corridor (excluding Matrix lands).

Other planned projects within watersheds where the proposed action crosses NFS lands include a variety of timber, fuel, grazing and biological projects (Table 13). Forest Service projects are not expected to have additional impact to peregrine falcons because eyries would be avoided. Similarly, mitigation actions proposed for Forest Service lands within the cumulative effects analysis area are not expected to affect peregrine falcons.

No potential cliff nesting habitat would be directly impacted. Additionally, the Project combined with planned projects in the cumulative effects analysis area would not contribute to illegal take or environmental contaminants which are threats to this species. Under the NWFP, LSR's and Riparian Reserves in the area are likely to improve habitat for this species over time. Therefore, cumulative impacts on the American peregrine falcon are expected to be insignificant.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize impacts to the peregrine falcon include seasonal restrictions to construction activities for helicopter use and blasting activities (Table 6). Pacific Connector has indicated they would avoid disturbances within 1.5 miles of active peregrine falcon nest sites from January 1 through July 31. As a result, they would not perform timber clearing or construction activities between MP 111.10 and MP 113.43 between January 1 and July 31 to avoid impacts to nesting peregrine falcons documented on the Umpqua National Forest.

Determination of Impact

In considering potential direct, indirect, and cumulative impacts, it is determined that the proposed action **“may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species”** for American peregrine falcon because known eyries would be avoided, and only about 3 percent of potential habitat in the analysis area would be impacted by the Project.

6.2.2.10 White-headed Woodpecker (Picoides albolarvatus)

Species Status in the Project Area

White-headed woodpeckers are found year-round in scattered areas of suitable mountainous coniferous forest from south-central British Columbia through the Cascades of Washington and Oregon, the Ochoco, Blue, and Wallowa mountains of northeastern Oregon, the Sierra Nevada and Lake Tahoe area, and scattered small locations in southern California, corresponding with the highest mountain ranges in the area. In Oregon, they are most commonly found east of the Cascades. As shown in Table 1, the species has been documented in all three national forests crossed by the Project. The white-headed woodpecker has been observed once within 1-3 miles of the Project in the Winema National Forest; there are no documented observations of the species within 3 miles of the Project in the Rogue River or the Umpqua national forests. Partners in Flight Science Committee (2013) estimates 4,000 white-headed woodpeckers in BCR 5 and 36,000 in BCR 9.

Open ponderosa pine or mixed-conifer forests dominated by ponderosa pine are the main habitats used by white-headed woodpeckers (Bull et al. 1986, Johnson and O’Neil 2001). They forage among the cones and bark of live ponderosa pines, looking for insects and seeds, with trees greater than 10 inches dbh preferred (Bull et al. 1986, Marshall 2003). Main foods taken are invertebrates, especially ants and beetles, and conifer seeds; the relative importance of these two diet components varies seasonally (Garrett et al. 1996). Nesting is in cavities excavated in snags, down trees, or logs at an average height of 8 feet (Garrett et al. 1996). Cavities excavated by other species are sometimes used (Marshall 2003). Nest excavation takes place in May, with eggs laid late May into the first half of June. Incubation is 14 days.

The major threat to this species is loss of habitat. Less than 10 percent of old-growth ponderosa pine in Oregon and Washington remains from the time of pre-European settlement, and much of what is left is too fragmented to be suitable for white-headed woodpeckers (Marshall 2003). Fire suppression has precluded natural forest thinning, including grass reduction by grazing which inhibits a fire’s ability to spread; this leads eventually to the replacement of pines with firs. The resultant increase in shrubby understory resulting from fire suppression may also increase mammalian nest predation on white-headed woodpeckers (Marshall 2003). Timber harvest on federal lands, which historically targeted large-diameter trees, also has contributed to the degradation of white-headed woodpecker habitat. In the western region, populations have increased 1.33 percent annually between 2005 and 2015 (Sauer et al. 2017).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable white-headed woodpecker habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 28 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 28. White-headed Woodpecker Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Ponderosa Pine Forests and Woodlands	Closely Associated	Feeds and Breeds	0.00	0.00	821	0.00%
Westside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.41	0.00	1	32.88%
Eastside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.00	0.00	205	0.00%
Total			**0.41**	**0.00**	**1,028**	**0.04%**

1/ Totals taken from Table 7 for all three national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

No ponderosa pine habitat would be impacted within the analysis area (Table 7). Riparian habitat within the analysis area would be impacted by the Project. The amount of riparian habitat being disturbed is minimal (less than 0.5 acre); however, this habitat type is uncommon within the analysis area and therefore the small amount of habitat affects a large percentage of that habitat type available within the analysis area. Overall, the amount of white-headed woodpecker habitat being affected by the Project is minimal compared to the habitat available within the analysis area. The minimal amount of habitat impacted coupled with the single documented occurrence within 3 miles of the Project make impacts to this species from Project construction unlikely.

If an individual were passing through the area, it could be disturbed by Project construction. However, individuals would be able to move away from disturbance into nearby suitable habitat. Project construction would last about 8 weeks at any given location and could occur at any time of the year.

Cumulative Effects

The white-headed woodpecker cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 14). While ponderosa pines are still common, the key characteristics of historical open ponderosa pine woodlands have changed dramatically, mostly due to timber clearing and fire suppression (ODFW 2006). Only an estimated seven percent of historically-structured ponderosa pine forests remain in the Klamath Mountains province, most of which are greatly reduced in patch size and connectivity (ODFW 2006). The primary threat to this species is habitat loss. Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14); however, no ponderosa pine-dominated habitat would be removed, so Project effects are expected to be minimal.

Mitigation actions proposed for NFS lands that could affect resources used by the white-headed woodpecker include fuels reduction, reallocation of matrix to LSR, riparian vegetation planting, snag creation, and LWD upland placement projects. Fuels reduction projects would clear understory vegetation historically cleared by low-intensity understory fires, and potentially reduce mammalian nest predation. Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14).

Other planned projects within watersheds where the proposed action crosses NFS lands include a variety of timber, fuel, grazing and biological projects (Table 13). Timber sales and clearcutting on NFS lands could affect this species by removing habitat and disturbing birds year-round, although disturbance is not listed as a threat to this species (Marshall 2003). Anticipated timber clearing on private lands could also result in habitat loss. The pre-commercial thinning in the national forests would most likely contribute to the long term health of the forest ecosystems, and could benefit the white-headed woodpecker if the projects were located in ponderosa pine forest. Under the NWFP, LSRs and Riparian Reserves in the area are likely to improve habitat for this species over time.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,070 acres within the cumulative effects analysis area would be affected, or 6.9 percent of the total watershed area (Table 14). The proposed action combined with the actions described above would contribute to habitat loss which is listed as the primary threat to this species (Marshall 2003). However, suitable habitat removed by the Project is expected to be minimal, and the proposed mitigation actions would compensate for this loss. Construction noise disturbance to potential habitat in the analysis area would be of short duration, lasting about 8 weeks in any location. Therefore, cumulative impacts on the white-headed woodpecker expected to be insignificant because the combined impacts to the 6.9 percent of the watershed area, including short-term disturbance effects, are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Pacific Connector would remove timber outside of the core migratory bird breeding season (April 1–July 15), thus avoiding removal of occupied white-headed woodpecker nest sites if present. Noise disturbance from blasting and helicopter activity would be minimized with use of blast mats or other devices.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for white-headed woodpecker because of the limited amount of suitable habitat the Project would affect (0.04 percent of habitat available within the analysis area), and the mobility of the species to escape disturbance.

6.2.2.11 Lewis's woodpecker (Melanerpes lewis)

Species Status in the Project Area

The Lewis's woodpecker is found in mountainous areas of the western U.S. During winter, they shift to the southern portion of their range. In Oregon, they are found in most parts of the state, especially the Cascade, Wallowa, and Blue mountains. Along the potential pipeline route, they have been documented in Coos, Douglas, Jackson, and Klamath Counties. As shown in Table 1, the species has been documented in all three national forests crossed by the Project. Neither the Forest Service nor ORBIC location database records contained observations of the Lewis's woodpecker within 3 miles of the Project on NFS lands. BBS data within 50 miles of the Project in BCR 9 indicate Lewis' woodpeckers have been increasing locally. Note that Partners in Flight Science Committee (2013) estimates 30,000 Lewis' woodpeckers in BCR 9.

Breeding habitat for Lewis's woodpecker is predominantly open Douglas-fir or oak forests, open riparian woodland dominated by cottonwood, and logged or burned pine forest (Table 29; Johnson and O'Neil 2001). Important characteristics are an open canopy, a brushy understory, dead and LWD material, perches, and abundant insects (Tobalske 1997). Nests are in tree cavities, and soft dead or dying trees are required (Vierling 1997). Species used vary and in Oregon include Oregon white oak (*Quercus garryana*), ponderosa pine, cottonwoods, and juniper (Galen 2003, Thomas et al. 1979). Eggs are laid in May and June, and incubation lasts 12 to 16 days (Tobalske 1997). Lewis's woodpeckers are opportunistic feeders, consuming largely insects during the spring and summer, and acorns and ripe fruits during fall and winter (Galen 2003). Typical winter habitat is oak woodlands and commercial orchards, and birds depend on acorn crops during this time of year (Vierling 1997).

In Oregon, the species was once considered abundant but populations have declined 0.83 percent annually between 2005 and 2015 (Sauer et al. 2017). Lewis's woodpeckers are declining throughout their range, probably due to loss of suitable lowland oak habitat and loss of snags for nesting; only 2 to 8 percent of open ponderosa pine stands remain in eastern Oregon compared to presettlement conditions (Tobalske 1997). Another factor contributing to habitat degradation is timber clearing practices and fire suppression which result in denser forest types (Tobalske 1997). Other factors are competition for nest holes with European starlings (*Sterna vulgaris*) and pesticide application.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable Lewis's woodpecker habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 29 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 29. Lewis' Woodpecker Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Southwest Oregon Mixed Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	318.28	94.99	14,704	2.81%
Ponderosa Pine Forests and Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	821	0.00%
Westside Oak and Dry Douglas-fir Forest and Woodlands	Closely Associated	Feeds	0.00	0.00	0	0.00%
Westside Grasslands[3/]	Generally Associated	Feeds and Breeds	2.53	0.33	11	25.99%
Eastside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.00	0.00	205	0.00%
Agriculture, Pastures, and Mixed Environs	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Total			**320.82**	**95.32**	**15,741**	**2.64%**

1/ Totals taken from Table 7 for all three national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Of potential habitat available within the analysis area, approximately 2.6 percent would be impacted by the Project; 1.45 percent of snags present within the analysis area would be impacted by the Project (Appendix D). Project construction could potentially disturb breeding birds. During construction, adults would be able to temporarily relocate in order to avoid direct impacts, but incubating adults could be induced to abandon an active nest, leaving eggs or chicks vulnerable to predation and the elements. Chicks could also be killed directly if the tree or snag containing their nest is felled while occupied. However, because Lewis's woodpecker is most closely associated with westside oak woodlands, and this habitat does not exist in the area impacted by the Project, direct impacts are expected to be minimal (Table 7). An indirect effect of Project activities could be disturbance to wintering birds, possibly lowering their fitness at a colder time of year. ROW clearing and pipeline construction could also modify habitat, for example by removing snags, altering tree species composition in forests, and changing the seral stage of the habitat.

Project impacts would contribute to existing threats by removing snags (albeit not in the most suitable breeding habitat for Lewis's woodpecker), and using some pesticide application if required by the Forest Service. However, pesticide application would be limited, if employed at all, and would be used in accordance with Pacific Connector's Integrated Pest Management Plan that was developed in coordination with the Forest Service.

Cumulative Effects

The Lewis' woodpecker cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 14). While ponderosa pines are still common, the key characteristics of historical open ponderosa pine woodlands have changed dramatically, mostly due to timber clearing and fire suppression (ODFW 2006). Only an estimated seven percent of historically-structured ponderosa pine forests remain in the Klamath Mountains province, most of which are greatly reduced in patch size and connectivity (ODFW 2006).

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Approximately 479 acres disturbed during pipeline construction would be revegetated following construction, and be allowed to return to its pre-construction condition outside of the 30-foot maintenance corridor (excluding Matrix lands), 86 percent of which is currently forested. The Project would contribute to the habitat loss and modification that has caused Lewis' woodpecker numbers to decline, and could also disturb breeding individuals if present. However, as described above, these impacts would be minimal because very little oak and pine habitat would be impacted by the Project.

Mitigation actions proposed for NFS lands that could affect resources used by the Lewis' woodpecker include fuels reduction, reallocation of matrix to LSR, riparian vegetation planting, snag creation, and LWD upland placement projects. Potential negative impacts of these mitigation actions include fuels reduction projects that would clear the thick understory required by Lewis' woodpeckers. However, fuels reduction projects would also reduce habitat loss from stand-replacing fires. Snag creation as well as upland LWD placement could result in an increase in available nesting cavities. Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14).

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). The pre-commercial thinning projects in the national forests would most likely contribute to the long-term health of the forest ecosystems. However, the anticipated clear cutting on private lands would result in habitat loss from tree removal, especially because the forests that regenerate tend to be denser and thus less suitable for Lewis's woodpeckers. Under the NWFP, LSRs and Riparian Reserves in the area are likely to improve habitat for this species over time.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,070 acres within the cumulative effects analysis area would be affected, or 6.9 percent of the total watershed area (Table 14). The proposed action combined with the actions described above would contribute to habitat loss. However, suitable habitat removed by the Project is expected to be minimal, and the proposed mitigation actions would compensate for this loss. Construction noise disturbance to potential habitat in the analysis area would be of short duration, lasting about 8 weeks in any location. Therefore, cumulative impacts on the Lewis's woodpecker expected to be insignificant because the combined impacts to the 6.9 percent of the watershed area, including short-term disturbance effects, are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Amendments to the NWFP discuss specific mitigation measures that would help minimize impacts to Lewis's woodpecker and include planting of trees and creation of snags. Noise disturbance from blasting and helicopter activity would be minimized with use of blast mats or other devices. Timber removal would be avoided within 0.25 miles of an NSO activity center between March 1 and September 30, and all timber would be removed outside of the core migratory bird breeding season (April 1–July 15). Pipeline construction, including blasting and helicopter activity, would occur after the NSO critical breeding period (March 1–July 15) within 0.25 miles of an NSO activity center. These seasonal restrictions would benefit cavity nesting species.

Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit Lewis's woodpecker are described above under cumulative effects. In the Umpqua and Rogue River national forests, snag creation would be implemented across 946 acres of land. Snags would be created in LSR and matrix lands by blasting the tops off live trees or inoculating trees with heart rot decay fungi. Increased snags densities would provide cavity nesters with more nesting and foraging opportunities.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Lewis's woodpecker because primary breeding habitats, including oak woodlands, would not be impacted by the Project, 2.6 percent of habitat available within the analysis area would be impacted by the Project, and only 1.45 percent of snags present within the analysis area would be impacted by the Project.

6.2.2.12 Purple Martin (Progne subis arboricola)

Species Status in the Project Area

The breeding range of the purple martin extends east of the Rocky Mountains to the coast, and also along the Pacific Northwest coast and in parts of the southwestern U.S. They winter in South America. Within Oregon, the purple martin inhabits the Coast Range, Willamette Valley, and numerous colonies along the Columbia River (Marshall et al. 2003). As shown in Table 1, the species is suspected to occur in all three national forests crossed by the Project (Table 1). Neither the Forest Service nor ORBIC location database records contained observations of the purple martin within 3 miles of the Project on NFS lands. Partners in Flight Science Committee (2013) estimates 18,000 purple martin in BCR 5, and 50 in BCR 9.

The timing of spring migration for western populations is uncertain; however, they likely begin arriving in Oregon around March and April and continue to arrive until sometime in June (Rosenberg et al. 1991, Gilligan et al. 1994, Marshall et al. 2003). Historically, martins nested primarily within snags in a variety of forested woodland types and are closely associated with water (Table 30; Johnson and O'Neil 2001, Marshall et al. 2003). Due to a reduction in natural cavities and competition with non-native species currently only 5 percent of martins in Oregon nest in non-man-made structures (Horvath 1999). Breeding groups within Oregon vary from solitary nesting pairs to colonial nesting pairs inhabiting a single snag or martin box. They have been found to nest in snags, old pilings, nest-boxes, gourds set on poles within fields, and crevices in man-made structures (Marshall et al. 2003). Nest building occurs from May through July, and fledging occurs in July or August. Purple martins forage over open areas such as rivers, lakes, marshes, and fields. Fall migration typically occurs after fledging, with the last martin leaving Oregon about mid-September (Marshall et al. 2003).

Current population sizes within Oregon are unknown; however, a study conducted by the ODFW in 1998 found 784 purple martin pairs distributed within known colony locations (Horvath 1999). In Oregon, populations have increased 4.61 percent annually between 2005 and 2015 (Sauer et al. 2017). Current threats to the purple martin include activities that increase European starling and house sparrow populations, as these species compete with purple martins for nest cavities.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable purple martin habitat within 3,200 feet of the proposed action in the three national forests crossed by the Project. Table 30 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 30. Purple Martin Habitat Associations						
Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside-Lowland Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Southwest Oregon Mixed Conifer-Hardwood Forest	Generally Associated	Feeds and Breeds	318.28	94.99	14,704	2.81%
Westside Oak and Dry Douglas-fir Forests And Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Herbaceous Wetlands	Generally Associated	Feeds	0.01	0.00	21	0.03%
Westside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.41	0.00	1	32.88%
Developed-Urban and Mixed Environs	Generally Associated	Feeds and Breeds	27.72	0.00	32	87.20%
Coastal Dunes and Beaches	Generally Associated	Feeds	0.00	0.00	17	0.00%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.50	0.09	181	0.33%
Bays and Estuaries	Closely Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Total			**346.92**	**95.08**	**14,956**	**2.96%**

1/ Totals taken from Table 7 for all three national forests in which the species has been suspected to occur.

2/ Totals taken from Table 3 for all three national forests in which the species has been suspected to occur; does not include habitat located on other federal or non-federal lands.

Pipeline construction could negatively impact this species by reducing the availability of nesting habitat by removing snags, or by directly destroying nests. The Project would remove 1.45 percent of snags available within the analysis area. Of potential habitat within the analysis area, about 3 percent would be impacted by Project construction. As noted above, no records of purple martins have been documented within 3 miles of the Project area. Additionally, only 5 percent of martins in Oregon nest in non-man-made structures. Given the minimal amount of habitat impacted and common use of man-made nesting sites, there is a low possibility of encountering nesting martins in the Project area.

If nonbreeding martins were present in the area of Project construction, they could be disturbed, but would likely move away into nearby suitable habitat. Project construction would take place over about 8 weeks at any given location. As shown in Figure 2, construction activities would take place during the breeding season in some areas; however, timber removal would occur outside the core migratory bird breeding season (April 1–July 15).

As noted above, European starling and house sparrow populations compete with purple martins for nest cavities. Increased edge created by the Project could assist in these nuisance species expanding their range into previously unoccupied areas.

Cumulative Effects

The purple martin cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 14). Human encroachment within national forests has increased non-native bird populations such as European starling that are adaptable to development and can out-compete purple martin for food and nest resources. However, purple martins are able to use a wide variety of habitats, especially if man-made nest structures that exclude invasive species are provided.

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Project impacts would include removal of potential nest sites as a result of snag removal, disturbance during construction, and increases in populations of non-native species that compete with purple martins as result of increased edge. However, purple martins may also benefit from the cleared ROW as they forage over clearcuts (ODFW 2014). Additionally, snag creation would compensate for potential nest sites removed during construction.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). The pre-commercial thinning and timber projects in the national forests could potentially remove snags but would most likely contribute to the long term health of the forest ecosystems. Under the NWFP, LSR's and Riparian Reserves in the area are likely to improve habitat for this species over time.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,070 acres within the cumulative effects analysis area would be affected, or 6.9 percent of the total watershed area (Table 14). The proposed action as well as the actions described above would contribute to snag removal and increased competition from European starlings, which are the primary threats to this species (ODFW 2014). However, snags removed during construction would be replaced through 946 acres of snag creation. Therefore, cumulative impacts on the purple martin are expected to be insignificant because the combined impacts to the 6.9 percent of the watershed area are not expected to have a measurable effect on the species.

<u>Conservation Measures and Mitigation</u>

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts include ensuring that all construction contractors practice appropriate and responsible trash disposal every day in order to avoid attracting species such as the European starling, and creation of snags in large trees strategically left on the edge of the construction ROW by topping and/or girdling trees.

Noise disturbance from blasting and helicopter activity would be minimized with use of blast mats or other devices. Timber removal would be avoided within 0.25 miles of an NSO activity center between March 1 and September 30, and all timber would be removed outside of the core migratory bird breeding season (April 1–July 15). Pipeline construction, including blasting and helicopter activity, would occur after the NSO critical breeding period (March 1–July 15) within 0.25 miles of an NSO activity center. These seasonal restrictions would benefit cavity nesting species.

Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit purple martin are described above under cumulative effects. In the Umpqua and Rogue River national forests snag creation would be implemented across 946 acres of land. Snags would be created in LSR and matrix lands by blasting the tops off live trees or inoculating trees with heart rot decay fungi. Increased snags densities would provide cavity nesters with more nesting and foraging opportunities.

Impact Determination

In considering the potential direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for purple martin because timber felling would occur outside of the breeding season, 1.45 percent of snags available within the analysis area would be removed by the Project, and of potential habitat within the analysis area, about 3 percent would be impacted by Project construction.

6.2.2.13 Tricolored Blackbird (Agelaius tricolor)

Species Status in the Project Area

More than 99 percent of the restricted range of this blackbird is in California. In Oregon, there are scattered, intermittent breeding colonies, most consistently in Klamath and Jackson Counties, but also in Lake, Crook, and Umatilla Counties (Spencer 2003c). As shown in Table 1, the species has been documented in the Winema National Forest and is suspected to occur on the Rogue River National Forest; it has not been documented and is not suspected to occur in the Umpqua National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the tricolored blackbird 3 miles of the Project on NFS lands. Partners in Flight Science Committee (2013) has not estimated the tricolored blackbird population in BCR 9.

Nesting colonies are established in freshwater marshes dominated by cattails or hardstem bulrush, nettles, thistles, willows (Table 31; Johnson and O'Neil 2001). Himalayan blackberries, and other substrates are also used (Beedy and Hamilton 1999, Spencer 2003c). Colonies can be huge and include up to 100,000 nests, with nests only a foot apart from each other (Beedy and Hamilton 1999, Spencer 2003c). Males arrive and begin defending territories in late February. Eggs are laid mid-March through early April, hatching occurs in June and July, and breeding colonies are usually abandoned by mid-August (Beedy and Hamilton 1999). Important foraging habitats are dairies, feedlots, irrigated pastures, lightly grazed rangelands, dry seasonal pools, and mowed alfalfa fields (Beedy and Hamilton 1997). Tricolored blackbirds will follow and consume any locally abundant insect resource including grasshoppers, and also take grains, snails, and small clams (Beedy and Hamilton 1999).

Adults in California numbered at least 162,000 in 2000, and there are 3,000 to 4,000 estimated tricolored blackbirds in Oregon (NatureServe 2013). In western breeding bird survey region, populations have increased 1.51 percent annually between 2005 and 2015; however, these estimates have a high degree of uncertainty (Sauer et al. 2017). Threats to the species include conversion of nesting habitat to agriculture, predation and destruction of nesting colonies during agricultural activities and wetland dewatering (Churchwell et al. 2005).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable tricolored blackbird habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 31 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 31. Tricolored Blackbird Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed 1/	Total Acres Modified 1/	Total Acres in Analysis Area 2/	Percentage Impacted
Herbaceous Wetlands	Closely Associated	Feeds and Breeds	0.00	0.00	21	0.00%
Agriculture, Pastures, and Mixed Environs	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Total			**0.00**	**0.00**	**21**	**0.00%**

1/ Totals taken from Table 7 for the Rogue River and Winema national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for the Rogue River and Winema national forests in which the species has been documented to occur; does not include habitat located in the Umpqua National Forest or on other federal or non-federal lands.

The closest documented occurrence of this species is 1 mile from the Project area, outside of NFS lands. Additionally, zero acres of wetland are expected to be impacted by the Project within the analysis area. Given the large colonial nesting habits of this species, and the lack of documented occurrence and lack of habitat impacted, breeding birds are not expected to be impacted by the Project.

Pipeline construction could affect nonbreeding tricolored blackbirds if they are in the area by disturbing birds. We assume that birds would be able to move away from the disturbance into nearby suitable habitat without significant effects.

Cumulative Effects

The tricolored blackbird cumulative effects analysis area includes the fifth-field watersheds crossed by the Project on the Winema and Rogue River national forests (Table 14). The quality and quantity of tricolored blackbird habitat has been reduced with fire, agricultural development, and pesticide application (Spencer 2003c). Although one-third of Oregon wetlands, the main type of habitat used by tricolored blackbirds, are estimated to have been lost since the late 1700s, wetlands are now protected under federal law, and loss of estuarine wetlands has slowed substantially since the mid-1900s (ODSL and OPRD 1989, Dahl 1990). The NWFP protects wetlands through land use allocations and directed management techniques; this should improve the quantity and quality of tricolored blackbird habitat in the future.

Construction of the pipeline and associated facilities would affect 953 acres within the cumulative effects analysis area, or 0.2 percent of the total watershed area (Table 14). As noted above, very little tricolored blackbird habitat would be impact, and no known breeding sites would be impacted. Mitigation actions proposed for NFS lands are not expected to affect tricolored blackbirds. Noxious weed treatments could potentially affect tricolored blackbirds as Himalayan blackberries can be used as nests; however, herbicides would not be used in or within 100 feet of waterbodies, which is where nesting occurs, so no effects are anticipated. Other planned projects within the cumulative effects analysis area are not expected to impact wetlands, and thus are unlikely to have negative impacts on tricolored blackbirds. Lightly grazed rangelands are an important foraging habitat (Beedy and Hamilton 1997); the proposed grazing projects within the cumulative effects analysis area could benefit tricolored blackbirds by providing such habitat (Table 13).

The proposed action as well as other planned projects are not expected to contribute to conversion of nesting habitat to agriculture, predation and destruction of nesting colonies during agricultural activities, and wetland dewatering, which are threats to this species (Churchwell et al. 2005). Project impacts to non-breeding individuals would be short-term, if any. Therefore, cumulative impacts on the tricolored blackbird are expected to be insignificant.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts include the restoration and protection of wetlands and the surrounding landscapes that facilitate the hydrology and function of wetlands. These measures are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B of Appendix I of the POD), the Erosion Control and Revegetation Plan (Appendix I of the POD), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of FERC's BA).

Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit tricolored blackbird are described above under cumulative effects and include road decommissioning in the Winema and Rogue River national forests. Road decommissioning would reduce erosion and fragmentation that facilitates establishment of non-native species such as European starling.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for tricolored blackbird because breeding individuals are very unlikely to be impacted and none of the species' typical habitat associations would be impacted by the Project.

6.2.3 Amphibians

Surveys were not conducted specifically for special status amphibians; however, special status species were documented if observed during other survey activities. The information on sensitive species occurrence is based on several GIS data sources including ORBIC occurrence records (ORBIC 2017), Johnson and O'Neil (2001) habitat associations, and the Forest Service NRIS database (Forest Service 2017).

6.2.3.1 Foothill Yellow-legged Frog (Rana boylii)

Species Status in the Project Area

The range of the foothill yellow-legged frog extends from the Willamette Valley to southwestern Oregon to northwestern California and down the coastal ranges and Sierra Nevada Mountains to the Los Angeles area (Fellers 2005). As shown in Table 1, the species has been documented in the Umpqua and Rogue River national forests; it has not been documented and is not suspected to occur in the Winema National Forest. The foothill yellow-legged frog has been observed twice within 1-3 miles of the Project in the Umpqua National Forest and once within 1 mile of the Project in the Rogue River National Forest. Three fifth-field watersheds crossed by the Project on NFS land contain current documented sightings of the foothill yellow-legged frog: Upper Cow Creek, Trail Creek, and Little Butte Creek (Olson and Davis 2009).

Primary habitat typically includes a variety of conifer and hardwood forest types, typically located in the western and southwestern Cascade Mountains (Table 32; Johnson and O'Neil 2001). Within these habitats the species is typically found in large, 4-5th order streams in forested riparian corridors (Olson and Davis 2009). The species stays very close to permanent streams with rocky, gravelly, or sandy bottoms (Leonard et al. 1993), though cobble-sized rocks are necessary for egg-laying (Fellers 2005). They breed from early April to early June (Leonard et al. 1993, Fellers 2005). Diets include flies, moths, hornets, ants, beetles, grasshoppers, water striders, and snails (Fellers 2005). Overwintering appears to occur within and along the edges of streams and rivers, under various loose substrates (e.g., woody debris, rocks, etc.) and in seeps along the stream margin (Rombough 2006).

In Oregon, the foothill yellow-legged frog appears to be extirpated from 55 percent of its historical range (Csuti et al. 2001). Olson and Davis (2009) identify three primary threats including, 1) stream habitat loss or alteration from water impoundments that inundate habitats or alter natural flow regimes, causing fluctuations in water levels and altering water temperatures, 2) introduced species such as smallmouth bass and bullfrogs due to predation and competition, and 3) stream habitat loss or alteration from agricultural practices including re-routing stream channels and fluctuations in water levels caused by irrigation.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes aquatic areas within the above listed habitat types, within 3,200 feet of the proposed action on the Umpqua and Rogue River national forests. Table 32 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 32. Foothill Yellow-Legged Frog Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside-Lowland Conifer-Hardwood Forests	Generally Associated	Feeds	0.00	0.00	0	0.00%
Southwest Oregon Mixed Conifer and Hardwood Forests	Generally Associated	Feeds	269.36	90.74	13,805	2.61%
Westside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.15	0.00	1	12.38%
Total			**269.51**	**90.74**	**13,806**	**2.61%**

1/ Totals taken from Table 7 for the Umpqua and Rogue River national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for the Umpqua and Rogue River national forests in which the species has been documented to occur; does not include habitat located in the Winema National Forest or on other federal or non-federal lands.

Based on these habitat associations, approximately 2.6 percent of available habitat within the analysis area would be affected by the Project.

According to Olson and Davis (2009), 113 of 177 known sites for this species (64 percent) occur on federal lands. Of these sites, 79 (70 percent of federal sites) occur within LSR, and all occur within Riparian Reserves. Within the analysis area, 15.77 acres of the forested habitat that would be removed is within Riparian Reserves in the Upper Cow Creek, Trail Creek, and Little Butte Creek watersheds (Table 8). Of the forested habitat removed, 3.78 acres would be maintained in an early seral stage within the 30-foot Project corridor (Table 9). These forested habitats include LO, MS, and CR habitats (Table 8 and 9). These areas likely represent high quality habitat as they are forested and adjacent to water, which are important habitat components for the foothill yellow-legged frog.

During construction, adults and juveniles could suffer direct mortality from trampling during water body crossings. Within the three fifth-field watersheds crossed by the Project on NFS land where foothill yellow-legged frogs are known to occur (Upper Cow Creek, Trail Creek, and Little Butte Creek), the Project would affect ten streams. Eight of these streams would be crossed using the dry open-cut methods, one ephemeral drainage is located within a TEWA but the drainage itself would be avoided by construction, and one stream is located within a TEWA, but would be crossed using an existing culvert (Appendix C). Olson and Davis (2009) recommend timing activities at foothill yellow-legged frog sites to avoid the breeding season (early April to early June) in order to maintain these local populations. Within the range of the NSO, Pacific Connector has indicated that they would remove timber outside of the entire NSO breeding season (after September 30 and before February 28), and construct outside the early breeding season (after July 15 and before February 28) within at least 0.25 miles of activity centers. As the analysis area for foothill yellow-legged frog is within the range of the NSO, these timber removal and construction restrictions would also minimize impacts to breeding foothill yellow-legged frogs. On all construction spreads, Pacific Connector would remove timber outside of the core migratory bird breeding season (April 1–July 15).

This species could also experience habitat loss and modification due to construction. Removing timber for the Project could impact the foothill yellow-legged frog even if it occurs outside the breeding season. Timber removal may contribute to elevated stream water temperatures and sedimentation of downstream reaches, which may adversely affect frogs. Loss of standing green trees reduces the future potential for down wood recruitment in streams, which function to provide complex instream habitats including slow water areas that may be preferred by frogs for breeding (Olson and Davis 2009). As new trees regenerate, their smaller sizes likely would not provide the same functions as large down wood, and larger wood may not be available for several decades to centuries. However, foothill yellow-legged frogs have been found in stream reaches with limited down wood, so the importance of large wood is uncertain across the range of the species (Olson and Davis 2009). Additionally, the Project would clear a narrow corridor across streams so LWD recruitment would still occur from upstream and downstream habitat, and the associated increases in temperature and sediment would be minimal. Sedimentation would occur during Project construction and would be a short-term impact. The two habitat-based primary threats to foothill yellow-legged frogs are related to permanent diversions or impoundments that alter natural flow regimes (Olson and Davis 2009), which differ from the Project's short-term impacts on sedimentation and potential long-term impacts on instream LWD and temperature.

Other impacts include the potential for the ROW corridor to facilitate the spread of bullfrogs, which may prey on foothill yellow-legged frog larvae, juveniles or adults, and compete with foothill yellow-legged frog larvae for algae (Kupferberg 1997, Olson and Davis 2009). Introduced species are listed as a primary threat to foothill yellow-legged frogs due to predation and competition. Although Pacific Connector has indicated in their Integrated Pest Management

Plan (Appendix N to the POD) that they would control for noxious plant species as well as forest pathogens and soil pests, they have not developed measures to prevent bullfrog invasions into waterbodies crossed by the Project. Therefore, the spread of bullfrogs to waterbodies crossed by the Project may adversely affect the foothill yellow-legged frog populations at these locations.

Cumulative Effects

The foothill yellow-legged frog cumulative effects analysis area includes the three fifth field watersheds crossed by the Project on NFS lands where this species occurs: Cow Creek, Trail Creek, and Little Butte Creek. Foothill yellow-legged frog habitat has been negatively impacted by human activities over the last 200 years. Development has tended to concentrate around bodies of water, increasing disturbance, eliminating habitat, and encouraging the spread of mesopredators where these frogs live. Wetlands have also been lost due to draining and conversion to other land uses. Though one-third of Oregon wetlands are estimated to have been lost since the late 1700s, wetlands are now protected under federal law, and loss of estuarine wetlands has slowed substantially since the mid-1900s (ODSL and OPRD 1989, Dahl 1990).

Suitable foothill yellow-legged frog habitat would be removed during construction. Construction of the pipeline and associated facilities would affect 939 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). The Project could also facilitate the spread of bullfrogs, which is listed as one of three primary threats to this species (Olson and Davis 2009). However, the Project would not contribute to the other primary threats to this species, stream habitat loss from water impoundments as well as from agricultural practices (Olson and Davis 2009).

Mitigation actions proposed for NFS lands that affect resources used by the foothill yellow-legged frog include fish passage, fuels reduction, noxious weed treatment, road storm proofing, road decommissioning, in stream LWD placement, and stream crossing repair projects. Mitigation actions on NFS lands would affect 5,522 acres within the cumulative effects analysis area, or 1.7 percent of the total watershed area (Table 14). Potential negative effects include detrimental effects from herbicide if used during noxious weed treatments; however BMPs and avoidance of waterbodies during use should limit these impacts. Sediment could be mobilized into waterbodies during fish passage, road decommissioning, and stream crossing repair projects, especially where culverts are removed or replaced; however, long term beneficial effects include reconnection of aquatic habitats, sediment reduction, and shade restoration. Fuels reduction and in-stream LWD placement projects would also benefit the foothill yellow-legged frog. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time. Fuels reduction projects would lower the risk of loss of mature stands and other valuable habitats to high-intensity fire, which can contribute substantial sediment to streams and result in flooding and erosion during post-fire precipitation events.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing, and biological projects (Table 13). The thinning and aquatic habitat restoration projects would most likely contribute to the long term health of the ecosystems, and could improve habitat conditions for the foothill yellow-legged frog. However, the clearcuts, timber sales, and livestock grazing allotments could contribute to the further loss or degradation of foothill yellow-legged frog habitat. Specifically, similarly to the Project, timber removal from clearcuts and timber sales could remove upland habitat, and degrade instream habitat by increasing sedimentation and temperature in streams and reducing LWD recruitment. Livestock grazing may result in bank erosion, degrading shorelines and increasing stream sedimentation, and thus could directly impact instream habitats for frogs (Olson and Davis 2009).

Management guidelines under the NWFP are integral to species conservation (Olson and Davis 2009). The NWFP protects wetlands and Riparian Reserves; this protection provides connectivity between subpopulation and allows dispersal, minimizes impacts from livestock use, and prohibits timber harvest (Forest Service and BLM 2001). In the Olson and Davis (2009) population analysis, of the 177 current sites at the 500-meter spatial scale, 113 sites (64 percent) occur on federal lands. Of these, 79 (70 percent of federal sites) occur within the LSR land-use allocation and 34 (30 percent) sites occur within the Matrix or Adaptive Management Area land-use allocations, where timber management is a priority. However, all 113 sites are within Riparian Reserves, and are thus protected. The species also occurs in 17 of 34 federally designated Key Watersheds which form a system of large refugia for maintaining and recovering habitat for at-risk fish species and providing high quality water (Olson and Davis 2009). Federal protection of water bodies, wetlands, and Riparian Reserves would likely increase the quantity and quality of foothill yellow-legged frog habitat in the future.

The proposed Project, including mitigation actions, would affect approximately 6,461 acres. Combined with 15,786 acres of overlapping reasonably foreseeable activities, approximately 22,247 acres within the cumulative effects analysis area would be affected, or 6.9 percent of the total watershed area (Table 14). The proposed action could facilitate the spread of bullfrogs, which is listed as a primary threat to this species. The Project is not expected to contribute stream habitat loss from water impoundments and agricultural practices, which are also listed as primary threats to this species (Olson and Davis 2009). Additionally, both the Project mitigation and the reasonably foreseeable Projects are expected to benefit the foothill yellow-legged frog. Therefore, cumulative impacts on the foothill yellow-legged frog are expected to be insignificant because the combined impacts to the 6.9 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific mitigation measures that would help minimize impacts include the containment and safe disposal of hazardous materials and pollutants as discussed in Pacific Connector's Spill Prevention, Containment, and Countermeasures Plan (see Appendix X of the POD). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings (Appendix N of FERC's BA).

Restrictions to timber removal and construction activities that avoid NSO and other migratory bird nesting periods would also reduce noise disturbances during the breeding period for this species (see Appendix X of the POD, Appendix N of FERC's BA, and Appendix P of the BA). Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the foothill yellow-legged frog are also described above under cumulative effects.

Impacts Determination

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for foothill yellow-legged frog since the proposed Project would cross only eight streams on NFS lands in watersheds occupied by this species, would affect only approximately 2.6 percent of suitable habitat within the analysis area, and would affect only about 14 acres of forested habitat within Riparian Reserves within the analysis area.

6.2.4 Reptiles

Surveys were not conducted specifically for special status reptiles; however, special status species were documented if observed during other survey activities. The information on sensitive species occurrence is based on several GIS data sources including ORBIC species occurrence records (ORBIC 2017), Johnson and O'Neil (2001) habitat associations, and the Forest Service NRIS database (Forest Service 2017), as well as personal communication with Forest Service personnel.

6.2.4.1 Western Pond Turtle (Actinemys marmorata)

Species Status in the Project Area

The Western pond turtle is found in the Puget Sound region, the Willamette Valley of Oregon, southwest Oregon, and the western half of California including the Central Valley. In Oregon, they have been found up to elevations of 3,000 feet (Storm and Leonard 1995). Western pond turtles are most common in large river basins in southern Oregon (Storm and Leonard 1995). As shown in Table 1, the species has been documented in all three national forests crossed by the Project (Table 1). The Western pond turtle has been observed 3 times within 3 miles of the Project in the Umpqua National Forest; there are no documented observations of the species within 3 miles of the Project on the Rogue River or Winema national forests

The Western pond turtle is found in a variety of woodland and grassland habitats and is associated with wetlands and other waters (Table 33; Johnson and O'Neil 2001). Within these habitats, Western pond turtles prefer permanent or intermittent mud-bottomed lakes, marshes, sloughs, and slow-moving rivers that have basking sites such as logs or rocks, which are important for thermoregulation (Storm and Leonard 1995, St. John 2002). Nests can be several hundred feet from water in a variety of vegetation types, and adults sometimes hibernate as far as 1,600 feet from water (Csuti et al. 2001). Their diet includes crayfish, insects, amphibian eggs and larvae, and aquatic plants (St. John 2002).

Numbers of Western pond turtles are apparently declining, especially in the northern part of their range. They are no longer present throughout most of the historical range. Many turtle populations were depleted in the early 1900s when they were harvested for food.

Threats include habitat alteration and fragmentation, and disease (Storm and Leonard 1995). Eggs and young are also vulnerable to increasing predation by introduced bullfrogs, fish species, and raccoons, which are drawn to some areas where pond turtles live by human activity at campsites, resorts, and other developments (St. John 2002).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable Western pond turtle habitats within 3,200 feet of the proposed action in the three national forests crossed by the Project. Table 33 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 33. Western Pond Turtle Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed 1/	Total Acres Modified1/	Total Acres in Analysis Area2/	Percentage Impacted
Southwest Oregon Mixed Conifer and Hardwood Forests	Generally Associated	Feeds and Breeds	318.28	94.99	14,704	2.81%
Ponderosa Pine Forest and Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	821	0.00%
Westside Grassland3/	Generally Associated	Feeds and Breeds	2.53	0.33	11	25.99%
Herbaceous Wetlands	Closely Associated	Feeds	0.01	0.00	21	0.03%
Westside Riparian Wetlands	Closely Associated	Feeds and Breeds	0.41	0.00	1	32.88%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.50	0.09	181	0.33%
Total			**321.74**	**95.41**	**15,740**	**2.65%**

1/ Totals taken from Table 7 for all three national forests in which the species has been documented to occur.

2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Based on these habitat associations, approximately 3 percent of available habitat within the analysis area would be affected by the Project. However, these acreages may overestimate suitable habitat as these areas are not necessarily in close enough proximity to water to be used by Western pond turtles. According to Stone (2009a), the majority of Western pond turtle populations on NFS and BLM land in Oregon and Washington occur within Riparian Reserves. Excluding altered habitat, approximately 20 acres within Riparian Reserves would be removed by the Project within the analysis area (Table 8), and approximately 5 of these acres would be maintained in an early seral stage within the 30-foot Project corridor (Table 9). These areas likely represent high quality habitat as they are adjacent to water, which is an important habitat component for Western pond turtles.

Habitat destruction, alteration, and fragmentation is listed as the single greatest threat to Western pond turtles (Stone 2009a). The Project would impact habitat as described above; however, these impacts would be minor and affect habitat only minimally compared to the activities listed by Stone (2009a) as causing habitat impacts, including conversion of wetlands to farmland, water diversions and dams, channelization, mining, timber clearing, and urbanization.

The proposed action could cause direct mortality if individuals were not able to get out of the way of construction, or if emerging juveniles, nests, or eggs were in the proposed ROW. However, only three western pond turtle sites have been documented within 3 miles of the Project on NFS lands, all of which occur on the Umpqua National Forest. These sites are 1.8 miles northeast of MP 105.24, 1.5 miles southwest of MP 109.68, and 0.2 miles southwest of MP 110.1, and include 6-20 observations of Western pond turtle at each site (Forest Service 2017, ORBIC 2017, Stone 2009a). Although western pond turtles travel across terrestrial habitat to nest and overwinter, these movements are generally limited to within 1,600 feet of water (0.3 mi; Csuti et al. 2001, Reese and Welsh 1997), so individuals traveling from the known site near MP 110.1 on the Umpqua National Forest could be impacted by the Project when attempting to nest or overwinter. Pond turtles additionally disperse over land and along waterways, but long distance movement patterns are still poorly understood (Rosenburg et al. 2009). Dispersing individuals could be present along the ROW, and be impacted by equipment or Project vehicles.

An additional analysis of western pond turtle nesting habitat was conducted at the request of ODFW per their February 12, 2015 comment on the Project’s previous DEIS (FERC 2014) that all habitats within 0.5 miles of a waterway or wetland known to contain Western pond turtles be assumed to be suitable nesting habitat if they meet certain criteria, including vegetation consisting of primarily of sparse grasses and forbs. Currently, there are no waterways or wetlands known to contain Western pond turtles within 3 miles of the Project on the Winema National Forest nor on the Rogue River National Forest, but there are sites on the Umpqua National Forest as discussed above (Yamamoto 2015a, Forest Service 2017, ORBIC 2017). Two of the occurrences are of turtles in ponds surrounded by forest: one in McGill Pond (aka Sands Pond) most recently observed in 2000, the other in a small pond in a meadow near Callahan Creek Road last observed in 1993. Based on Pacific Connector’s digitized vegetation-land use data revised from aerial photography, no grasslands are present within the Project ROW within 0.5 miles of these two sites; therefore, no suitable nesting habitat would be impacted by the Project.

Two of the known Western pond turtle locations on the Umpqua National Forest were associated with Lake/Pond features in the National Hydrography Dataset (USGS 2014). An additional seven Lake/Pond features within 0.5 miles of the Project on the Umpqua National Forest were also identified as potentially occupied western pond turtle habitat. However, no grasslands are present within the Project ROW within 0.5 miles of any of the seven sites identified as potentially occupied by western pond turtles either. Therefore, the absence of suitable vegetation cover along the Project within the Umpqua National Forest precludes any suitable nesting habitat from being affected by the Project.

Other impacts include the potential for the ROW corridor to facilitate the spread of nonnative and native predators such as bullfrogs, raccoons, spotted skunks, coyote, fox, feral and domestic dogs, black bear, river otter, mink, osprey, bald eagle, and largemouth bass (Holland 1994). Stone (2009a) list predation as a threat the Western pond turtles; however, they note that many large populations of turtles occur in the presence of these predators so the threat does not appear to be universal (Stone 2009a). All trash, food waste, and other items attractive to predators would be picked up and removed from the Project area on a daily basis to minimize potential predation of Western pond turtles.

Cumulative Effects

The Western pond turtle cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 14). Most of the habitats used by these turtles have been impacted severely in the past 200 years. Development has concentrated around bodies of water, increasing disturbance, eliminating habitat, and encouraging the spread of mesopredators. Wetlands have been drained and converted to agriculture and huge amounts of grassland habitat has been lost. The NWFP addresses many of these issues, and management activities taking place within the analysis area should increase the quality of Western pond turtle habitat in the future.

Suitable Western pond turtle habitat would be removed during construction. Construction of the pipeline and associated facilities would affect 1,866 acres within cumulative effects analysis area, which constitutes 0.3 percent of the total watershed area (Table 14). The Project could also facilitate the spread of predators such as bullfrogs and raccoons. Both habitat alteration and fragmentation, and increasing predation by introduced species are listed as a threat to this species (St. John 2002).

Mitigation actions proposed for NFS lands that affect resources used by the Western pond turtle include fish passage, fuels reduction, road storm proofing, road closure and decommissioning, in stream LWD placement, riparian planting, and stream crossing repair projects. Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14). Sediment could be mobilized into waterbodies during fish passage, road decommissioning, and stream crossing repair projects, especially where culverts are removed or replaced; however, long term beneficial effects include reconnection of aquatic habitats, sediment reduction, and shade restoration. Fuels reduction and in-stream LWD placement projects would also benefit the Western pond turtle. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time. Fuels reduction projects would lower the risk of loss of mature stands and other valuable habitats to high-intensity fire, which can contribute substantial sediment to streams and result in flooding and erosion during post-fire precipitation events.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). They would affect 40,742 acres, or 5.6 percent of the cumulative effects analysis area. The large number of thinnings combined with the aquatic habitat restoration would most likely contribute to the long term health of the ecosystem. However, the timber sales, grazing allotments, and clearcuts could contribute to habitat alteration and disturbance within the vicinity of the proposed Project.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with the 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the Western pond turtle cumulative effects analysis area includes 50,070 acres, or 6.9 percent of the total watershed area (Table 14). The proposed action, as well as reasonably foreseeable actions, would contribute to habitat loss and alteration, as well as the potential to increase predation from non-native species. However, Project mitigation is expected to benefit the Western pond turtle. Additionally, construction BMPs that require all trash to be removed daily would minimize potential predation of Western pond turtles. Therefore, cumulative impacts on the Western pond turtle are expected to be insignificant, because the combined impacts to the 6.9 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize impacts include the containment and safe disposal of hazardous materials and pollutants as discussed in Pacific Connector's Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings.

Restrictions to timber removal and construction activities that avoid NSO nesting periods would also reduce noise disturbances during the breeding period for this species (see Appendix X of the POD, Appendix N of FERC's BA, and Appendix P of the BA). Also, all trash, food waste, and other items attractive to predators would be picked up and removed from the Project area on a daily basis to minimize potential predation of Western pond turtles. Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the Western pond turtles are also described above under cumulative effects.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a**

trend toward federal listing or loss of viability of the species" for the Western pond turtle because impacts would likely be limited to dispersing individuals as there is only one known or suspected nesting or overwintering site within 1 mile of the Project on NFS land, and the Project would impact only approximately 3 percent of potentially suitable habitat within the analysis area.

6.2.5 Fish

Surveys were not conducted specifically for special status fish. The information on sensitive species occurrence is based on several GIS data sources including ORBIC occurrence records (ORBIC 2017), the StreamNet database (StreamNet 2008), and the Forest Service NRIS database (Forest Service 2017).

6.2.5.1 Umpqua Chub (Oregonichthys kalawatseti)

Species Status in the Project Area

Umpqua chub can be found throughout most of the Umpqua River in Douglas County; from the mouth of the Smith River in the north to Cow Creek and the South Umpqua River, near the boundary of the Umpqua National Forest, in the south (Markle et al. 1991). As shown in Table 1, the species has been documented in the Umpqua National Forest; it has not been documented and is not suspected to occur in the Winema or the Rogue River national forests.

The Umpqua chub inhabits areas which contain eroded or depositional substrates with moderate to low flowing waters. They gather near the banks in shallow waters, and prefer habitats with riparian cover and abundant aquatic vegetation. Spawning occurs primarily in rocky areas. The Umpqua chub's diet consists of bottom-dwelling chironomids and other organisms (Markle et al. 1991).

The main threat to this species is the increasing population of invasive smallmouth bass (NatureServe 2013).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes waterbodies crossed within the South Umpqua sub-basin, where this species is found. Umpqua chub are assumed to be present in 1 of the 10 stream crossings within the analysis area that would be impacted by the Project (Table 34; further detail in Appendix C).. The other affected waterbodies would be crossed using a dry open cut during the in-water work window recommended by ODFW. The dry open cut method used would either be flume or dam and pump, both of which maintain downstream flows and isolate the construction area from the streamflow. Construction across small or intermediate waterbodies generally takes seven days using these methods. Some mortality could occur to eggs with this process, but adults and juveniles would likely stay with the streamflow and avoid negative effects. Turbidity increases are generally low using this crossing method but could increase temporarily.

Indirect effects could occur through the harvest of riparian vegetation on either side of the stream for the width of the ROW, potentially increasing sedimentation.

The Project would not contribute to the main threat to this species, the increasing population of invasive smallmouth bass.

Table 34. Umpqua Chub Potential Habitat

Waterbodies Crossed and Waterbody ID	Identification Number (LLID) and Jurisdiction	Approximate Pipeline MP	Waterbody Type Size	Proposed Crossing Method Scour Level	Chub Potentially Present
Ditch (Beaver Creek) (CDX-50)	Forest Service – Umpqua NF	105.41	Intermittent Intermediate	Dry Open-Cut	No
Ditch (CDX-49)	Forest Service – Umpqua NF	106.77	Intermittent N/A	Adjacent to centerline within ROW	No
Roadside Ditch (CDX-47)	Forest Service – Umpqua NF	108.08	Intermittent Minor	Dry Open-Cut	No
Roadside Ditch (CDX-48)	Forest Service – Umpqua NF	108.40	Intermittent Minor	Dry Open-Cut	No
Ditch (GDX-15)	17100302034497 Forest Service – Umpqua NF	109.13	Intermittent N/A	Adjacent to centerline within TEWA	No
Trib. to East Fork Cow Creek (GSI-16/FS-HF-F)	17100302013838 Forest Service – Umpqua NF	109.33	Intermittent Minor	Dry Open-Cut	No
East Fork Cow Creek (GSP-19/ASP-297/FS-HF-G)	17100302013839 Forest Service – Umpqua NF	109.47	Perennial Intermediate	Dry Open-Cut (Streambed-bedrock)	Assumed
East Fork Cow Creek S-T09-002 (GSP-22/FS-HF-G ASP297)	17100302013839 Forest Service – Umpqua NF	109.68	Perennial Minor	Dry Open-Cut	No
Trib. to East Fork Cow Creek S-T09-001 (FS-HF-M)	17100302013840 Forest Service – Umpqua NF	109.74	Perennial Minor	Dry Open-Cut	No
Trib. to East Fork Cow Creek (ESI-68/FS-HF-N)	17100302034587 Forest Service – Umpqua NF	110.96	Intermittent Intermediate	Dry Open-Cut	No

Cumulative Effects

The Umpqua chub cumulative effects analysis area includes the fifth field watersheds crossed by the Project within the South Umpqua subbasin: Upper Cow Creek, Elk Creek, and Days Creek. Construction of the pipeline and associated facilities would affect 696 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Project impacts would primarily be from potential increases in sediment following construction, and removal of riparian vegetation at the ROW crossing. Neither of these impacts are listed as threats to this species.

Mitigation actions proposed for NFS lands that could affect resources used by the Umpqua chub include fish passage, fuels reduction, road storm proofing, and road closure and decommissioning, projects. Mitigation actions on NFS lands would affect 4,159 acres within the cumulative effects analysis area, or 1.7 percent of the total watershed area (Table 14). Sediment could be mobilized into waterbodies during fish passage, road decommissioning, and road closure projects, especially where culverts are removed or replaced; however, long term beneficial effects include reconnection of aquatic habitats, sediment reduction, and shade restoration. Fish passage projects could also be detrimental to the Umpqua chub if barriers are removed that currently prevent or limit the spread of smallmouth bass (Simon 2008). Restoration of these crossings includes riparian planting as a mitigation which would help offset the impact of shade removal where the Project affects streams and riparian areas. Fuels reduction projects would benefit the Umpqua chub. Fuels reduction projects would lower the risk of loss of mature stands and other valuable habitats to high-intensity fire, which can contribute substantial sediment to streams and result in flooding and erosion during post-fire precipitation events.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing, and biological projects (Table 13). Forest Service projects that could additionally impact the Umpqua chub include grazing that could cause direct mortality of eggs by crushing, and several timber treatments that could potentially increase sedimentation and disturb riparian vegetation. Multiple aquatic restoration projects within the South Umpqua sub-basin would benefit water quality and fish habitat within the watershed. Restoration projects include culvert replacements, Riparian Reserve timber thinning and road removal.

The NWFP identifies restoration and maintenance of Riparian Reserves as a goal on NFS land. Riparian Reserves include the hydrologic, geologic or ecological features within a watershed that affect stream processes. Actions to improve aquatic habitat surrounding Riparian Reserves includes limiting livestock grazing and commercial timber harvest. These management activities may result in improved quantity and quality of Umpqua chub habitat in the analysis area in the future.

The proposed Project, including mitigation actions, would affect approximately 4,855 acres. Combined with 17,964 acres of overlapping reasonably foreseeable activities, approximately 22,819 acres within the cumulative effects analysis area would be affected, or 9.4 percent of the total watershed area (Table 14). The proposed action as well as planned projects could temporarily increase sediment and remove riparian vegetation; however, Project impacts would be mitigated as described above, and planned aquatic restoration projects would also benefit the Umpqua chub. The Project would be unlikely to contribute to the main threat to this species, the increasing population of invasive smallmouth bass. Therefore, cumulative impacts on the

Umpqua chub are expected to be insignificant because the combined impacts to the 9.4 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B to Appendix I of the POD), the Erosion Control and Revegetation Plan (Appendix I of the POD), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of FERC's BA).

Specific conservation measures to minimize impacts to the Umpqua chub include backfill of perennial waterbodies. Material would be removed from the trench, with the upper 1-foot of the trench backfilled with clear gravel or native cobbles appropriate for resident fish. The bottom and banks would be returned to preconstruction contours, banks would be stabilized, and temporary sediment barriers would be installed before returning flow to the waterbody channel. If fish are present, a fish salvage plan would be followed to reduce mortality from construction. These activities are described in the Conservation Measures and Fish Salvage Plan documents (see Appendix N of FERC's BA and Appendix L of the POD). Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the Umpqua chub are also described above under cumulative effects.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Umpqua chub because the waterbody crossings would be conducted with minimal damage to the species, and the Project would be unlikely to contribute to the major threat to this species, which is the spread of smallmouth bass.

6.2.6 Terrestrial Invertebrates

Surveys were conducted for special status mollusks in accordance with the "Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the NWFP, Version 3.0" (Duncan et al. 2003). In addition to Forest Service designated sensitive species, target species also included federal and state-listed threatened and endangered species and special-status species, and Region 6 Survey and Manage species (Forest Service and BLM 2001). Surveys were conducted between March 17 and May 23, 2007 and October 13 and November 16, 2007 and covered approximately 1,160 total acres in the three national forests. Surveys for route modifications in 2010 were conducted during spring (June 6 and July 1, 2010) and in fall

(October 13 and November 16, 2010) and covered approximately 230 acres (SBS 2011a). Surveys were also conducted in the spring and fall of 2014 and covered approximately 76.5 acres (Pacific Connector April 27, 2015 response to FERC data request). Additional surveys were performed in 2015 to cover Project route realignments. Project-specific surveys for individual insect species were not conducted. The area considered for potential terrestrial invertebrate habitat included all Forest Service-managed lands in Douglas and Jackson and Klamath counties (as well as BLM-managed lands crossed by the Project) within 100 feet of the Project capable of supporting special-status terrestrial invertebrate species. Detail on survey methodology and results are provided in the 2008 and 2010 Biological Survey Reports (SBS 2008, SBS 2011a).

6.2.6.1 Traveling Sideband (Monadenia fidelis celeuthia)

Species Status in the Project Area

This endemic terrestrial snail is found primarily in Jackson County, Oregon. Stone (2009b) reports occurrences from Medford east and northeast in the eastern Rogue River and Little Butte Creek drainages. As shown in Table 1, the species has previously been documented on the Rogue River National Forest, and was recently documented on the Winema and Umpqua national forests.

The traveling sideband was observed at 2 locations in the Umpqua National Forest, 10 locations in the Rogue River National Forest, and 2 locations in the Winema National Forest during Project surveys. During surveys, shells and live individuals were located within and outside the ROW, as well as within proposed UCSAs (Forest Service 2017).

Traveling sideband is found at low to moderate elevation in unaltered, somewhat dry and open forested terrain (Frest and Johannes 2000). The species is associated with dry basalt talus and rock outcrops in areas with oak/maple overstory, and along springs in rock and moist vegetation and moss (Frest and Johannes 2000).

Threats to the traveling sideband include timber clearing and livestock grazing. Removal or reduction of forest canopy and increased sun exposure from timber clearing or other removal activities can result in drying of important subterranean refugia sites, reduction in fungi food sources and loss of dormant individuals. Because many species in this genus are partially arboreal, tree felling may result in direct mortality to individuals (Stone 2009b).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable traveling sideband habitat within 700 feet of the proposed action within the all three national forests crossed by the Project. Based on the habitat description above, we inferred that the traveling sideband is associated with the late successional/old growth (i.e., unaltered) Johnson and O'Neil habitat types shown below in Table 35, especially where talus or rock outcrops are present. However, these associations likely overestimate suitable habitat as specific habitat information such as overstory species, presence of talus and rock outcrops, and presence of springs in rock and moist vegetation were not available for this analysis. Nonetheless, Table 35 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the traveling sideband. Because the biology of this species is not well understood (Stone 2009b), general and close associations, as well as activities associated with each habitat type, have not been inferred.

Table 35. Traveling Sideband Habitat Associations

Habitat Type[1/]	Total Acres Removed[2/]	Total Acres Modified[2/]	Total Acres in Analysis Area[3/]	Percentage Impacted
Westside-Lowland Conifer-Hardwood Forests (LO)	0.00	0.00	0	0.00%
Southwest Oregon Mixed Conifer-Hardwood Forest (LO)	181.08	69.72	2,480	10.11%
Ponderosa Pine Forest and Woodlands (LO)	0.00	0.00	2	0.00%
Westside Oak and Dry Douglas-fir Forest and Woodlands (LO)	0.00	0.00	0	0.00%
Westside Riparian Wetlands	0.41	0.00	0	91.66%
Eastside Riparian Wetlands	0.00	0.00	5	0.00%
Total	**181.49**	**69.72**	**2,487**	**10.10%**

1/ LO, Late Succession/Old Growth assumed to be ≥80 years old.
2/ Totals taken from Table 7 for all three national forests in which the species has been documented to occur.
3/ Totals taken from Table 2 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

Based on these habitat association assumptions, approximately 10 percent of available potentially suitable habitat within the analysis area would be affected by the Project. Additionally, 6.80 acres of late successional/old growth forested habitat that would be removed within the three national forests is within Riparian Reserves (Table 8), and 1.88 of these acres would be maintained in an early seral stage within the 30-foot Project corridor (Table 9). These areas likely represent high quality habitat as they are forested, unaltered, and adjacent to water, which are important habitat components for the traveling sideband. However, as discussed above, these calculations of potentially suitable habitat are likely overestimates due to the lack of available data on specific habitat components such as talus, rock outcrops, and overstory species composition within the analysis area. Additionally, complete surveys were conducted for mollusks on NFS lands, so impacts to the potentially suitable habitat occupied by this species, assumed to be the highest quality habitat, would be minimized as described below.

Direct mortality could occur to individuals if they are located within the ROW, UCSAs, and TEWAs during Project clearing or construction due to their low mobility. Vegetation removal and grading activities in the construction corridor and in TEWAs would disturb vegetation and soils within sites and could result in injury or mortality to individuals. Clearing of the ROW and TEWAs could impact habitat by removing forest overstory, potentially making the area unsuitable for this species. Indirect effects could result from the alteration of composition and structure of vegetation resulting in changes in microclimate.

Minor route adjustments following the 2007 and 2010 surveys resulted in avoidance of some of the sites observed during Project surveys. Four of the locations are outside of the ROW and UCSAs, and greater than 100 feet from Project disturbance, so impacts are not expected (MP 104.92, 155.75, 157.14, and 161.35,). Two sites within UCSAs are currently proposed to be impacted (MP 158.79 and 164.34). One location within the ROW on the Rogue River National Forest (156.48) and two locations within the ROW on the Winema National Forest are also currently proposed to be impacted (MP 173.38 and 175.30).

Indirect effects are expected to the traveling sideband sites observed within the analysis area even if direct impacts to these sites are avoided. Construction of the Project would create an open corridor, which would be dominated by early seral vegetation for approximately 30 years. This is a long-term effect that could modify microclimate conditions around populations or individuals adjacent to the corridor during the early seral vegetation phase. Five sites are outside the ROW and UCSAs, but are within 100 feet of Project disturbance and thus would be indirectly impacted (MP 113.17, 154.91, 159.33, 162.45, and 167.10).

According to the Forest Service NRIS and BLM GeoBOB databases, approximately 32 traveling sideband sites are known from the three national forests crossed by the Project, including the 14 sites on NFS land identified during Project surveys, and 95 sites known from BLM land within the range of the NWFP (Yamamoto 2014, Yamamoto 2015b). Assuming that these 127 sites comprise all existing traveling sideband sites, on NFS lands the Project would indirectly impact approximately 3.9 percent of known sites, although not likely affect site persistence at these locations. The Project would directly impact 5 sites, affecting the site persistence of approximately 3.9 percent of known sites. The 24 sites documented during surveys for the Project (including the 10 sites documented on BLM land, not discussed here) indicate that this species is more abundant and widely distributed than previously thought. However, this analysis conservatively assumes that the 127 confirmed sites comprise all existing traveling sideband sites.

Cumulative Effects

The traveling sideband cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 14). Current threats to the traveling sideband include timber clearing and livestock grazing (Stone 2009b). Loss of woodlands and increased forest fragmentation over the past 200 years may have impacted the traveling sideband. Oak woodlands in Oregon have declined precipitously due to conversion to other land uses, invasive species, and fire suppression. Fragmentation decreases connectivity between populations and reduces dispersal between sub-populations. Livestock tend to concentrate around a water source, which can increase disturbance and eliminate habitat. Concentrated use of riparian areas by livestock may also degrade available loose soil and litter habitat used for foraging and breeding (Stone 2009b).

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Project impacts would include habitat loss and modification, as well as potential mortality of individuals. However, Project impacts are not expected to affect species persistence as described above.

Project-related mitigation actions proposed by the Forest Service in the cumulative effects analysis area include reallocation of Matrix to LSR, road closure and decommissioning, pre-commercial thinning, and riparian planting. Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14). There could be some negative short-term impacts of these actions, including disturbance and trampling of individuals during implementation. However, overall, these projects would benefit the traveling sideband through habitat improvements and a reduction in disturbance over the long term. Reallocation of Matrix to LSR would offset the long-term loss of LSR acres, and thus ensure future availability of late-successional habitat. Decommissioning and planting of selected roads in conjunction with pre-commercial thinning treatments would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years. Density management of forested stands would assist in the recovery of late-seral habitat, reduce impacts from fragmentation, reduce edge effects, and enhance resilience of mature stands, all of which would benefit this late-successional obligate species. Planting of riparian vegetation would also improve habitat quality for the traveling sideband at these sites.

Other planned projects within watersheds where the proposed action crosses NFS lands include a variety of timber, fuel, grazing and biological projects (Table 13). The planned projects would affect 40,742 acres, or 5.6 percent of the cumulative effects analysis area. The proposed grazing allotments could result in habitat destruction or modification, as well as trampling of individuals. The proposed timber projects could also result in impacts to habitat and individuals similar to those expected by the Project. However, the NWFP identifies restoration and maintenance of mossy talus slopes and Riparian Reserves as a goal on NFS land. These management activities may result in improved quantity and quality of traveling sideband habitat in the analysis area in the future.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,070 acres, or 6.9 percent of the total watershed area (Table 14). The proposed action combined with reasonably foreseeable actions would contribute to the threats to this species from timber clearing and grazing. However, cumulative impacts on the traveling sideband are expected to be insignificant, because the combined impacts to the 6.9 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B to Appendix I of the POD), the Erosion Control and Revegetation Plan (Appendix I of the POD), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of FERC's BA).

Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit traveling sideband are described above under cumulative effects. On the Rogue River and Winema national forests restoration of stream crossings and riparian planting would promote shade and cover for the traveling sideband.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals and habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for traveling sideband because the proposed action would affect approximately 10 percent of potentially suitable available habitat within the analysis area, impact approximately 3.9 percent of the known sites (including indirect effects), and directly affect (eliminate) approximately 3.9 percent of known sites, although this species is likely more common than indicated by the NRIS database.

6.2.6.2 Siskiyou Hesperian (Vespericola sierranus)

Species Status in the Project Area

In Oregon, this land snail is found in Jackson, Klamath, and Douglas Counties. As shown in Table 1, this species has previously been documented on the Rogue River and Winema national forests, and was recently documented on the Umpqua National Forest.

This species was observed at 2 locations on the Umpqua National Forest, 26 locations on the Rogue River National Forest, and 3 locations on the Winema National Forest. Shell fragments and live individuals were observed within and outside the ROW, as well as within proposed TEWAs and UCSAs.

The Siskiyou hesperian is associated with riparian areas and other perennially moist habitats and may occur along running water or around permanent ponds and springs (Frest and Johannes 1996, Stone 2009c). The species can be found near spring seeps and deep leaf litter along streambanks and under debris and rocks. Moist valley, ravine, gorge, or talus sites are preferred, near the lower portions of slopes in areas that are not subject to regular flooding. This species has a global status of imperiled (NatureServe 2013). Threats include the diversion or modification of springs for livestock watering and irrigation. Human use may result in loss or degradation of habitat. Removal of forest overstory from timber clearing can dry important subterranean refugia and loss of aestivating individuals. Concentrated use of riparian areas by livestock may also degrade habitat, as can development for agriculture or human use (Frest and Johannes 2000).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable Siskiyou hesperian habitat within 700 feet of the proposed action within the three national forests crossed by the Project. Based on the habitat description above, we inferred that the Siskiyou hesperian is associated the Westside Riparian Wetlands and Eastside Riparian Wetlands Johnson and O'Neil habitat types, as shown below in Table 36, especially near the lower portions of slopes at moist valley, ravine, gorge, or talus sites. These associations likely overestimate suitable habitat as specific habitat information such as location on slope and presence of talus were not available for this analysis. Nonetheless, Table 36 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the Siskiyou hesperian. Because the biology of this species is not well understood (Stone 2009c), general and close associations, as well as activities associated with each habitat type have not been inferred.

Table 36. Siskiyou Hesperian Habitat Associations

Habitat Type	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Riparian Wetlands	0.41	0.00	0.45	91.66%
Eastside Riparian Wetlands	0.00	0.00	5.08	0.00%
Total	**0.41**	**0.00**	**5.53**	**7.43%**

1/ Totals taken from Table 7 for all three national forests in which the species has been documented to occur.

2/ Totals taken from Table 2 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

Based on these habitat association assumptions, approximately 7 percent of available potentially suitable habitat within the analysis area would be affected by the Project. Additionally, 19.51 acres of forested habitat (of all seral stages) that would be removed within the analysis area is within Riparian Reserves (Table 8), and 4.81 of these acres would be maintained in an early seral stage within the 30-foot Project corridor (Table 9). These areas likely represent high quality habitat as they are forested and adjacent to water, which are important habitat components for the Siskiyou hesperian. However, as discussed above, these calculations of potentially suitable habitat are likely overestimates due to the lack of available data on specific habitat components such as talus and location on slope. Additionally, complete surveys were conducted for mollusks on NFS lands, so impacts to the potentially suitable habitat occupied by this species, assumed to be the highest quality habitat, would be minimized as described below.

Direct mortality to individuals could occur if they are located within the ROW, TEWAs, or UCSAs during Project clearing or construction. Vegetation removal and grading activities in the construction corridor and in TEWAs would disturb vegetation and soils within sites documented during Project surveys, and could result in injury or mortality to individuals. Another potential direct effect is destruction or alteration of hydrology of riparian, wetland, or aquatic habitats used by this species. Indirect effects could result from the alteration of composition and structure of vegetation resulting in changes in microclimate. The increase in sun exposure could reduce moisture levels and potential decrease dispersal between populations or suitable habitat. Additionally, removal of the forest overstory would dry important subterranean refugia and impact aestivating individuals.

Both of the locations within the Umpqua National Forest are within the ROW (MP 110.18 [2]). Eighteen of the locations within the Rogue River National Forest are outside of the ROW, UCSAs and TEWAs, so direct impacts are not expected (MP 154.03 [2], 154.5 [2], 154.88, 155.7, 155.77, 155.83, 155.87, 156.23, 156.91, 156.97, 157.13, 158.73, 159.35, 160.00, 160.57,161.35). Nine sites within the ROW, UCSAs, or TEWAs within the Rogue River National Forest are currently proposed to be impacted (MP 153.9, 154.84, 156.48, 156.49, 156.9, 162.29, 164.29, 164.54, and 164.71). Three locations within the Winema National Forest are outside of the ROW, UCSAs and TEWAs, so direct impacts are not expected (MP 168.77 [2], 168.85).

Indirect effects are expected to the Siskiyou hesperian sites observed within the analysis area even where direct impacts to these sites are avoided. Construction of the Project would create an open corridor, which would be dominated by early seral vegetation for approximately 30 years. This is a long-term effect that could modify microclimate conditions around populations or individuals adjacent to the corridor during the early seral vegetation phase, and also result in changes in hydrology where vegetation is no longer present to stabilize soil and reduce the erosional effects of runoff. All the sites are within approximately 100 feet of Project disturbance, and thus would be affected by these changes in microclimate conditions and alterations in hydrology.

According to the Forest Service NRIS database, at least 60 Siskiyou hesperian sites are known from the three national forests crossed by the Project, including the 32 observations on the observed during Project surveys (Yamamoto 2015b). Project surveys additionally identified 11 sites on BLM lands (Roseburg and Medford BLM Districts, not discussed here); 56 sites are known from BLM land within the range of the NWFP. The Forest Service additionally described this species as very common throughout the High Cascades Ranger District. There are currently 63 observation points of Siskiyou hesperian that exist in NRIS from 2007-2011 project surveys, but not all have vouchers associated with them. It is additionally estimated that there are over 50 additional observations that have not been entered into NRIS, but also do not have vouchers associated with them (Yamamoto 2015b). However, this analysis conservatively assumes that the 116 confirmed sites comprise all existing Siskiyou hesperian sites.

Based on this information, the Project would indirectly affect approximately 13.8 percent of known sites, although not likely affect site persistence at all these locations. The Project would affect the site persistence of approximately 9.5 percent of known sites. The sites documented during surveys for the Project as well as personal communication with the Forest Service (Yamamoto 2014, 2015b) indicate that this species may be more abundant and widely distributed than previously thought; however, until further surveys map additional Siskiyou hesperian occurrences, the documented occurrences are assumed to comprise all sites for this species.

Cumulative Effects

The Siskiyou hesperian cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 14). Habitat types preferred by the Siskiyou hesperian have been negatively impacted over the past 200 years. Development has concentrated around bodies of water, increasing disturbance and eliminating habitat. Riparian areas have been damaged and removed by timber clearing practices and conversion to other uses. Wetlands and wet meadows have been drained and trampled by grazing livestock. However, the NWFP has special land use allocations around Riparian Reserves, streams, lakes, ponds, and wetlands that protect these resources. Standards and guidelines within the NWFP limit livestock grazing around aquatic areas and provide measures to minimize impacts from timber harvest. These actions would likely lead to improved quantity and quality of suitable Siskiyou hesperian habitat in NFS lands within the analysis area.

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Project impacts would include habitat loss and modification, as well as potential mortality of individuals. However, Project impacts are not expected to affect species persistence as described above.

Project-related mitigation actions proposed by the Forest Service in the cumulative effects analysis area that would affect the Siskiyou hesperian include road decommissioning and riparian planting. Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14). There could be some negative short-term impacts of these actions, including disturbance and trampling of individuals during implementation. However, overall, these projects would benefit Siskiyou hesperian through habitat improvements and a reduction in disturbance over the long term. Decommissioning and planting of selected roads would reduce edge effects and fragmentation. Planting of riparian vegetation would also improve habitat quality for the Siskiyou hesperian at these sites.

Other planned projects within cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). The planned projects would affect 40,742 acres, or 5.6 percent of the cumulative effects analysis area. The proposed grazing could result in habitat destruction or modification, as well as trampling of individuals. The proposed timber projects could also result in impacts to habitat and individuals similar to those expected by the Project.

The aquatic restoration projects would likely benefit the Siskiyou Hesperian by improving habitat.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,070 acres, or 6.9 percent of the total watershed area (Table 14). The proposed action combined with reasonably foreseeable actions would contribute to the threats to this species from timber clearing and grazing. However, cumulative impacts on the Siskiyou hesperian are expected to be insignificant because the combined impacts to the 6.9 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B to Appendix I of the POD), the Erosion Control and Revegetation Plan (Appendix I of the POD), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of FERC's BA).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals and habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the Siskiyou hesperian because the proposed action would affect approximately 7 percent of potentially suitable available habitat within the analysis area, indirectly impact approximately 14 percent of the known sites, and directly affect (eliminate) approximately 9 percent of known sites, although this species is likely more common than indicated by the NRIS database.

6.2.6.3 *Western Bumblebee (Bombus occidentalis)*

Species Status in the Project Area

Historical populations of western bumblebees used to cover much of the western U.S.; however, populations in central California, Oregon, Washington and southern British Columbia have mostly disappeared (Milliron 1971, Andrews 2010a). In Oregon and Washington, Western bumblebee populations are currently largely restricted to high elevation sites (Xerces Society 2012), and the species is no longer found in the western portions of either state where it was once common (Cameron et al. 2011). Despite being nearly extirpated in Oregon, this species has been documented on all three national forests crossed by the Project (Table 1; Thorp et al. 2008; Jepsen 2013). However, it is unknown what the current "Documented" status is for many of these field units, as many of the documented sites are considered historic (Jepsen 2013). A single observation of this species occurs in location databases and was recorded in 2009 on the Umpqua National Forest 4.3 miles from the Project.

Western bumblebees will visit a range of different plant species and are important generalist pollinators of a wide variety of flowering plants and crops (Goulson 2003, Heinrich 2004). Bumblebees inhabit a wide variety of natural, agricultural, urban, and rural habitats, although they are closely associated with areas that have continuously-blooming flowers throughout the year (Goulson 2010). Western bumblebees frequently nest in abandoned rodent burrows or bird nests. Queen production is dependent on access to sufficient quantities of pollen, so the amount of pollen available to bumblebee colonies directly affects the number of queens that can be produced (Burns 2004). Because queens are the only bumblebees capable of forming new colonies, pollen availability directly impacts future bumble bee population levels (Thorp et al. 2008). Western bumblebee nests have primarily been observed in underground cavities such as old squirrel or other animal nests and in open west-southwest slopes bordered by trees (Jepsen 2013). Very little is known about western bumblebee overwintering sites, although Hobbs (1968) reported western bumblebee overwintering sites that were two inches deep in a steep west slope.

Of the 15,573 bees sampled in extensive surveys throughout Oregon between 1998 and 2007, only 115 (less than 1 percent) were western bumblebees (Thorp et al. 2008). According to Jepsen (2013), the primary threats to the western bumblebee at the sites where it currently exists in Oregon and Washington include pathogens from commercial bumble bees and other sources, impacts from reduced genetic diversity, and habitat alterations including conifer encroachment (resulting from fire suppression), grazing, and timber clearing. Additional threats include pesticide use, fire, agricultural intensification, urban development and climate change (Jepsen 2013).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable western bumblebee habitat within 3,200 feet of the proposed action on the three national forests crossed by the Project. Based on the habitat description above, we inferred that the western bumblebee is closely and generally associated with the Johnson and O'Neil habitat types shown below. Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate. Nonetheless, Table 37 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the western bumblebee.

Table 37. Western Bumblebee Habitat Associations						
Habitat Type	**Association**	**Activities**	**Total Acres Removed1/**	**Total Acres Modified1/**	**Total Acres in Analysis Area2/**	**Percentage Impacted**
Montane Mixed Conifer Forest	General		75.31	26.38	1,766	5.76%
Southwest Oregon Mixed Conifer-Hardwood Forest	General		318.28	94.99	14,704	2.81%
Ponderosa Pine Forest and Woodlands	General		0.00	0.00	821	0.00%
Westside Oak and Dry Douglas-fir Forest and Woodlands	General		0.00	0.00	0	0.00%
Western Juniper and Mountain Mahogany Woodlands	General		0.00	0.00	0	0.00%
Shrub-steppe	General		7.35	0.59	52	15.40%
Westside Grasslands3/	Close	Feeds and Breeds	2.53	0.33	11	25.99%
Eastside Grasslands3/	Close	Feeds and Breeds	1.59	0.14	18	9.80%
Herbaceous Wetland	Close	Feeds	0.01	0.00	21	0.03%
Westside Riparian Wetlands	General		0.41	0.00	1	32.88%
Eastside Riparian Wetlands	General		0.00	0.00	205	0.00%
Agriculture, Pastures and Mixed Environs	General	Feeds	0.00	0.00	0	0.00%
Roads	General		31.28	3.56	231	15.10%
Total			**436.76**	**125.99**	**17,830**	**3.16%**

1/ Totals taken from Table 7 for the Rogue River, Winema, and Umpqua national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Rogue River, Winema, and Umpqua national forests in which the species has been documented to occur.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Based on these habitat association assumptions, approximately 3 percent of available potentially suitable habitat within the analysis area would be affected by the Project.

Direct impacts include construction-related activities that would impact individuals or destroy, alter, fragment, degrade or reduce the bumblebee's food supply, nesting habitat, or hibernation sites for overwintering queens (Andrews 2010a). Direct mortality could occur during clearing and construction if individuals are not able to get out of the way, although bumblebees are relatively mobile. Impacts could occur due to the loss of suitable habitat from Project activities such as road construction.

The Project could impact nest sites and overwintering sites during construction. Assuming that these sites would be primarily located in eastside and westside grassland habitats crossed by the Project, the Project would impact approximately 16 percent of nesting and overwintering habitat available within the analysis area (Table 37). However, as noted above, delineation of grassland habitat outside of Project impacts was limited so the percentage of acres impacted is likely an overestimate. Although nest sites disturbed during construction would be negatively impacted, Project effects to nesting habitat would be temporary as the ROW would be restored following construction, and grassland habitats disturbed during construction would recover relatively quickly. Additionally, the Project could create additional suitable nesting habitat for this species by clearing woody vegetation, replanting with native grass and forb species, and controlling potential invasion by noxious weeds post-construction.

Application of herbicides during noxious weed treatments may have an indirect effect on nectar and pollen sources. Vegetation at aboveground facilities would be periodically maintained using mowing, cutting, trimming and the selective use of herbicides[5]. Project herbicide application could reduce available floral sources for bumblebees, which Jepsen (2013) lists as a serious threat. However, herbicides would only be used where they are most appropriate treatment method, and would be applied using spot treatments to minimize impact to native or non-target species. Additionally, in non-forested areas Pacific Connector would revegetate the ROW following construction to approximate the original pre-disturbed condition. Jepsen (2013) also lists pesticide application as a direct threat to western bumblebee; however, Pacific Connector has not proposed to use pesticides for the Project.

Cumulative Effects

The Western bumblebee cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Winema, and Umpqua national forests (Table 14). Major threats to this species include habitat alteration, broad-spectrum herbicides, and invasive plants. Native grasslands are one of the most imperiled habitats in the western U.S., including Oregon, due to conversion to agriculture, development, invasion by non-native plant species, and fire suppression. In the Coast Range and West Cascades of Oregon, grassland loss since historical times is estimated at 99 percent (ODFW 2006). As the habitat becomes more fragmented the genetic diversity decreases due to inbreeding which in turn causes an increase in the risk of population declines. Grazing livestock also negatively affects bumblebee populations by altering the vegetation community, disturbing nest sites, and removing flowering food sources. Standards and guidelines within the NWFP provide measures to minimize

[5] Pacific Connector would obtain applicable approvals or permits for use of herbicides on federal lands prior to use/treatment. Herbicides approved for use on NFS land include Chlorsulfuron, Glyphosate, Imazapyr, Metsulfuron methyl, Picloram, Sulfometuron methyl, Triclopyr, Sethoxydim, and Imazapic; see Pacific Connector's Integrated Pest Management Plan for details, Appendix N to the POD.

impacts from timber harvest. These habitat management practices would likely lead to improved quantity and quality of suitable habitat on NFS lands within the analysis area.

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). The Project would result in habitat alteration as well as potential direct mortality to individuals during construction. However, as described above, impacts are expected to be short-term as the grassland habitats potentially occupied by Western bumblebees would recover relatively quickly following construction. Approximately 8 percent of the construction ROW within the cumulative effects analysis area is currently non-forested; an additional 30 percent is currently forested but would be maintained in an early seral stage following construction within the permanent 30-foot corridor, and thus could provide additional habitat for the Western bumblebee.

Project-related mitigation actions proposed by the Forest Service in the cumulative effects analysis area that would affect the Western bumblebee include fuels reduction, noxious weed treatment, and meadow habitat planting projects. Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14). Fuels reduction projects could negatively affect the Western bumblebee by allowing conifer encroachment, which is listed as a threat to this species. However, fuel treatments would also reduce the probability for stand-replacement fires that could remove bumblebee food sources. Noxious weed treatments would benefit this species by removing invasive plant species that compete with preferred nectar sources. Additionally, meadow habitat planting designed to benefit other meadow species (Mardon skipper, Siskiyou short-horned grasshopper) within the ROW on 20 acres in the Rogue River National Forest could also benefit the Western bumblebee.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). The planned projects would affect 40,742 acres, or 5.6 percent of the cumulative effects analysis area. Forest Service projects include noxious weed treatment projects, several timber treatments, grazing allotments, and a fuelbreak project; other projects include clearcutting on private lands, and a BLM timber sale forest management projects (Table 13). The large number of thinnings would most likely contribute to the long term health of the ecosystem. Meadow restoration planned on BLM lands as part of a forest management project could also improve habitat for Western bumblebee. However, the timber sales, grazing allotments, and clearcuts could contribute to habitat alteration and disturbance within the vicinity of the proposed action.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,070 acres, or 6.9 percent of the total watershed area (Table 14). The proposed action combined with reasonably foreseeable actions could result in conifer encroachment, habitat alteration, and grazing, which are listed as threats to the species. However, Project mitigation and ROW restoration would compensate for habitat alteration. Therefore, cumulative impacts on the Western bumblebee are expected to be insignificant, because the combined impacts to the 6.9 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize impacts include site restoration and habitat enhancement measures (See Appendix I of the POD and Appendix N of FERC's BA). Site restoration includes enhancement of soil productivity and noxious weed treatments. A native grass mix would be used to benefit federally listed plant and insect species and may also provide food sources for the bumblebee. Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the Western bumblebee are also described above under cumulative effects.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the western bumblebee because the proposed Project would affect only approximately 3 percent of available suitable habitat for this species within the analysis area.

6.2.6.4 Siskiyou Short-horned Grasshopper (Chloealtis aspasma)

Species Status in the Project Area

Siskiyou short-horned grasshoppers are distributed in two general areas: the Siskiyou and Cascade mountain ranges in Jackson County in southwestern Oregon, and Benton County in west-central Oregon. As shown in Table 1, the species is suspected to occur in the Umpqua and Rogue River national forests; it has not been documented and is not suspected to occur in the Winema National Forest.

This grasshopper lives in grasslands and is dependent upon elderberry for egg-laying. It is active July through September. This species has also been observed in clearings created by old clearcuts and vegetated with grasses, forbs, and elderberry, and on the brushy edges of clearcuts (Foster 1974). It is known to occur in Jackson County, Oregon at elevations between 5,000 and 5,800 feet. The closely related species *C. conspersa* feeds primarily on grasses and to a lesser extent on forbs (Gangwere 1961); Siskiyou short-horned grasshoppers may exhibit similar feeding behavior.

Threats to this species include the loss of open meadows at higher elevations which can lead to the elimination of habitat for the host plant (Brenner 2006). Sources of meadow loss include fire prevention and restricted timber clearing (Brenner 2006). Other threats include birds, which may feed on the juveniles and adults, and the predator *Goniopsita oophaga* whose larvae infest egg pods (Brenner 2006).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes grassland and herbaceous habitat within 3,200 feet of the proposed action in the Rogue River and Umpqua national forests. Based on the habitat description above, we inferred that the Siskiyou short-horned grasshopper is associated with the Westside Grasslands, Eastside Grasslands, and Herbaceous Wetlands Johnson and O'Neil (2001) habitat types, as shown below. Table 38 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the Siskiyou short-horned grasshopper.

Table 38. Siskiyou Short-horned Grasshopper Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Grasslands[3/]	Close	Feeds and Breeds	2.53	0.33	11	25.99%
Eastside Grasslands[3/]	Close	Feeds and Breeds	0.38	0.00	1	38.45%
Herbaceous Wetland	General	Feeds and Breeds	0.01	0.00	1	1.03%
Total			**2.92**	**0.33**	**13**	**25.88%**

1/ Totals taken from Table 7 for the Rogue River and Umpqua national forests in which the species has been documented or is suspected to occur.

2/ Totals taken from Table 3 for the Rogue River and Umpqua national forests in which the species has been documented or is suspected to occur; does not include habitat located in the Winema National Forest or on other federal or non-federal lands

3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Based on these habitat association assumptions, approximately 26 percent of available potentially suitable habitat within the analysis area would be affected by the Project. Impacts would include loss of elderberry plants used for breeding, and loss of forage species. However, as discussed above, these calculations of potentially suitable habitat are likely overestimates as grassland habitat outside of the Project area was not fully delineated. Additionally, this species has been documented in clear-cuts, and timber clearing appears to provide open habitat for the host plant, blue elderberry, thereby increasing local populations of Siskiyou short-horned grasshoppers (Brenner 2006). As a result, removal of woody vegetation by the Project, and maintenance of the ROW in an early seral stage could create habitat for this species.

Direct mortality could occur during clearing and construction if individuals are not able to get out of the way, although grasshoppers are relatively mobile. Plants containing eggs could also be destroyed. Although elderberry trees containing eggs disturbed during construction would be negatively impacted, Project effects to breeding and foraging habitat would be temporary as the ROW would be restored following construction, and grassland habitats disturbed during construction would recover relatively quickly. Additionally, meadow restoration and elderberry plantings as described below under Conservation Measures and Mitigation would benefit the Siskiyou short-horned grasshopper.

Cumulative Effects

The short-horned grasshopper cumulative effects analysis area includes the fifth field watersheds crossed by the Project in the Umpqua and Rogue River national forests (Table 14). A major threat to this species is restricted timber clearing or fire prevention that lead to the loss of open habitat at high elevations (Brenner 2006). Other threats include removal of host plants by livestock and predation by other insects and birds. Under the NWFP, LSRs in the area are likely to improve habitat for this species with the maintenance of forest gaps and frequency of low-intensity fire. Meadows are further protected under the NWFP through measures that conserve great gray owl habitat by prohibiting tree-clearing within 300 feet of a meadow's edge. In addition, standards and guidelines within the NWFP limit livestock grazing around aquatic areas. These actions would likely lead to improved quantity and quality of suitable habitat on NFS lands within the analysis area.

Construction of the pipeline and associated facilities would affect 1,635 acres within the cumulative effects analysis area, or about 0.2 percent of the total watershed area (Table 14). As described above, Project impacts would include loss of elderberry plants used for breeding, and loss of forage species. However, removal of woody vegetation by the Project, and maintenance of the ROW in an early seral stage could create habitat for this species. Within the Rogue River and Umpqua national forests, 83 acres (29 percent) of the construction ROW is currently forested but would be maintained in an early seral stage within the 30-foot permanent corridor (Appendix B).

Project-related mitigation actions proposed by the Forest Service in the cumulative effects analysis area that would affect the Siskiyou short-horned grasshopper include fuels reduction and meadow habitat planting projects. Mitigation actions on NFS lands would affect 7,348 acres within the cumulative effects analysis area, or 1.1 percent of the total watershed area (Table 14). Fuels reduction projects could negatively affect the short-horned grasshopper by contributing to fire prevention, which can result in loss of meadow habitat and is listed as a threat to this species. However, approximately 20 acres of elderberry, the species' host plant, would be planted within the ROW near a known population on the Dead Indian Plateau, within the Rogue River National Forest, resulting in habitat creation. Additionally, the proposed lupine meadow restoration on 124 acres of land within the Umpqua National Forest may improve habitat for the Siskiyou short-horned grasshopper.

Within the cumulative effects analysis area planned projects include livestock grazing allotments, timber thinning projects, and BLM forest management projects. Livestock grazing and timber thinning could negatively affect the Siskiyou short-horned grasshopper and its habitat in a similar fashion as the Project by preventing fire and disturbing individuals and habitat. Clearcutting could benefit the Siskiyou short-horned grasshopper by creating openings where elderberries may establish.

The proposed Project, including mitigation actions, would affect approximately 8,983 acres. Combined with 36,272 acres of overlapping reasonably foreseeable activities, acreage impacted within the cumulative effects analysis area includes 45,255 acres, or 6.7 percent of the total watershed area (Table 14). The proposed action combined with reasonably foreseeable actions could result in meadow habitat loss through fire prevention which is listed as a threat to this species. However, clearing of the ROW as well as planned clearcutting would create habitat for the Siskiyou short-horned grasshopper. Therefore, cumulative impacts on the Siskiyou short-horned grasshopper are expected to be insignificant, because the combined impacts to the 6.7 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize project-related impacts and reestablish grassland vegetation are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B to Appendix I of the POD), and the Erosion Control and Revegetation Plan (Appendix I of the POD).

Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the Siskiyou short-horned grasshopper are also described above under cumulative effects. Approximately 20 acres of elderberry, the species' host plant, would be planted within the ROW near a known population on the Dead Indian Plateau, within the Rogue River National Forest. Additionally, the Forest Service has proposed 124 acres of meadow restoration on the Umpqua National Forest within the Elk Creek and Upper Cow Creek watersheds that would benefit native species including the Siskiyou short-horned grasshopper (Table 13).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the Siskiyou short-horned grasshopper because only approximately 3 acres of suitable habitat would be impacted, and approximately 20 acres of the ROW would be planted with elderberry, creating suitable habitat near a known population. Additionally, the proposed Project could create additional suitable habitat for this species by clearing woody vegetation, replanting with native grass and forb species, and controlling potential invasion by noxious weeds post-construction throughout the ROW.

6.2.6.5 Gray-blue butterfly (Plebejus podarce klamathensis)

Species Status in the Project Area

The gray-blue butterfly is found in the southern Cascades and eastern Siskiyou Mountains located in Douglas, Jackson, and Klamath counties (Pyle 2002). As shown in Table 1, the species has been documented in all three national forests crossed by the Project. No observations occur within 3 miles of the Project on NFS lands.

Appropriate habitat includes marshy slopes and meadows that contain deep grasses and dense stands of false hellebore (*Veratrum viride*; Dornfeld 1980). The species has been recorded at high elevation wet montane meadows from 5,100 ft. to over 6,500 feet. Adults typically begin to fly during June at lower elevations and continue through September at higher elevations. The larval food plant in Oregon has not been reported, but shooting stars (*Dodecatheon jeffreyi* and *D. alpinum*) are the larval food plant in the Trinity and Sierra Nevada mountains, California (Pyle 2002, Warren 2005). Adults typically feed on yellow flowers in the composite family (NatureServe 2013). Adults are very local and do not appear to wander much beyond their meadow habitat (Opler and Wright 1999).

Threats to the limited high elevation habitat the species depends on include succession, impacts from grazing and recreation, or desiccation due to water diversions (Opler et al. 2006). Succession may include the encroachment of trees or woody shrubs that out compete native food plants. Grazing and recreation may trample or remove food plants while impacts to hydrology may influence moisture regimes and the abundance of native plants.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable gray-blue butterfly habitat within 3,200 feet of the proposed action on the Rogue River and Winema national forests. Although this species has been documented on the Umpqua National Forest, the Project does not cross the Umpqua National Forest within the suspected distribution of the species (Jordan 2009); therefore no impacts are expected within the Umpqua National Forest and it is not included in this analysis.

Based on the habitat description above, we inferred that the gray-blue butterfly is associated the Westside Grasslands, Eastside Grasslands, and Herbaceous Wetlands Johnson and O'Neil (2001) habitat types. Delineation of grassland habitat outside of Project impacts was limited so the total acres of grassland habitat within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate. Nonetheless, Table 39 lists the acreages of associated habitats impacted by the Project, as well as the total acreage available within the analysis area for the gray-blue butterfly.

Table 39. Gray-blue Butterfly Habitat Associations						
Habitat Type	**Association**	**Activities**	**Total Acres Removed1/**	**Total Acres Modified1/**	**Total Acres in Analysis Area2/**	**Percentage Impacted**
Westside Grasslands3	Close	Feeds and Breeds	2.53	0.33	11	25.99%
Eastside Grasslands3	Close	Feeds and Breeds	1.59	0.14	18	9.80%
Herbaceous Wetland	Close	Feeds and Breeds	0.00	0.00	21	0.00%
Total			**4.12**	**0.47**	**50**	**9.25%**

1/ Totals taken from Table 7 for the Rogue River and Winema national forests in which the species has been documented to occur. Totals do not include the Umpqua National Forest because the proposed action does not cross the Umpqua National Forest within the range of the species.

2/ Totals taken from Table 3 for the Rogue River and Winema national forests in which the species has been documented to occur. Totals do not include the Umpqua National Forest because the proposed action does not cross the Umpqua National Forest within the range of the species.

3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Based on these habitat association assumptions, approximately 4 acres, or 9 percent of available potentially suitable habitat within the analysis area would be affected by the Project; all three habitat types identified are assumed to be used by the gray-blue butterfly for feeding and breeding.

Direct mortality could occur to this species if individuals are located within the ROW during Project clearing or construction, including mortality of eggs, caterpillars, and nectaring adults, although adults would likely be able to fly out of the way of construction equipment. Another potential direct effect is destruction or alteration of the high elevation wetland and meadow habitats used by this species. However, these habitats within the ROW would be revegetated following construction to approximate the original pre-disturbed condition. As described in Pacific Connector’s Erosion Control and Revegetation Plan (Appendix I of the POD), all graded areas associated with pipeline construction would be regraded and recontoured as feasible to blend into the surrounding landscape and to reestablish natural drainage patterns. This would minimize changes in hydrology, which is listed as a threat to this species. Pacific Connector would also mitigate soil compaction during ROW restoration by regrading, recontouring, and scarifying compacted areas. These actions would promote infiltration, reduce surface water runoff, minimize erosion, and enhance revegetation efforts.

Indirect effects could result from the alteration of composition and structure of food plants resulting from changes in hydrology or soil compaction. However, as described above, changes in hydrology and soil compaction would be minimized following construction, and the ROW would be reseeded using an appropriate seed mix, which would minimize the loss of food plants in the long term. Therefore, although the Project could result in some impacts to individuals and habitat, considering site restoration measures designed to minimize compaction and changes in hydrology, and promote revegetation, the Project is not expected to result in a loss of viability for this species.

Cumulative Effects

The cumulative effects analysis area for the gray-blue butterfly includes the fifth field watersheds crossed by the Project on the Rogue River and Winema national forests (Table 14). As stated above, the Project does not cross the Umpqua National Forest within the suspected distribution of the species; therefore no impacts are expected within the Umpqua National Forest and it is not included in this analysis. Habitat types preferred by the gray-blue butterfly have been negatively impacted over the past 200 years. Development has concentrated around bodies of water, increasing disturbance and eliminating habitat. Wetlands and wet meadows have been drained and trampled by grazing livestock. However, the NWFP has special land use allocations around riparian areas, streams, lakes, ponds, and wetlands that protect these resources. Wetlands are often associated with meadows, another habitat component for blue-gray butterflies. Meadows are further protected under the NWFP through measures that conserve great gray owl habitat by prohibiting tree-clearing within 300 feet of a meadow's edge. In addition, standards and guidelines within the NWFP limit livestock grazing around aquatic areas. These actions would likely lead to improved quantity and quality of suitable blue-gray butterfly habitat on NFS land within the analysis area.

Construction of the pipeline and associated facilities would affect 953 acres within the cumulative effects analysis area, or 0.2 percent of the total watershed area (Table 14). The Project would result in habitat modification as well as potential direct mortality to individuals during construction. However, as described above, effects would be short term because meadow habitats within the ROW would be revegetated following construction to approximate the original pre-disturbed condition.

Mitigation actions on NFS lands would affect 2,407 acres within the cumulative effects analysis area, or 0.5 percent of the total watershed area (Table 14). However, the only Project-related mitigation actions proposed by the Forest Service in the cumulative effects analysis area with the potential to affect the gray-blue butterfly is the meadow habitat planting project described above for the Siskiyou short-horned grasshopper. This meadow habitat planting, designed to benefit other meadow species (Mardon skipper, Siskiyou short-horned grasshopper) within the ROW on 20 acres in the Rogue River National Forest, could also benefit the gray-blue butterfly.

Other planned projects within watersheds where the proposed action crosses the Rogue River and Winema national forests include a variety of timber, grazing, and biological projects (Table 13). The thinning and noxious weed treatments would most likely contribute to the long term health of the ecosystem. However, the timber sales and grazing allotments could contribute to habitat alteration and disturbance within the vicinity of the proposed Project, especially where the livestock grazing tramples food plants and alters hydrology by compacting soil at high elevation wet meadows.

The proposed Project, including mitigation actions, would affect approximately 3,360 acres. Combined with 13,181 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 16,541 acres, or 3.7 percent of the total watershed area (Table 14). The proposed action combined with reasonably foreseeable actions could contribute to forest succession and impacts from grazing, which are listed as threats to the species (Opler et al. 2006). However, meadow habitat planting and ROW restoration would mitigate these effects. Therefore, cumulative impacts on the gray-blue butterfly are expected to be insignificant, because the combined impacts to the 3.7 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts and promote meadow habitat are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B to Appendix I of the POD), and the Erosion Control and Revegetation Plan (Appendix I of the POD). Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit the gray-blue butterfly are also described above under cumulative effects. Additionally, a native grass mix would be used to benefit federally listed plant species and may also provide suitable habitat for the butterfly.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the gray-blue butterfly because the proposed Project would affect only approximately 4 acres of potentially suitable habitat, and would restore the ROW to pre-disturbance conditions following construction.

6.2.6.6 Johnson's Hairstreak (Callophrys johnsoni)

Species Status in the Project Area

The Johnson's hairstreak butterfly is found on Pacific-sloped mountains from British Columbia south to central California. In Oregon, populations have been found on the west side of the southern Cascade Mountains. In western Oregon, the species occupies a wide range of elevations, between 500 to over 5,000 feet (Warren 2005). There are 121 sites in Oregon and Washington and an undisclosed number of sites on NFS land (Andrews 2010b, Davis and Weaver 2011, Stone et al. 2011). As shown in Table 1, the species has been documented in all three national forests crossed by the Project. Neither the Forest Service nor ORBIC location database records contained observations of the Johnson's hairstreak butterfly within 3 miles of the Project on NFS lands.

Larsen et al. (1995) states that old-growth and late successional second growth forests provide the best habitat for this butterfly, although younger forests where mistletoe (*Arceuthobium* spp.) is present also supports populations. The most important habitat features to predict moderate to high abundance is the presence of its host larval plant, pine dwarf mistletoe (Davis 2009). The butterfly can occur in western hemlock (*Tsuga heterophylla*), ponderosa pine (*Pinus ponderosa*) or white fir (*Abies concolor*) forests that are infected with mistletoe (Davis 2009). Once hatched, caterpillars feed on the host plant (Opler et al. 2006). Caterpillars can be found on host leaves April to October (Allen et al. 2005). Adults fly from mid-May to early September with peaks occurring in May and August (Pyle 2002, Davis 2009). Adult food plants include nectar from genera *Actostophylos, Ceanothus, Cornus, Fragaria, Rorippa, Spraguea,* and *Taraxacum* (Andrews 2010b).

Threats to the species are not fully understood but timber harvest and clearing, particularly involving stands that contain larval plants, is assumed to be the primary threat (Andrews 2010b). Additional threats may include the aerial broadcast of the bacteria *Bacillus thuringiensis kurstaki* to control spruce budworm outbreaks, although it is not know to what extent. Finally, herbicides may remove nectar plants which may affect individuals (Andrews 2010b).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes coniferous forests within 3,200 feet of the proposed action on the three national forests crossed by the Project. Based on the habitat description above, we inferred that Johnson's hairstreak is closely and generally associated with the Johnson and O'Neil (2001) habitat types shown below, especially where its host larval plant, pine dwarf mistletoe, is present. Table 40 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the Johnson's hairstreak.

Table 40. Johnson's Hairstreak Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside-Lowland Conifer-Hardwood-Forest	General	Feeds and breeds	0.00	0.00	0	0.00%
Montane Mixed Conifer Forest	General	Feeds and breeds	75.31	26.38	1,766	5.76%
Southwest Oregon Mixed Conifer-Hardwood Forest	General	Feeds and breeds	318.28	94.99	14,704	2.81%
Ponderosa Pine Forest and Woodlands	General	Feeds and breeds	0.00	0.00	821	0.00%
Westside Oak and Dry Douglas-fir Forest and Woodlands	General	Feeds and breeds	0.00	0.00	0	0.00%
Total			**393.59**	**121.37**	**17,291**	**2.98%**

1/ Totals taken from Table 7 for the Rogue River, Winema, and Umpqua national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Rogue River, Winema, and Umpqua national forests in which the species has been documented to occur.

Based on these habitat association assumptions, approximately 3 percent of available potentially suitable habitat within the analysis area would be affected by the Project.

This species could be negatively impacted by the Project by the clearing of mistletoe host trees containing eggs or larvae and by alteration of habitat which could impact adult food plants and remove potential host trees, all of which are listed as current threats to this species (Andrews 2010b). Pacific Connector's removal of timber outside of the core migratory bird breeding season (April 1–July 15) would minimize the potential for the removal of host trees containing eggs or larvae; however, eggs could be present and cleared before this period, and larvae remaining after this period could be killed. Indirect effects could result from the alteration of composition and structure of vegetation resulting in changes in microclimate. However, the Project would only affect approximately 3 percent of habitat available within the analysis area. Additionally, impacts to old-growth and late successional forests that provide the best habitat for this butterfly have been minimized where feasible.

Application of herbicides during noxious weed treatments may also have an indirect effect on the species by removing nectar sources. Vegetation at aboveground facilities would be periodically maintained using mowing, cutting, trimming and the selective use of herbicides[6]. Project herbicide application could reduce available floral sources for the Johnson's hairstreak, which Andrews (2010b) lists as a threat. However, herbicides would only be used where they are most appropriate treatment method, and would be applied using spot treatments to minimize impact to native or non-target species. The Project would not contribute to the third threat listed above, application of the bacterium *Bacillus thuringiensis kurstaki* to control spruce budworm outbreaks.

Cumulative Effects

The Johnson's hairstreak cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 14).The primary threat to Johnson's hairstreak is timber harvest and clearing. Over the past 200 years, timber clearing has dramatically decreased late successional and old-growth forest habitats in Oregon upon which the Johnson's hairstreak depends. Compared to historical times, only eight percent of this habitat type remains in the Coast Range of Oregon, 23 percent in the West Cascades, and 25 percent in the Klamath Mountains province (ODFW 2006). The NWFP designates late successional and old-growth forests on federal lands as protected areas and manage them for optimal habitat characteristics. Because the larval host plant is associated with late-seral and old growth habitat, management under the NWFP would maintain or potentially increase the quality and quantity of Johnson's hairstreak habitat in the future.

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Project impacts would include habitat destruction, as well as potential effects from herbicide use.

[6] Pacific Connector would obtain applicable approvals or permits for use of herbicides on federal lands prior to use/treatment. Herbicides currently approved for use on NFS land include Chlorsulfuron, Glyphosate, Imazapyr, Metsulfuron methyl, Picloram, Sulfometuron methyl, Triclopyr, Sethoxydim, and Imazapic; see Pacific Connector's Integrated Pest Management Plan for details, Appendix N to the POD.

However, impacts to old-growth and late successional forests that provide the best habitat for this butterfly have been minimized where feasible.

Proposed Forest Service mitigation actions in the cumulative effects analysis area include reallocation of Matrix to LSR, road closure decommissioning, and pre-commercial thinning. Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14). There could be some negative short-term impacts of these actions, including disturbance during implementation and potential removal of the host larval plant, pine dwarf mistletoe. However, overall, these projects would benefit the Johnson's hairstreak through habitat improvements and a reduction in disturbance over the long term. Reallocation of Matrix to LSR would offset the long-term loss of LSR acres, and thus ensure future availability of late-successional habitat. Decommissioning and planting of selected roads in conjunction with pre-commercial thinning treatments would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years. Density management of forested stands would assist in the recovery of late-seral habitat, reduce impacts from fragmentation, reduce edge effects, and enhance resilience of mature stands, all of which would benefit this late-successional associated species.

Other planned projects within the cumulative effects analysis area that could affect the Johnson's hairstreak include a variety of timber projects. Forest Service projects include several timber treatments; other projects include BLM timber sale and forest management projects (Table 13). Most of these projects would contribute to the assumed primary threat to this species, timber harvest and clearing, however the thinning and fuel reduction actions planned as part of the BLM forest management projects would improve habitat for Johnson's hairstreak (Andrews 2010b).

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,070 acres, or 6.9 percent of the total watershed area (Table 14). The proposed action combined with reasonably foreseeable actions would contribute to the threats to this species from timber harvest and clearing. However, cumulative impacts on the Johnson's hairstreak are expected to be insignificant because the combined impacts to the 6.9 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B to Appendix I of the POD), and the Erosion Control and Revegetation Plan (Appendix I of the POD). Additionally, the Forest Service has proposed re-allocation of approximately 1,100 acres of forested lands from matrix to LSR allocation (Table 13), which would benefit Johnson's hairstreak over time by providing additional habitat that is managed to create late successional–old growth stand conditions.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Johnson's hairstreak butterfly since the proposed Project would affect only about 3 percent of available potentially suitable habitat for this species within the analysis area.

6.2.6.7 Mardon Skipper (Polites mardon)

Species Status in the Project Area

This butterfly species' distribution is limited to sites located in the southern Puget Sound of Washington, the Mt. Adams area in southern Washington, the north coast of California, and the Cascade Range in southern Oregon. Many seemingly suitable habitats within the Cascade Range are currently unoccupied (NatureServe 2013). Within Oregon, the Mardon skipper can be found in Jackson and Klamath Counties. As shown in Table 1, the species is suspected to occur in the Umpqua and Winema national forest and has been documented in the Rogue River National Forest. The Mardon skipper has been observed 3 times within 3 miles of the Project in the Rogue River National Forest.

The Mardon skipper is a small butterfly that inhabits grassland and meadow habitats dominated by fescue grasses (*Festuca* spp.). They complete one life cycle annually, with adults emerging from their chrysalis in late spring or early summer. Following mating, females deposit their eggs onto the stalks of fescue. The eggs hatch after 6 to 7 days, after which the larva feeds on fescue grasses for about 3 months before hibernating through the winter and spring as a pupa (Black and Vaughan 2005). Adults feed on the nectar of a variety of plants including blue violet (*Viola adunca*), lupine (*Lupinus* spp.), Idaho blue-eyed grass (*Sisyrinchium idahoense*), penstemon (*Penstemon* spp.), western wallflower (*Erysimum capitatum*), and clover (*Trifolium* spp.); Scotch broom (*Cytisus scoparius*) is strongly avoided. Very little movement between populations or suitable habitat is believed to occur due to the Mardon skipper's inability to traverse through unsuitable habitat such as closed woodlands and shrub thickets (Black and Vaughan 2005). Most sites support less than fifty butterflies, while none support more than a few hundred (Black and Vaughan 2005).

Threats to Mardon skipper include direct impacts to eggs, larvae and pupae by unregulated off-road vehicle use, livestock grazing, and application of the bacterium *Bacillus thuringiensis kurstaki*, used to control spruce budworm outbreaks (Kerwin 2011). Habitat loss or modification through conifer encroachment, noxious weed invasion, roadside maintenance, and grassland/meadow management activities such as prescribed burning and mowing are also threats (Kerwin 2011). Stochastic events and climate change also threaten this species (Kerwin 2011).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable mardon skipper habitat within 3,200 feet of the proposed action in the three national forests crossed by the Project. Based on the habitat description above, we inferred that the mardon skipper is associated the Westside Grasslands and Eastside Grasslands Johnson and O'Neil (2001) habitat types, as shown below. Table 41 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the mardon skipper.

Table 41. Mardon Skipper Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed1/	Total Acres Modified1/	Total Acres in Analysis Area2/	Percentage Impacted
Westside Grasslands3	Close	Feeds and Breeds	2.53	0.33	11	25.99%
Eastside Grasslands3	Close	Feeds and Breeds	1.59	0.14	18	9.80%
Total			**4.12**	**0.47**	**29**	**16.02%**

1/ Totals taken from Table 7 for the Rogue River, Winema, and Umpqua national forests in which the species has been documented or is suspected to occur.

2/ Totals taken from Table 3 for the Rogue River, Winema and Umpqua national forests in which the species has been documented or is suspected to occur; does not include habitat located on other federal or non-federal lands.

3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate

Based on these habitat association assumptions, approximately 4 acres, or 16 percent of available potentially suitable habitat within the analysis area would be affected by the Project. However, as discussed above, these calculations of potentially suitable habitat are likely overestimates as grassland habitat outside of the Project area was not fully delineated.

Pipeline construction could directly affect the Mardon skipper by increasing invasion by exotic plant species, impacting grassland habitat, or by direct mortality or disturbance during construction activities, all of which Kerwin (2011) lists as threats to this species. Eggs or pupae could also be destroyed during vegetation removal. Indirect effects could result from the alteration of composition and structure of vegetation resulting in changes in microclimate. However, these habitats within the ROW would be revegetated following construction to approximate the original pre-disturbed condition, and would be replanted with appropriate seed mixes to help reduce noxious weed germination. Additionally, after construction, the ROW would be monitored and any noxious weed infestations would be controlled as described in Pacific Connector's Integrated Pest Management Plan (Appendix N to the POD). Therefore, although the Project could result in some impacts to individuals and habitat, considering site restoration measures designed to promote revegetation with desirable species and prevent the spread of noxious weeds, the Project is not expected to result in a loss of viability for this species.

Cumulative Effects

The mardon skipper cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema and Rogue River national forests (Table 14). Native grasslands are one of the most imperiled habitats in the western U.S., including Oregon, due to conversion to agriculture, development, invasion by non-native plant species, and fire suppression. In the Coast Range and West Cascades of Oregon, grassland loss since historical times is estimated at 99 percent (ODFW 2006). Sustainable grazing practices help maintain existing grasslands. Noxious weed treatments promote native vegetation and may benefit native grasslands and pastures.

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). As described above, Project impacts would include habitat modification as well as potential mortality of individuals during construction. However, removal of woody vegetation by the Project and maintenance of the ROW in an early seral stage could create habitat for this species, and post-construction restoration would help reduce noxious weeds from establishing. Approximately 104 acres (30 percent) of the construction ROW is currently forested but would be maintained in an early seral stage within the 30-foot permanent corridor (Appendix B).

Proposed Forest Service mitigation actions in the cumulative effects analysis area that would affect the mardon skipper include fuels reduction and meadow habitat planting projects. These mitigation actions would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14). Fuels reduction projects could negatively affect the mardon skipper by contributing to fire prevention, which could result in conifer encroachment which is listed as a threat to this species. However, within the Rogue River National Forest approximately 20 acres of the ROW near a known population on the Dead Indian Plateau would be planted with species preferred by the mardon skipper, resulting in habitat creation (Table 13).

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). Forest Service projects include a weed treatment project, several timber treatments, grazing, and a fuelbreak project; other projects include BLM timber sales, grazing, and forest management projects (Table 13). The noxious weed treatments would benefit the mardon skipper by reducing the threat of noxious weed invasion, and meadow restoration planned on BLM lands as part of a forest management project could also improve habitat for Mardon skipper. However, the timber sales and livestock grazing allotments could contribute to habitat alteration and trampling of individuals within the vicinity of the proposed Project.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,070 acres, or 6.9 percent of the total watershed area (Table 14). The proposed action combined with reasonably

foreseeable actions could result in meadow habitat loss through fire prevention and the associated conifer encroachment, and trampling of individuals during livestock grazing; both are listed as a threat to this species. However, clearing of the ROW and restoration following construction would create habitat for the mardon skipper. Therefore, cumulative impacts on the mardon skipper are expected to be insignificant, because the combined impacts to the 6.9 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would minimize Project-related impacts include revegetating and reseeding the ROW using native vegetation, avoiding soil compaction by performing construction during dry periods (May-October) and potentially using helicopters in rugged terrain, and controlling for invasive species after construction (see Appendix N of FERC’s BA).

As discussed above, approximately 20 acres of the ROW near a known population on the Dead Indian Plateau would be restored with grasses (including *Festuca* sp.) preferred by the Mardon skipper in addition to the rehabilitation required under best management practices guidelines. In addition, 6.7 miles of roads in the Umpqua National Forest would be treated for noxious weeds and approximately 124 acres of meadow would be restored on the Umpqua National Forest within the Elk Creek and Upper Cow Creek watersheds that would benefit native species including Mardon skipper (Table 13).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **“may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species**” for the Mardon skipper butterfly since the proposed Project would affect approximately 4 acres of potentially suitable habitat for this species, but create approximately 20 acres of Mardon skipper habitat by planting grass species preferred by the Mardon skipper on 20 acres of the ROW, and controlling for noxious weeds throughout the ROW.

6.2.6.8 Coronis Fritillary (Speyeria coronis coronis)

Species Status in the Project Area

This butterfly subspecies is found in low densities in the Siskiyou Mountains of Oregon. The majority of known records are from Josephine County, and there are a few records from Jackson County, including the lower Rogue River valley and the Illinois River valley (Scheuering 2006; Jordan 2011). As shown in Table 1, the subspecies is suspected to occur on the Umpqua and Rogue River national forests; it is not suspected to occur in the Winema National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the Coronis fritillary within 3 miles of the Project on NFS lands.

This subspecies inhabits mountain slopes, foothills, dry gulches, lower elevation canyons, prairie valleys, meadows, chaparral, sage steppe, and forest glades, margins, and openings (Evergreen Aurelians 1996, Opler et al. 2011). Most known records are from lower slopes at elevations less than 2,000 feet, although elevations of 4,400 feet and 5,100 feet have also been recorded (Scheuering 2006). In Oregon, *Speyeria coronis coronis* adults often congregate on hillsides and meadows overgrown with rabbitbrush (*Ericameria* spp., *Chrysothamnus* spp.) and sagebrush (*Artemisia* spp.; Dornfeld 1980). The common food plant are species in the *Viola* genus.

Recent surveys of *S. coronis coronis* in Josephine County found this species to be generally associated with serpentine influenced, rocky hill-slopes dominated by Jeffery pine (*Pinus jeffreyi*) and other serpentine associated forbs and grasses (Reilly and Black 2011). The serpentine region of the Siskiyou Mountains consists of a roughly 450 square mile area that extend from the California border beyond Medford and includes portions of the Rogue River National Forest (Brooks 1987). Jackson County (i.e., Umpqua and Rogue River national forests) contain little serpentine soils so habitat conditions are likely different to what is found in the Illinois Valley, approximately 60 miles southwest.

On NFS lands, conifer encroachment and wildfire are potential threats at historical, current, and suspected sites. Controlled burning could also be an issue if conducted on a large scale in areas where this subspecies is known or suspected to occur. Additionally, habitat for this butterfly is threatened by off-road vehicle use at some sites (Jordan 2011).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable coronis fritillary habitat within 3,200 feet of the proposed action on the Rogue River and Umpqua national forests. Based on the habitat description above, we inferred that coronis fritillary is closely and generally associated with the Johnson and O'Neil habitat types shown below, especially on rocky hillslopes and where its primary host plant (*Viola hallii*) occurs. Table 42 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the coronis fritillary.

Table 42. Coronis Fritillary Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Southwest Oregon Mixed Conifer-Hardwood Forest	General		269.36	90.74	13,805	2.61%
Shrub-Steppe	Close	Feeds and breeds	7.35	0.59	52	15.40%
Westside Grasslands[3/]	Close	Feeds and breeds	2.53	0.33	11	25.99%

Table 42. Coronis Fritillary Habitat Associations						
Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Eastside Grasslands[3/]	Close	Feeds and breeds	0.38	0.00	1.0	38.45%
Total			**279.63**	**91.65**	**13,869**	**2.68%**

1/ Totals taken from Table 7 for the Rogue River and Umpqua national forests in which the species has is suspected to occur.

2/ Totals taken from Table 3 for the Rogue River and Umpqua national forests in which the species has been documented to occur.

3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Based on these habitat association assumptions, approximately 3 percent of available potentially suitable habitat within the analysis area would be affected by the Project, although over 50 percent of feeding and breeding habitat would be affected. However, not all the acreage listed here is likely suitable habitat as the specific habitat components associated with this species may not be present, including rocky slopes and the presence of host violet species (*Viola* sp.). Additionally, little to no serpentine soils are likely present within the analysis area so the species is not expected to occur in the densities found at locations to the southwest in Josephine County where serpentine soils and associated vegetation are prevalent.

Direct mortality could occur to this species if they are located within the ROW during Project clearing or construction of suitable habitat such as chaparral, sage, or meadows are destroyed or altered. Indirect effects could result from the alteration of composition and structure of vegetation resulting in changes in microclimate. Soil compaction may occur from construction machinery while new artificial clearings may promote invasive weeds and alter hydrology. However, non-forested habitats within the ROW would be revegetated following construction to approximate the original pre-disturbed condition, and would be replanted with appropriate seed mixes to help reduce noxious weed germination. Additionally, after construction, the ROW would be monitored and any noxious weed infestations would be controlled as described in Pacific Connector's Integrated Pest Management Plan (Appendix N to the POD).

Herbicides used to treat invasive weeds may remove nectar plants which may affect individuals, although herbicides would only be used where they are most appropriate treatment method, and would be applied using spot treatments to minimize impact to native or non-target species. Additionally, Jordan (2011) lists conifer encroachment, wildfire, controlled burning, and off-road vehicle use as threats to this species on NFS lands; the Project would not contribute to these threats, and may reduce conifer encroachment by clearing woody vegetation from the ROW.

Cumulative Effects

The coronis fritillary cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River and Umpqua national forests (Table 14). Serpentine soil habitats preferred by the Coronis fritillary have been previously impacted by mining, recreation, and timber harvest. Mining development concentrated around serpentine deposits, fragmenting habitats with roads. Although mining claims on national forests are no longer at historical levels, habitat impacts from development remain. Through motorized vehicle use plans, national forests limit the type and extent of off-road vehicle use (Forest Service 2009). Even though serpentine areas are generally low in forest productivity these lands have been cut for timber resulting in accelerated soil erosion and vegetation changes. Natural recolonization of disturbed serpentine soils is generally slow often taking decades for vegetation to become established. Managing these actions would likely lead to improved quantity and quality of suitable Coronis fritillary habitat on NFS lands.

Construction of the pipeline and associated facilities would affect 1,643 acres within the cumulative effects analysis area, or 0.2 percent of the total watershed area (Table 14). As described above, Project impacts would include habitat modification as well as potential mortality of individuals during construction. However, removal of woody vegetation by the Project and maintenance of the ROW in an early seral stage could create habitat for this species, and post-construction restoration would help reduce noxious weeds from establishing. Within the Rogue River and Umpqua national forests, 83 acres (29 percent) of the construction ROW is currently forested but would be maintained in an early seral stage within the 30-foot permanent corridor (Appendix B).

Project-related mitigation actions proposed by the Forest Service in the cumulative effects analysis area that would affect the coronis fritillary include fuels reduction and meadow habitat planting projects. Mitigation actions on NFS lands would affect 7,348 acres within the cumulative effects analysis area, or 1.1 percent of the total watershed area (Table 14). Fuels reduction projects could negatively affect the Coronis fritillary by contributing to fire prevention, which could result in conifer encroachment which is listed as a threat to this species. However, wildfire is also listed as a threat to this species so reducing fire risk could benefit this species. Additionally, meadow habitat planting designed to benefit other meadow species (Mardon skipper, Siskiyou short-horned grasshopper) within the ROW on 20 acres in the Rogue River National Forest could also benefit the coronis fritillary. Lupine meadow restoration proposed for 124 acres in the Umpqua National Forest may also benefit this species.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). Forest Service projects include noxious weed treatment, several timber treatments, grazing allotments, and a fuelbreak project; other projects include BLM timber sales, commercial thinning, and forest management projects (Table 13). The noxious weed treatments would benefit the Coronis fritillary by reducing the threat of noxious weed invasion, and meadow restoration planned on BLM lands as part of a forest management project could also improve habitat for Coronis fritillary. However, the timber sales and grazing allotments could contribute to habitat alteration and disturbance within the vicinity of the proposed Project.

The proposed Project, including mitigation actions, would affect approximately 8,983 acres. Combined with 36,272 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 45,255 acres, or 6.7 percent of the total watershed area (Table 14). The proposed action combined with reasonably

foreseeable actions could result in meadow habitat loss through fire prevention and the associated conifer encroachment, which is listed as a threat to this species. However, as wildfire is also listed as a threat to this species, the fire suppression projects would also benefit the coronis fritillary. Additionally, clearing of the ROW and restoration following construction would create habitat for the coronis fritillary. Therefore, cumulative impacts on the coronis fritillary are expected to be insignificant, because the combined impacts to the 6.7 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts include revegetation and reseeding efforts, and road decommissioning and riparian planting that reduce soil compaction. To further avoid soil compaction, construction would occur during dry periods (May-October) and potentially use helicopters in rugged terrain (see Appendix N of FERC's BA).

Proposed Forest Service mitigation activities that would generally benefit butterflies includes native grass restoration within 20 acres of the Rogue River National Forest and treatment of 6.7 miles of noxious weeds in the Umpqua National Forest. Additionally, the Forest Service has proposed 124 acres of meadow restoration on the Umpqua National Forest within the Elk Creek and Upper Cow Creek watersheds that would benefit butterfly species (Table 13).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the Coronis fritillary butterfly because the proposed Project would affect a small amount of the suitable serpentine habitat for this species, if any, and the highest population densities are located approximately 60 miles southwest of the Project.

6.2.7 Aquatic Invertebrates

Surveys were not conducted specifically for all special status aquatic invertebrates. Five of the 14 sensitive aquatic invertebrate species that are documented or suspected to occur in the three national forests crossed by the Project received Project-specific surveys (Table 1). These five species were not found during surveys so they are not discussed here. The information on sensitive species occurrence is based on several GIS data sources including ORBIC occurrence records (ORBIC 2017), Johnson and O'Neil (2001) habitat associations, and the Forest Service NRIS database (Forest Service 2017).

6.2.7.1 California Floater Mussel (Anodonta californiensis)

Species Status in the Project Area

The California floater mussel has been documented in Arizona, California, Idaho, Nevada, Oregon, Utah, Washington, and Wyoming (Jepsen et al. 2010). As shown in Table 1, the species has been documented in the Winema, and is suspected to occur in the Rogue River and Umpqua national forests. Neither the Forest Service nor ORBIC location database records contained observations of the California floater mussel within 3 miles of the Project on NFS lands (Forest Service 2017, ORBIC 2017).

This species typically inhabits lakes, reservoirs, and slow-moving streams with mud or sand substrates at low elevations, although they have also been found in rivers and creeks with gravel substrates and can occupy streams and springs in higher reaches of drainage basins with good water quality (Jepsen et al. 2010). This species is a relatively sedentary filter feeder that consumes plankton and other particulate matter suspended in the water column (Jepsen et al. 2010). The California floater grows quickly and has a maximum lifespan of about 15 years.

Like other freshwater mussels in North America, threats to the California floater include loss of host fish, channel modification from channelization, dredging, restoration activities, contamination, sedimentation, nutrient enrichment, water withdrawal and diversion, thermal pollution, over-grazing of riparian areas, and the introduction of non-native and invasive aquatic species (Jepsen et al. 2010). The California floater is specifically threatened by low genetic diversity as a result of recent population reductions (Mock et al. 2010).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes river and stream habitat within 700 feet of the proposed action within all three forests crossed by the Project (12 acres, Table 2). The Project would impact 0.6 acres (Table 7), representing 5 percent of available habitat. Waterbodies to be crossed by the Project are shown in Appendix C; we assume that California floater mussel could be present in all of these waterbodies. Waterbodies crossed include 12 on the Umpqua National Forest, 3 on the Rogue River National Forest, and 3 on the Winema National Forest (Appendix C).

The dry open cut method used to cross waterbodies would either be flume or dam and pump, both of which maintain downstream flows and isolate the construction area from the streamflow. Construction across small or intermediate waterbodies generally takes seven days using these methods. Some mortality could occur to individuals with this process, especially because they are sensitive to dewatering. Turbidity increases are generally low using this crossing method but could increase temporarily. Indirect effects could occur through the harvest of riparian vegetation on either side of the stream for the width of the ROW, potentially increasing sedimentation and solar exposure. Discharge of contaminants into streams from construction equipment is not expected.

Cumulative Effects

The California floater mussel cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Rogue River, and Winema national forests (Table 14). Habitat types preferred by the California floater mussel have been negatively impacted over the past 200 years. The concentration of human development around suitable habitat has increased disturbance and eliminated habitat. Riparian areas have been damaged and removed by timber clearing practices and conversion to other uses. Riparian areas have also been trampled and polluted by grazing livestock. However, the NWFP has special land use allocations around Riparian Reserves, streams, lakes, ponds, and wetlands that protect these resources. Standards and guidelines within the NWFP limit livestock grazing around aquatic areas and provide measures to minimize impacts from timber harvest. These actions would likely lead to improved quantity and quality of suitable California floater mussel habitat, and the fish that they depend upon, on NFS lands within the analysis area.

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Project impacts on the California floater mussel include mortality during construction, as well as negative effects associated with increased sedimentation during construction, and following construction as a result of riparian vegetation removal. However, proposed mitigation would reduce sedimentation in the long-term within the cumulative effects analysis area. Mitigation actions proposed for NFS lands that could affect resources used by the California floater mussel include fish passage, fuels reduction, road storm proofing, road decommissioning, in-stream LWD placement, riparian planting, and stream crossing repair projects.

Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14). Sediment could be mobilized into waterbodies during fish passage, road decommissioning, and stream crossing repair projects, especially where culverts are removed or replaced; however, long term beneficial effects include reconnection of aquatic habitats, sediment reduction, and shade restoration. Restoration of these crossings includes riparian planting as a mitigation which would help offset the impact of shade removal where the Project affects streams and riparian areas. Fuels reduction and in-stream LWD placement projects would benefit the California floater mussel. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time. Fuels reduction projects would lower the risk of loss of mature stands and other valuable habitats to high-intensity fire, which can contribute substantial sediment to streams and result in flooding and erosion during post-fire precipitation events.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). Forest Service projects that could additionally impact the California floater mussel include a grazing allotment that could cause short-term channel modification and increased sedimentation, and several timber sales and timber treatments that could potentially increase sedimentation and disturb riparian vegetation. However, multiple aquatic restoration projects within the Umpqua River sub-basin would benefit water quality and fish habitat within the watershed. Restoration projects include culvert replacements, Riparian Reserve timber thinning and road decommissioning.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,070 acres, or 6.9 percent of the total watershed area (Table 14). The proposed action combined with reasonably

foreseeable actions would contribute to sedimentation, which is listed as a threat to this species. However, Project mitigation as well as other planned projects would reduce sedimentation overall within the cumulative effects analysis area long-term through riparian planting and various culvert repair and road closure and decommissioning projects. Therefore, cumulative impacts on the California floater mussel are expected to be insignificant, because the combined impacts to the 6.9 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B to Appendix I of the POD), the Erosion Control and Revegetation Plan (Appendix I of the POD), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of FERC's BA).

Several proposed Forest Service projects within the Rogue River, Winema, and Umpqua national forests would benefit the mussel and include the repair of stream crossings, riparian plantings and in-stream placement of woody debris that would provide cover and improve stream integrity (Table 13).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the California floater mussel because the proposed Project would affect a small amount of the suitable habitat for this species (approximately 5 percent within analysis area) and because of the waterbody and wetland crossing methods that would be applied during construction.

6.2.7.2 Western Ridged Mussel (Gonidea angulata)

Species Status in the Project Area

Western ridged mussels are broadly distributed in Washington, Oregon, California, Idaho, Nevada, possibly Montana (Gangloff and Gustafson 2000), and southern British Columbia. In Oregon this species historically occurred in rivers of the Coast Range, and the main stem and tributaries of the Columbia River, including tributaries to the Snake and Malheur Rivers and John Day River mainstem (Brim Box et al. 2006). As shown in Table 1, the species has been documented in the Winema, and is suspected to occur in the Rogue River and Umpqua national forests. Neither the Forest Service nor ORBIC location database records contained observations of the western ridged mussel within 3 miles of the Project on NFS lands (Forest Service 2017, ORBIC 2017).

This species inhabits creeks and rivers of all sizes and can be found on substrates varying from firm mud to coarse particles; it is rarely found in lakes or reservoirs (Taylor 1981, Frest and Johannes 1995). Freshwater mussels are filter feeders that consume phytoplankton and zooplankton suspended in the water. The western ridged mussel is a relatively slow growing and long lived species that may live 20 to 30 years (Vannote and Minshall 1982, COSEWIC 2003). Fertilized juvenile mussels attach to host fish for a period of weeks to months. Gravid females have been found from late March through mid-July, and juvenile mussels have been observed on fish from late March to early August (COSEWIC 2003, Spring Rivers 2007).

Threats include loss of host fish, introduction of non-native fish, dams, channel modification from channelization and suction dredge mining, thermal pollution, chemical pollution, sedimentation and siltation from silvicultural and agricultural practices, water withdrawal and diversion, and livestock grazing in riparian areas (Bogan 1993, Williams et al. 1993, Hovingh 2004, Lydeard et al. 2004, Krueger et al. 2007). Because this species prefers stable habitats, it may be particularly threatened by dewatering and other activities that cause shifting substrates, water level fluctuations, and seasonal hypoxia or anoxia (COSEWIC 2003). They are also particularly vulnerable during activities such as channel modification from channelization and suction dredge mining.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes river and stream habitat within 700 feet of the proposed action within all three national forests (12 acres, Table 2). The Project would impact 0.6 acres (Table 7), representing 5 percent of available habitat. Waterbodies to be crossed by the Project are shown in Appendix C; we assume that western ridged mussels could be present in all of these waterbodies. Waterbodies crossed include 12 on the Umpqua National Forest, 3 on the Rogue River National Forest, and 3 on the Winema National Forest (Appendix C).

The dry open cut method used to cross waterbodies would either be flume or dam and pump, both of which maintain downstream flows and isolate the construction area from the streamflow. Construction across small or intermediate waterbodies generally takes seven days using these methods. Some mortality could occur to individuals with this process, especially because they are sensitive to dewatering. Turbidity increases are generally low using this crossing method but could increase temporarily. Indirect effects could occur through the harvest of riparian vegetation on either side of the stream for the width of the ROW, potentially increasing sedimentation and solar exposure. Discharge of contaminants into streams from construction equipment is not expected.

Cumulative Effects

The western ridged mussel cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Rogue River, and Winema national forests (Table 14).

Habitat types preferred by the western ridged mussel have been negatively impacted over the past 200 years. The concentration of human development around suitable habitat has increased disturbance and eliminated habitat. Riparian areas have been damaged and removed by timber clearing practices and conversion to other uses. Riparian areas have also been trampled and polluted by grazing livestock. However, the NWFP has special land use allocations around Riparian Reserves, streams, lakes, ponds, and wetlands that protect these resources. Standards and guidelines within the NWFP limit livestock grazing around aquatic areas and provide measures to minimize impacts from timber harvest. These actions would likely lead to improved quantity and quality of suitable western ridged mussel habitat, and the fish that they depend upon, on NFS lands within the analysis area.

Construction of the pipeline and associated facilities would affect 1,866 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Project impacts on the western ridged mussel include mortality during construction, as well as negative effects associated with increased sedimentation during construction, and following construction as a result of riparian vegetation removal. However, proposed mitigation would reduce sedimentation in the long-term within the cumulative effects analysis area. Mitigation actions proposed for NFS lands that could affect resources used by the western ridged mussel include fish passage, fuels reduction, road storm proofing, road decommissioning, in stream LWD placement, riparian planting, and stream crossing repair projects.

Mitigation actions on NFS lands would affect 7,462 acres within the cumulative effects analysis area, or 1.0 percent of the total watershed area (Table 14). Sediment could be mobilized into waterbodies during fish passage, road decommissioning, and stream crossing repair projects, especially where culverts are removed or replaced; however, long term beneficial effects include reconnection of aquatic habitats, sediment reduction, and shade restoration. Restoration of these crossings includes riparian planting as a mitigation which would help offset the impact of shade removal where the Project affects streams and riparian areas. Fuels reduction and in-stream LWD placement projects would also benefit the western ridged mussel. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time. Fuels reduction projects would lower the risk of loss of mature stands and other valuable habitats to high-intensity fire, which can contribute substantial sediment to streams and result in flooding and erosion during post-fire precipitation events.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). Forest Service projects that could additionally impact the western ridged mussel include grazing allotments that could cause short-term channel modification and increased sedimentation, and several timber treatments that could potentially increase sedimentation and disturb riparian vegetation. However, multiple aquatic restoration projects within the Umpqua River sub-basin would benefit water quality and fish habitat within the watershed. Restoration projects include culvert replacements, Riparian Reserve timber thinning, and road decommissioning.

The proposed Project, including mitigation actions, would affect approximately 9,328 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,070 acres, or 6.9 percent of the total watershed area (Table 14). The proposed action combined with reasonably foreseeable actions would contribute to sedimentation, which is listed as a threat to this species. However, Project mitigation as well as other planned projects would reduce sedimentation overall within the cumulative effects analysis area long-term through riparian planting and various culvert repair and road decommissioning projects. Therefore, cumulative impacts on the western ridged mussel are expected to be insignificant, because the combined impacts to the 6.9 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B to Appendix I of the POD), the Erosion Control and Revegetation Plan (Appendix I of the POD), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of FERC's BA). Several proposed Forest Service projects within the Rogue River, Winema, and Umpqua national forests would benefit the mussel and include the repair of stream crossings, riparian plantings and in-stream placement of woody debris that would provide cover and improve stream integrity (Table 13).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the western ridged mussel because the proposed Project would affect a small amount of the suitable habitat for this species (approximately 5 percent within analysis area) and because of the waterbody and wetland crossing methods that would be applied during construction.

6.2.7.3 A Caddisfly (Rhyacophila chandleri)

Species Status in the Project Area

The range of this species is restricted to alpine areas of southern Oregon and northern California; in Oregon, it is known from Deschutes, Lane, Linn, and Jefferson Counties (Jordan 2012). As shown in Table 1, the species has been documented in the Umpqua National Forest and is not suspected to occur in the Winema or Rogue River national forests. Neither the Forest Service nor ORBIC location database records contained observations of the caddisfly within 3 miles of the Project on NFS lands.

In the Cascade Mountains of Oregon, this species is associated with very cold, larger spring-fed streams at 4,000 to 5,600-foot elevation and surrounded by coniferous forest (Jordan 2012). Most *Rhyacophila* species in North America have a univoltine life history (i.e., having one brood or generation per year); however, at higher elevations the species may be semivoltine (growth season is too short for larvae to complete development in a single year). Little is known about the adult emergence, sexual maturation, mating, oviposition, dispersal, and life span of this species; although all known records in both Oregon and California show that emergence and flight period occur in late summer (July 19th to September 13th) (Jordan 2012).

Specific threats to this species have not been identified; however, since this species requires cold, spring-fed streams for survival, any actions that may influence water quality could have negative effects on the species.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes river and stream habitat within 700 feet of the proposed action within the Umpqua National Forest (1 acre, Table 2). The Project would impact 0.3 acres (Table 7), representing 30 percent of available habitat. Waterbodies to be crossed by the Project are shown in Appendix C; we assume that *Rhyacophila chandleri* could be present in all of these waterbodies. Waterbodies crossed include 12 on the Umpqua National Forest (Appendix C).

The dry open cut method used to cross waterbodies would either be flume or dam and pump, both of which maintain downstream flows and isolate the construction area from the streamflow. Construction across small or intermediate waterbodies generally takes seven days using these methods. Some mortality could occur to individuals with this process. Turbidity increases are generally low using this crossing method but could increase temporarily. Indirect effects could occur through the harvest of riparian vegetation on either side of the stream for the width of the ROW, potentially increasing sedimentation and solar exposure. Discharge of contaminants into streams from construction equipment is not expected.

Cumulative Effects

The *Rhyacophila chandleri* cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua National Forest (Table 14). Habitat types preferred by the caddisfly have been negatively impacted over the past 200 years. Riparian areas have been damaged and removed by timber clearing practices and conversion to other uses. Protection and management of riparian habitat including maintenance of shading, water quality, and sediment control would benefit this species. The NWFP designates Riparian Reserves around streams, lakes, ponds, and wetlands to protect these resources. Standards and guidelines within the NWFP limit livestock grazing around aquatic areas and provide measures to minimize impacts from timber harvest. These actions would likely lead to improved quantity and quality of suitable caddisfly habitat on NFS lands within the analysis area.

Construction of the pipeline and associated facilities would affect 913 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Project impacts on *Rhyacophila chandleri* include mortality during construction, as well as negative effects associated with increased sedimentation during construction, and following construction as a result of riparian vegetation removal. However, proposed mitigation would reduce sedimentation in the long-term within the cumulative effects analysis area. Mitigation actions proposed for NFS lands that could affect resources used by *Rhyacophila chandleri* include fish passage, fuels reduction, road storm proofing, road closure and decommissioning, instream LWD placement, riparian planting, and stream crossing repair projects. Mitigation actions on NFS lands would affect 5,055 acres within the cumulative effects analysis area, or 1.8 percent of the total watershed area (Table 14).

Sediment could be mobilized into waterbodies during road decommissioning, instream habitat enhancement, and stream crossing repair projects, especially where culverts are removed or replaced; however, long term beneficial effects include reconnection of aquatic habitats, sediment reduction, and shade restoration. Restoration of these crossings includes riparian planting as a mitigation which would help offset the impact of shade removal where the Project affects streams and riparian areas. Fuels reduction and instream LWD placement projects would benefit *Rhyacophila chandleri* if present. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time. Fuels reduction projects would lower the risk of loss of mature stands and other valuable habitats to high-intensity fire, which can contribute substantial sediment to streams and result in flooding and erosion during post-fire precipitation events. Therefore, fuels reduction projects would benefit *Rhyacophila chandleri* by protecting both the aquatic habitat used by the species, as well as the surrounding mature forests with which it is associated.

Other planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 13). Forest Service and BLM projects that could additionally impact *Rhyacophila chandleri* include grazing allotments that could cause short-term channel modification and increased sedimentation, and several timber sales and timber treatments that could potentially increase sedimentation and disturb riparian vegetation. Multiple aquatic restoration projects within the Umpqua River sub-basin would benefit water quality and fish habitat within the watershed. Restoration projects include culvert replacements, Riparian Reserve timber thinning, and road decommissioning.

The proposed Project, including mitigation actions, would affect approximately 5,968 acres. Combined with 27,561 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 33,529 acres, or 12.0 percent of the total watershed area (Table 14). The proposed action combined with reasonably foreseeable actions would contribute to sedimentation, as well as potential eutrophication from construction and timber harvest, all of which are listed as a threat to this species. However, Project mitigation as well as other planned projects would reduce sedimentation overall within the cumulative effects analysis area long-term through riparian planting and various culvert repair and road decommissioning projects. Therefore, cumulative impacts on *Rhyancophila chandleri* are expected to be insignificant, because the combined impacts to the 12.0 percent of the cumulative effects analysis area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific mitigation measures that would minimize Project-related impacts include the containment and safe disposal of hazardous materials and pollutants as discussed in the Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings and would contribute to the stability of the streambank and reduce erosion (Appendix N of FERC's BA). Project-related mitigation actions proposed by the Forest Service on NFS lands that would benefit *Rhyacophila chandleri* are also described above under cumulative effects

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the *Rhyancophila chandleri* caddisfly because the proposed action would only affect 0.3 acre of potential habitat for this species and because of the waterbody and wetland crossing methods that would be applied during construction.

6.2.7.4 Archimedes Springsnail (Pyrgulopsis archimedis)

Species Status in the Project Area

The possible range of the Archimedes springsnail includes Lower Klamath Lake and Tule Lake, California where sites have been documented in the past but have not been relocated and may be extinct (Frest and Johannes 1996). It is known from a handful of spring-influenced sites in the vicinity of Upper Klamath Lake in Klamath County, Oregon. The range description for the Archimedes springsnail is based on very few documented locations. As shown in Table 1, the species has been documented to occur on the Winema National Forest; it has not been documented and is not suspected to occur in the Rogue River or the Umpqua National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the Archimedes springsnail within 3 miles of the Project on NFS lands.

The species is found in large spring outflows and spring-influenced sites near shore in Upper Klamath Lake. It is associated with open water-lakes, rivers, and stream habitats (Frest and Johannes 1996). The species prefers sites with gravel-boulder basalt and pumice substrates and few macrophytes. It grazes on the sides and lower surfaces of larger stones (Frest and Johannes 1996). The Archimedes springsnail is a totally aquatic gastropod with a single-year lifespan. The biology of this species is not well understood and needs further investigation.

Threats to the species includes the alteration or degradation of perennial water quality. A variety of activities can impact water quality and include road construction and maintenance, livestock grazing, recreation, and dewatering springs for irrigation or construction (Frest and Johannes 1996).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes river and stream habitat within 700 feet of the proposed action within the Winema National Forest (5 acres, Table 2). The Project would impact 0.07 acres of that habitat (Table 7), representing 1.4 percent of available habitat. Waterbodies to be crossed by the Project on the Winema National Forest include Spencer Creek and two tributaries to Spencer Creek (Appendix C). These waterbody crossings are far from known Archimedes springsnail sites, with the closest known site occurring greater than 10 miles from the Project.

If the species were to occur in impacted area, habitat modification could occur. Because this snail is an annual species, the entire population may be extirpated if all individuals at an isolated spring site are lost in one incident. Any action which reduces the ground water discharge at springs or seeps may result in adverse changes to water chemistry and habitat quality in downstream habitats especially during Project related activities such as trenching and waterbody crossing. Lowering the water table or diverting the outflow of springs such that sites are dewatered, even temporarily, can eliminate an entire population (Frest and Johannes 1996).

Cumulative Effects

The Archimedes springsnail cumulative effects analysis area consists of the Spencer Creek fifth field watershed. Construction of the pipeline and associated facilities would affect 231 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 14). Potential Project impacts include habitat modification at stream crossings and potential mortality of individuals, if present. However, this species is not known to occur within 10 miles of the Project, and Upper Klamath Lake, where this species is documented, is outside the Spencer Creek fifth field watershed.

This species is threatened by habitat destruction and water quality degradation. The major determining factor for the persistence of the Archimedes springsnail at spring sites is perennial water quality. Any action which reduces the ground water discharge at springs or seeps may result in adverse changes to water chemistry and habitat quality in downstream habitats. Lake and river sites may be adversely affected by fluctuating water levels caused by drought or by draw-downs for irrigation or power generation. Several spring flows around Upper Klamath Lake have been altered during road construction, altering habitat conditions at snail sites. Sites may also be degraded by grazing cattle, as a result of trampling, pollution from feces and urine and removal of vegetation (Frest and Johannes 1996). However, the NWFP designates Riparian Reserves around streams, lakes, ponds, and wetlands to protect these resources. Standards and guidelines within the NWFP limit livestock grazing around aquatic areas and provide measures to minimize impacts from timber harvest. These actions would likely lead to improved quantity and quality of suitable habitat on NFS lands within the analysis area.

Several mitigation projects have been identified in the Spencer Creek watershed that would benefit the Archimedes springsnail, if present, by reducing sedimentation and improving riparian vegetation conditions in the long term. Riparian planting is proposed for Spencer Creek, downstream of the Project crossing. Shade provided by the plantings would contribute to moderating water temperatures in Spencer Creek, and root strength provided by new vegetation would increase bank stability and decrease erosion and sediment depositions to Spencer Creek. Fencing between the Project ROW and an adjacent grazing allotment has been proposed in order to keep cattle from grazing newly re-vegetated areas in the Project corridor, including areas where the corridor crosses Spencer Creek, thus helping to ensure that erosion control and re-vegetation objectives are met. Approximately 1.0 mile of LWD placement is proposed for Spencer Creek to mitigate Project effects by adding structural complexity to the aquatic system, trapping fine sediments, and potentially reducing the stream temperature over time. Road decommissioning and ford hardening within the cumulative effects analysis area would also improve habitat for the Archimedes springsnail, if present. Mitigation actions on NFS lands would affect 114 acres within the cumulative effects analysis area, or 0.2 percent of the total watershed area (Table 14).

Other planned projects on the Winema National Forest include a grazing allotment, road maintenance, firewood collection, noxious weed treatments, a fuels treatment, and timber harvest projects (Table 13). Livestock grazing could contribute to habitat modification and increased sedimentation, and harvest treatments could potentially disturb riparian vegetation. Both these actions could reduce water quality and thus negatively affect the Archimedes springsnail. Bank stabilization and reduction of sediment flow would likely have long-term benefits for the species.

The proposed Project, including mitigation actions, would affect approximately 345 acres. Combined with 4,470 acres of overlapping reasonably foreseeable activities, approximately 4,815 acres within the cumulative effects analysis area would be affected, or 8.9 percent of the total watershed area (Table 14). The proposed action as well as planned projects could temporarily increase sediment and remove riparian vegetation, thus degrading water quality within the cumulative effects analysis area. However, Project impacts on water quality would be temporary, and minimized or mitigated with the measures discussed below. Therefore, cumulative impacts on the Archimedes springsnail are expected to be insignificant because the combined impacts to the 8.9 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Attachments A and B to Appendix I of the POD), the Erosion Control and Revegetation Plan (Appendix I of the POD), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of FERC's BA).

Within the Winema National Forest, there are several proposed Forest Service projects planned within the Spencer Creek watershed that include stream crossing repair, riparian plantings, and in-stream placement of woody debris that would provide cover and improve stream integrity (Table 13). In addition, over 29 miles of road would be decommissioned, which would improve water quality and reduce fragmentation.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the Archimedes springsnail because the species is unlikely to be encountered, the proposed Project would affect a small amount of the suitable habitat (0.07 acres within analysis area) for this species, and because of the waterbody and wetland crossing methods that would be applied during construction.

6.2.8 Plants and Fungi

Surveys were conducted for all special status vascular plants, non-vascular plants, and fungi species on NFS lands. Botanical surveys were conducted in 2007 and 2008 and 2010 through 2018. Surveys in 2017 and 2018 included targeted surveys for species added in 2015 to the Forest Service sensitive species list, as well as other areas where route adjustments required additional survey effort.

Botanists worked in pairs or singly and walked the survey area on foot. Full coverage complete surveys were conducted along the centerline and in the construction ROW. Along the corridor margins, surveys were conducted in an intuitive-controlled meander, where botanists stratified their survey effort, focusing on habitat(s) with potential for special status species. Botanists recorded all common species encountered in field notebooks. Species that could not be easily identified in the field were collected and identified later in the lab. Botanists maintained field notes of habitat encountered, and recorded MPs (or acres) considered to be suitable habitat for special status species. When a special status vascular or non-vascular plant species was encountered, botanists recorded the Global Positioning System location, determined the area and population (i.e., number of plants) of the plant site location, recorded habitat data and associated species, and mapped the site on 1:200 scale maps. Plant sites located on NFS lands were flagged for future location and identification. Plant site locations were later digitized into GIS shape files and site maps were created (SBS 2008, SBS 2011b, SBS 2014, SBS 2016, SBS 2017).

Surveys were conducted for over 200 vascular and non-vascular species. Of these species, four Forest Service sensitive species addressed in this BE, Umpqua mariposa lily, pine woods cryptantha, California globe mallow, and Bellinger's meadowfoam, were documented on NFS lands. Six additional Forest Service sensitive species—*Bryoria subcana* (lichen with no common name), Rogue Canyon rockcress (*Arabis modesta*), bensonia (*Bensoniella oregana*), bristly sedge (*Carex comosa*), coastal lip-fern (*Cheilanthes intertexta*), and wayside aster (*Eucephalis vialis*)—were documented on State Forest, BLM, or private lands. These six species are not discussed here as no impacts are expected on NFS lands (see Appendix A).

6.2.8.1 Umpqua Mariposa Lily (Calochortus umpquaensis)

Species Status in the Project Area

Umpqua mariposa lily is a narrow endemic species restricted to the Klamath Mountains physiographic province of southwestern Oregon (Holmes 2018). This species is primarily known from Umpqua River drainage in Douglas County, but is also found in Jackson and Josephine counties (Oregon Flora Project 2007; ODA 2008). The Umpqua mariposa lily is known from 17 localities and none of the sites are considered protected (ORBIC 2018, Pacific Connector 2017b). Two of the known occurrences are located on private lands and the remainder are split relatively evenly between BLM and NFS lands (NatureServe 2017).

As shown in Table 1, Umpqua mariposa lily has previously been documented in the Umpqua National Forest; it has not been documented and is not suspected to occur in the Winema or Rogue River national forests. Umpqua mariposa lily has been observed within the impact area and approximately 1.3 miles of the Project in the Umpqua National Forest. Field surveys in 2016 located seven plants along the existing Green Butte access road (EAR) 102.30 and 25 feet east of the Hatchet Quarry Rock Source/Disposal Site at MP 102.30 (FERC 2019b). This site occurs within the area that burned during the 2015 Stouts Creek fire. Additionally, several large populations of this plant (5,000 to 60,000+) have previously been documented approximately 1.3 and 2.5 miles east of the Project near MP 99.5 and located adjacent to the Green Butte (EAR 102.30) and Callahan Creek (EAR 104.24) access roads on lands administered by Umpqua National Forest (Pacific Connector 2017b). These populations were identified in 1992 and 2008 in a variety of habitats (ORBIC 2017). Although plants were not documented during surveys, suitable habitat for Umpqua mariposa lily also occurs between MPs 74.08 to 75.02 where Cox's mariposa lily (*Calochortus coxii*) was documented.

Habitat for this species includes open meadows and forested slopes on serpentine soils and it is most vigorous in the ecotone between open meadows and forest edges (Holmes 2018). Associated species include Jeffrey pine, incense cedar (*Calocedrus decurrens*), Douglas-fir (*Pseudotsuga menziesii*), Oregon rockcress (*Arabis oregana*), silky balsamroot (*Balsamorhiza sericea*), Tolmie star-tulip (*Calochortus tolmiei*), Howell's camas (*Camassia howellii*), Siskiyou lewisia (*Lewisia cotyledon*), Hooker's silene (*Silene hookeri* ssp. *hookeri*), showy tarweed (*Madia elegans* var. *densifolia*), cismontane minuartia (*Minuartia cismontana*) and Roemer's fescue (*Festuca roemeri*; Holmes 2018; Oregon Flora Project 2007). The species typically occurs at elevations between 885 and 2,690 feet and blooms from June to July (Oregon Flora Project 2007).

Umpqua mariposa lily has a global status of vulnerable and current population trends appear stable but not increasing (NatureServe 2017). Past threats to this species included logging and associated road construction, as well as cattle grazing. However, a conservation agreement signed by the BLM, Forest Service and FWS in 1996 reduced the threats from logging and cattle grazing (NatureServe 2017). Other threats include herbivory, mining of the nickel-bearing serpentine soils on which this species occurs, digging of bulbs for horticulture, and competition with non-native invasive species (Fredricks 1989, ODA 2008). Fire suppression may also decrease habitat quality in some areas, as meadow or ecotonal habitats move to closed-canopy forests (Kagan 1992, Vance et al. 2003 as cited in NatureServe 2017). Additionally, because of the low survival rate of seedlings, recolonization of Umpqua mariposa lily may take a while after disturbance (NatureServe 2017).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable Umpqua mariposa lily habitat within 700 feet of the proposed action in the Umpqua National Forest. Table 43 shows the habitat types in the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 43. Umpqua Mariposa Lily Habitat Associations

Habitat Type	Association	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Southwest Oregon Mixed Conifer-Hardwood Forest	Closely Associated	143.96	42.68	2,146.85	8.69%
Westside Grasslands	Closely Associated	0.00	0.00	0.00	0.00%
Total		**143.96**	**42.68**	**2,146.85**	**8.69%**

1/ Totals taken from Table 7 for the Umpqua National Forest in which the species has been documented to occur.

2/ Totals taken from Table 2 for the Umpqua National Forest in which the species has been documented to occur; does not include habitat located in the Rogue River or Winema national forests or on other federal or non-federal lands.

No road improvements are necessary along the Greene Butte (EAR 102.30) or Callahan Creek (EAR 104.24) EARs. Additionally, plants are separated from these access roads by topography and/or Callahan Creek; therefore, it is not expected that use of the existing access roads would directly or indirectly affect documented populations of Umpqua mariposa lily in those locations.

No direct impacts are anticipated to the site observed in 2016 along EAR 102.30 and near the Hatchet Quarry Rock Source/Disposal site at MP 102.30. Indirect effects at this site, as well as the area of suitable habitat located between MPs 74.08 and 75.02, could include removal of currently unoccupied but suitable habitat such as open meadows and the forest edge/open meadow ecotone. Construction activities could also create opportunities for invasive species that could outcompete and/or exclude Umpqua mariposa lily from areas previously inhabited. Impacts from fugitive dust created during construction and travel on unpaved access roads could also affect the photosynthetic surfaces of Umpqua mariposa lily in the vicinity of the Project.

Pacific Connector has committed to protecting plants adjacent to the pipeline construction right-of-way through the appropriate installation of safety and silt fence as determined by Pacific Connector's EIs. Additionally, the large populations of Umpqua mariposa lily previously documented near the Greene Butte and Callahan Creek EARs would not be impacted. Consequently, the potential loss of individuals and habitat at this site is not expected to affect the viability of Umpqua mariposa lily over its broader geographic range within Douglas, Jackson and Josephine counties.

Cumulative Effects

The Umpqua mariposa lily cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua National Forest (Table 14). Construction of the pipeline and associated facilities would affect 913 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Project impacts include removal of individuals, and habitat modification, although these effects would be minimized and mitigated as described below under Conservation Measures and Mitigation.

Noxious weeds and non-native invasive plant species began to appear and spread with European settlement and continue to arrive today. The introduction of non-native invasive plants has increased dramatically in the past decade. Local spread of noxious weeds can be natural; but human activities such as, recreation, vehicle travel, and the movement of contaminated equipment, products, and livestock often greatly increase the distance and rate of dispersal. This spread of noxious weeds degrades native habitats, and has decreased suitable Umpqua mariposa lily habitat.

Past logging and associated road construction, as well as cattle grazing on the Umpqua National Forest likely resulted in the decline of this species. Fire suppression activities may have also decreased habitat quality for Umpqua mariposa lily on the Umpqua National Forest. However, as stated above, a conservation agreement signed by the BLM, Forest Service and FWS in 1996 likely reduced the threats to Umpqua mariposa lily from logging and cattle grazing (NatureServe 2017). In addition, the NWFP offers protections for meadows through measures that conserve great gray owl habitat by prohibiting tree-clearing within 300 feet of a meadow's edge. These management activities may result in improved quantity and quality of Umpqua mariposa lily habitat in the analysis area in the future.

On the Umpqua National Forest, other planned projects within the cumulative effects analysis area that could potentially affect individuals or habitat of Umpqua mariposa lily include a noxious weed treatment project, several timber treatments, livestock grazing, a fuelbreak project, and aquatic restoration projects (Table 13). Projects outside the Umpqua National Forest but within the cumulative effects analysis area include BLM timber sales and forest management projects (Table 13). These planned projects would affect 27,561 acres, or 9.9 percent of the watersheds (Table 14).

The proposed Project, including mitigation actions, would affect approximately 5,968 acres. Combined with 27,561 acres of overlapping reasonably foreseeable activities, approximately 33,529 acres within the Umpqua mariposa cumulative effects analysis area would be affected, or 12.0 percent of the total watershed area (Table 14). The proposed action as well as planned projects would potentially remove individuals and degrade habitat; however, Project impacts would be mitigated through site restoration and noxious weed control as described below. Therefore, cumulative impacts on Umpqua mariposa lily are expected to be insignificant because the combined impacts to the 12.0 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts to Umpqua mariposa lily include restoring areas disturbed during construction (Appendix I of the POD), fencing off, marking and not disturbing populations of Umpqua mariposa lily adjacent to the ROW, and implementing measures in Pacific Connector's Air, Noise, and Fugitive Dust Control (Appendix B of the POD) and Integrated Pest Management plans (Appendix N of the POD) to minimize the potential spread and infestation of noxious weeds along the construction ROW and to minimize the potential impacts of fugitive dust. Additionally, the Forest Service has proposed approximately 124 acres of meadow restoration and 6.7 miles of noxious weed treatments on the Umpqua National Forest within the Elk Creek and Upper Cow Creek watersheds that may benefit native plant species, such as Umpqua mariposa lily, that rely on meadow habitats (Table 13).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Umpqua mariposa lily because minimal impacts are anticipated to this species from the proposed action, several large populations of this species that wouldn't be affected by the proposed action are known to occur, and the proposed conservation and mitigation measures described above would minimize impacts to the species on NFS land.

6.2.8.2 Pine Woods Cryptantha (Cryptantha simulans)

Species Status in the Project Area

Pine woods cryptantha occurs from Washington south to California and east to Idaho and Nevada (NRCS 2018). In Oregon, this species occurs in Baker, Harney, Jackson, Jefferson Josephine, Klamath, and Lake counties (ORBIC 2016, NRCS 2018). There are 14 documented occurrences of pine woods cryptantha in the State of Oregon (Wise, personal communication, March 7, 2018).

As shown in Table 1, this species has been documented in the Rogue River and Winema national forests; it has not been documented and is not suspected to occur in the Umpqua National Forest. Pine woods cryptantha has been observed within the impact area and within 0.1 mile of the Project in the Rogue River National Forest. Field surveys in 2017 located 50 plants approximately 96 feet northwest of MP 155.8 in the Rogue River National Forest and 5 plants on the edge of Clover Creek Road, 10 feet from the ROW near MP 175.3 in the Winema National Forest (Pacific Connector 2017b). Additionally, surveys in 2017 documented approximately 100 plants in the ROW near MP 176.96 and 1 plant on the edge of Clover Creek Road and the ROW near MP 176.98 on lands managed by the Lakeview BLM District (Pacific Connector 2017b).

Little is known about this species, including its habitat requirements. However, this species has been found in association with dry gravelly or rocky sites, disturbed areas, and open conifer or ponderosa pine forests from approximately 1,475 to 8,530 feet in elevation (Forest Service 1993, The Jepson Herbarium 2018). The population of pine woods cryptantha observed near MP 155.8 was located in late-seral to old-growth forest comprised predominantly of white fir and Douglas-fir, with scattered incense cedar and sparse shrubs and forbs. Associated species at this site include golden chinquapin (*Chrysolepis chrysophylla*), thinleaf huckleberry (*Vaccinium membranaceum*), tall Oregon grape (*Mahonia aquifolium*), California hazel (*Corylus cornuta*), deerbrush (*Ceanothus integerrimus*), baldhip rose (*Rosa gymnocarpa*), creeping snowberry (*Symphoricarpos mollis*), blue wildrye (*Elymus glaucus*), star-flowered Solomon's-seal (*Maianthemum stellatum*), and small-flowered blue-eyed Mary (*Collinsia parviflora*). The population observed near MP 175.3 was found growing along the gravel shoulder of a paved road in partial shade of a mid-seral mixed conifer forest dominated by Douglas-fir and ponderosa pine. Other associated species at this site include white fir, prostrate ceanothus (*Ceanothus prostratus*), wax currant (*Ribes cereum*), woodland strawberry (*Fragaria vesca* var. *bracteata*), and slender hairgrass (*Deschampssia elongata*).

Pine woods cryptantha has a global status of G4, which means that it is apparently secure (NatureServe 2017). Its ORBIC ranking is List 2, meaning that the species is considered threatened, endangered, or extirpated from Oregon, but secure or abundant elsewhere (ORBIC 2016).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable pine woods cryptantha habitat within 700 feet of the proposed action in the Rogue River and Winema national forests. Table 44 shows the habitat types in the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 44. Pine Woods Cryptantha Habitat Associations					
Habitat Type	**Association**	**Total Acres Removed[1/]**	**Total Acres Modified[1/]**	**Total Acres in Analysis Area[2/]**	**Percentage Impacted**
Southwest Oregon Mixed Conifer-Hardwood Forest	Generally Associated	174.33	52.32	2394.15	9.47%
Ponderosa Pine Forest and Woodland	Generally Associated	0.00	0.00	46.29	0.00%
Western Juniper and Mountain Mahogany Woodlands	Generally Associated	0.00	0.00	0.00	0.00%
Total		**174.33**	**52.32**	**2440.43**	**9.29%**

1/ Totals taken from Table 7 for the Rogue River and Winema national forests in which the species has been documented to occur.

2/ Totals taken from Table 2 for the Rogue River and Winema national forests in which the species has been documented to occur; does not include habitat located in the Umpqua National Forest or on other federal or non-federal lands.

Direct impacts to the site observed in 2017 at MPs 155.8 would not be expected as the site is approximately 96 feet northwest of the Project ROW. Plants at this site; however, could be indirectly affected. Indirect effects could include removal of currently unoccupied but suitable habitat, the introduction and/or spread of non-native invasive species, and fugitive dust from construction activities.

Potential impacts to the site observed in 2017 near MP 175.3 include removal of individuals and permanent loss or alteration of habitat. The site is located approximately 10 feet from the proposed Project ROW and therefore would likely be disturbed by the Project. Direct effects of the proposed action would consist of temporary disturbance and permanent loss or alteration of habitat by directly removing or damaging plants, compacting soils, or disturbing the soil layers. To minimize adverse effects, the Forest Service would require that during construction Pacific Connector fence the pine woods cryptantha plants located approximately 10 feet from the proposed Project ROW near MP 175.3 to prevent disturbance within the fenced area, and to the extent possible minimize disturbance within the ROW near these plants.

Indirect effects could include removal of currently unoccupied but suitable habitat such as open coniferous or ponderosa pine forest. Construction activities could create opportunities for invasive species that could outcompete and/or exclude pine woods cryptantha from areas previously inhabited. Additionally, removal of trees for construction could result in changes to the microclimate through increased solar exposure and decreased humidity, which could alter the suitability of the area for pine woods cryptantha. Impacts from fugitive dust created during construction could also affect the photosynthetic surfaces of pine woods cryptantha in the vicinity of the Project.

Although this species was previously suspected to occur on the Rogue River and Winema national forests, the sites at MPs 155.8 and 175.3 are the only known occurrences of pine woods cryptantha on these two national forests. Little is known about the distribution and population size of this species on the Rogue River and Winema national forests. Consequently, the expected loss of individuals and habitat at these sites may affect the viability of pine woods cryptantha on the Rogue River and Winema national forests.

Cumulative Effects

The pine woods cryptantha cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River and Winema national forests. On the Rogue River National Forest these watersheds include Big Butte Creek and Little Butte Creek and on the Winema National Forest this includes the Spencer Creek fifth field watershed. Construction of the pipeline and associated facilities would affect 953 acres within the cumulative effects analysis area, or 0.2 percent of the total watershed area (Table 14). Project impacts include removal of individuals, and habitat modification, although these effects would be minimized and mitigated as described below under Conservation Measures and Mitigation.

Noxious weeds and non-native invasive plant species began to appear and spread with European settlement and continue to arrive today. The introduction of non-native invasive plants has increased dramatically in the past decade. Local spread of noxious weeds can be natural; but human activities such as, recreation, vehicle travel, and the movement of contaminated equipment, products, and livestock often greatly increase the distance and rate of dispersal. This spread of noxious weeds degrades native habitats, and has likely decreased the amount of suitable habitat for pine woods cryptantha. Additionally, suitable habitat for this species, including forested habitats, have decreased in complexity and abundance from historical conditions due to widespread timber clearing, settlement patterns, and fire suppression.

On the Rogue River National Forest, other planned projects that could potentially impact individuals or habitat of pine woods cryptantha include livestock grazing, forest management, and timber sale projects (Table 13). On the Winema National Forest, planned projects within the cumulative effects analysis area that could potentially affect individuals or habitat of pine woods cryptantha include livestock grazing, fuels treatments, roadside firewood collection, a timber sale, and a noxious weed treatment (Table 13). These other planned projects would affect 13,181 acres, or 2.9 percent of the watersheds.

The proposed Project, including mitigation actions, would affect approximately 3,360 acres. Combined with 13,181 acres of overlapping reasonably foreseeable activities, approximately 16,541 acres within the pine woods cryptantha cumulative effects analysis area would be affected, or 3.7 percent of the total area of the watersheds (Table 14). The proposed action as well as planned projects would potentially remove individuals and degrade habitat; however, Project impacts would be mitigated through site restoration and noxious weed control as described below. Therefore, cumulative impacts on pine woods cryptantha are expected to be insignificant because the combined impacts to the 3.7 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts to pine woods cryptantha include restoring areas disturbed during construction (Appendix I of the POD), fencing off the area, marking and not disturbing the population of pine woods cryptantha adjacent to the ROW, and implementing measures in Pacific Connector's Air, Noise, and Fugitive Dust Control (Appendix B of the POD) and Integrated Pest Management plans (Appendix N of the POD) to minimize the potential spread and infestation of noxious weeds along the construction ROW, and to minimize the potential impacts of fugitive dust. Additionally, the Forest Service has proposed approximately 57.5 and 29.2 miles of road decommissioning on the Rogue River and Winema national forests, respectively, as well as 618 acres of precommercial thinning and 522 acres of reallocation of matrix lands to LSR on the Rogue River National Forest (see Table 13). These activities may benefit native plant species, such as pine woods cryptantha.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that, the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for pine woods cryptantha because the Project would only impact two of the 14 occurrences in Oregon, this species is not considered rare in any of the five states in which it is known to occur, and the proposed conservation and mitigation measures described above would minimize impacts to the species on NFS land. However, because the occurrences of pine woods cryptantha at MPs 155.8 and 175.3 are the only known occurrences on the Rogue River and Winema national forests, the expected loss of individuals and habitat at these sites may affect the viability of pine woods cryptantha on these two national forests.

6.2.8.3 California Globe Mallow (Iliamna latibracteata)

Species Status in the Project Area

California globe mallow has a range restricted primarily to several counties in northern California and southern Oregon. In Oregon, this species is known from Coos, Curry, Douglas, Jackson, Josephine, and Linn counties (ORBIC 2016; NRCS 2018). There are 61 known occurrences of California globe mallow in Oregon (Wise, personal communication, March 7, 2018).

As shown in Table 1, the species has been previously documented in the Rogue River and Umpqua national forests; it has not been documented and is not suspected to occur in the Winema National Forest. Field surveys in 2017 located three individuals of this species within the Project ROW in the Umpqua National Forest near MP 106.23 and 106.74 (Pacific Connector 2017b). This species was also observed in the Project ROW near MP 99.9 on lands managed by the Roseburg BLM District (Pacific Connector 2017b).

The species is associated with montane chaparral, lower montane coniferous forest, and riparian scrub habitat (CNPS 2018). The species typically occurs at elevations between approximately 200 and 6,560 feet and blooms from June to August (CNPS 2018). Associated species include white fir and Douglas-fir (Darlingtonia 2009). Individuals of California globe mallow within the Project area were observed within late-successional and old-growth conifer forest dominated by Douglas fir. Incense cedar, ponderosa pine, and sugar pine (*Pinus lambertiana*) were also present. Other associated species include salal (*Gaultheria shallon*), oceanspray (*Holodiscus discolor*), trailing blackberry (*Rubus ursinus*), Scouler's willow (*Salix scouleriana*), common whiplea (*Whipplea modesta*), broad leaved arnica (*Arnica latifolia*), varied-leaf collomia (*Collomia heterophylla*) fescue (*Festuca occidentalis, F. rubra*), common bedstraw (*Galium aparine*), Sierra pea (*Lathyrus nevadensis*), and common groundsel (*Senecio vulgaris*). It is often found in burned areas, and most of the known occurrences of this species have been found in areas that have recently burned (Darlingtonia 2009). Patches of California globe mallow will persist in these burned areas until re-sprouting shrubs and trees crowd or shade them out (Darlingtonia 2009). The observations of California globe mallow within the Project area near MP 106.2 and 106.7 were located within the area burned during the 2015 Stouts Creek fire.

California globe mallow has a global status of G2G3 which means that its rank is somewhere between imperiled (G2) and vulnerable (G3). Its ORBIC ranking is List 1 meaning that the species is considered threatened or endangered throughout its range (ORBIC 2016). Threats to this species may include fire suppression and grazing (CNPS 2018).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable California globe mallow habitat within 700 feet of the proposed action in the Rogue River and Umpqua national forests. Table 45 shows the habitat types in the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 45. California Globe Mallow Habitat Associations

Habitat Type	Association	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Lowland Conifer-Hardwood Forest	Generally Associated	0.00	0.00	0.00	0.00%
Southwest Oregon Mixed Conifer-Hardwood Forest	Generally Associated	269.36	90.74	3944.32	9.13%
Westside Riparian Wetlands	Closely Associated	0.15	0.00	0.45	34.51%
Total		**269.51**	**90.74**	**3944.77**	**9.13%**

1/ Totals taken from Table 7 for the Rogue River and Umpqua national forests in which the species has been documented to occur.

2/ Totals taken from Table 2 for the Rogue River and Umpqua national forests in which the species has been documented to occur; does not include habitat located in the Winema National Forest or on other federal or non-federal lands.

Potential impacts to the sites observed in 2017 at MPs 106.23 and 106.74 include removal of or damage to individuals and temporary disturbance and permanent loss or alteration of habitat including changes in microclimate of the area, compacting soils, or disturbing the soil layers.

Indirect effects could include removal of currently unoccupied but suitable habitat such as coniferous forest and riparian areas. Removal of trees for construction could result in changes to the microclimate through increased solar exposure and decreased humidity, which could alter the suitability of the area for California globe mallow. Construction activities could create opportunities for invasive species that could outcompete and/or exclude California globe mallow from areas previously inhabited. Impacts from fugitive dust created during construction and travel on unpaved access roads could also affect the photosynthetic surfaces of California globe mallow in the vicinity of the Project.

Although Project activities would affect the local population at MPs 106.23 and 106.74, the species is known from 61 occurrences in Oregon and more undocumented sites may occur on unsurveyed private lands. Consequently, the expected loss of individuals and habitat at these sites is not expected to affect the viability of California globe mallow across its known range.

Cumulative Effects

The California globe mallow cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River and Umpqua national forests. Construction of the pipeline and associated facilities would affect 1,635 acres within the cumulative effects analysis area, or 0.2 percent of the total watershed area (Table 14). Project impacts include removal of individuals, and habitat modification, although these effects would be minimized and mitigated as described below under Conservation Measures and Mitigation.

Noxious weeds and non-native invasive plant species began to appear and spread with European settlement and continue to arrive today. The introduction of non-native invasive plants has increased dramatically in the past decade. Local spread of noxious weeds can be natural; but human activities such as, recreation, vehicle travel, and the movement of contaminated equipment, products, and livestock often greatly increase the distance and rate of dispersal. This spread of noxious weeds degrades native habitats, and has decreased suitable California globe mallow habitat. Additionally, suitable habitat for this species, including forested habitats, have decreased in complexity and abundance from historical conditions due to widespread timber clearing, settlement patterns, and fire suppression.

Riparian areas in the cumulative effects analysis area have decreased dramatically from historic conditions; their acreage and connectivity has been lost due to development, timber clearing, and grazing. The NWFP protects riparian areas by designating protected areas with specific management objectives around streams, ponds, and lakes (Forest Service and BLM 1994). Further, the NWFP has special land use allocations around riparian areas, streams, lakes, ponds, and wetlands that protect these resources.

On the Rogue River National Forest, planned projects that could potentially impact individuals or habitat of California globe mallow include livestock grazing (Table 13). On the Umpqua National Forest, planned projects within the cumulative effects analysis area that could potentially affect individuals or habitat of California globe mallow include a noxious weed treatment project, several timber treatments, livestock grazing, a fuel break project, and aquatic restoration projects (Table 13). Projects outside the Umpqua National Forest but within the cumulative effects analysis area include and a BLM timber sale and three BLM forest management projects (Table 13). The planned projects would affect 36,272 acres, or 5.4 percent of the watersheds.

The proposed Project, including mitigation actions, would affect approximately 8,983 acres. Combined with 36,272 acres of overlapping reasonably foreseeable activities, approximately 45,255 acres within the California globe mallow cumulative effects analysis area would be affected, or 6.7 percent of the total area of the watersheds (Table 14). The proposed action as well as planned projects would potentially remove individuals and degrade habitat; however, Project impacts would be mitigated through site restoration and noxious weed control as described below. Therefore, cumulative impacts on pine woods cryptantha are expected to be insignificant because the combined impacts to the 6.7 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that Pacific Connector would implement that would help minimize Project-related impacts to suitable habitat for California globe mallow include restoring areas disturbed during construction (Appendix I of the POD), and implementing measures in Pacific Connector's Integrated Pest Management Plan (Appendix N of the POD) to minimize the potential spread and infestation of noxious weeds along the construction ROW. Additionally, the Forest Service has proposed several projects on the Rogue River and Umpqua national forests, such as road closure and decommissioning, precommercial thinning, noxious weed treatment, and off-site pine removal, that may benefit native plant species including California globe mallow (see Table 13).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for California globe mallow because of the relatively large number of occurrences of the species outside of NFS lands, this species' tolerance of disturbance, and the proposed conservation and mitigation measures described above that would minimize impacts to the species on NFS land.

6.2.8.4 Bellinger's Meadowfoam (Limnanthes floccosa ssp. bellingeriana)

Species Status in the Project Area

Bellinger's meadowfoam has a range restricted to several counties within northern California and southern Oregon. The species is considered a narrow endemic but locally abundant with relatively more occurrences on BLM and private lands than on NFS lands (Rolle 2014). In Oregon, this subspecies is known from over 100 sites in Jackson County and an unknown number in Klamath County (Rolle 2014). As shown in Table 1, the species has been previously documented on the Rogue River National Forest; it has not been documented and is not suspected to occur in the Winema or the Umpqua national forests. Bellinger's meadowfoam has been observed within the impact area and within 1 mile of the Project in the Rogue River National Forest. Field surveys in 2008 located approximately 2,300 plants within 0.5 acres in clay soils in a seasonally saturated rocky meadow in the ROW near MP 154.1 (SBS 2008). In 2010, surveys documented approximately 30,000 plants within 0.8 acres within and adjacent to the ROW and a TEWA between MPs 154.7 and 154.8 (SBS 2011b). Several observations of this species were also documented in and near the Project on lands managed by the Medford BLM District near MPs 120.3, 128.8 and 129.0 and in and near TEWA 128.79-N.

The species is associated with cismontane woodlands and moist meadows with seeps and wetlands. Woodlands typically have an open canopy where oaks and conifer trees dominate and understories may be open and herbaceous or closed and shrubby (CalFlora 2014). It is associated with vernally wet meadows or vernal pools, and is generally found on nutrient-poor basalt scablands. The species typically occurs at elevations between 1,000 and 4,000 feet and is able to grow on disturbed sites and withstand grazing, although it is unable to complete with weedy species (Meinke 1982, Rolle 2014).

Bellinger's meadowfoam has a global status of vulnerable and current population trends appear stable but not increasing (NatureServe 2017). A major threat to Bellinger's meadowfoam is habitat degradation as non-native invasive plant species continue to move onto vernally moist scablands. In addition, grazing of vernally moist areas and hydrologic manipulations that alter or dry out vernally moist areas may contribute to the decline of this species (Rolle 2014).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable Bellinger's meadowfoam habitat within 700 feet of the proposed action in the Rogue River National Forest. Table 46 shows the habitat types in the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 46. Bellinger's Meadowfoam Habitat Associations					
Habitat Type	**Association**	**Total Acres Removed1/**	**Total Acres Modified1/**	**Total Acres in Analysis Area2/**	**Percentage Impacted**
Westside Grasslands	Generally Associated	2.53	0.33	11.00	25.99%
Eastside Grasslands	Generally Associated	0.38	0.00	1.00	38.45%
Herbaceous Wetlands	Closely Associated	0.00	0.00	0.00	0.00%
Westside Riparian Wetlands	Generally Associated	0.00	0.00	0.00	0.00%
Eastside Riparian Wetlands	Generally Associated	0.00	0.00	0.00	0.00%
Total		**2.92**	**0.33**	**12.00**	**27.03%**

1/ Totals taken from Table 7 for the Rogue River National Forest in which the species has been documented to occur.

2/ Totals taken from Table 2 for the Rogue River National Forest in which the species has been documented to occur; does not include habitat located in the Umpqua or Winema national forests or on other federal or non-federal lands.

In order to avoid impacts to the Bellinger's meadowfoam site observed at MP 154.1, Pacific Connector adopted a minor route adjustment and the site is now approximately 95 to 255 feet south of the ROW and TEWA. Therefore, direct impacts to the site observed in 2008 at MPs 154.1 would not be expected.

Potential impacts to the site observed in 2010 between MPs 154.7 and 154.8 include removal of individuals and permanent loss or alteration of habitat including changes in hydrology. The site is located in a vernally moist scabland meadow within the proposed Project ROW and a TEWA and therefore would be disturbed by the Project (SBS 2011, Rolle 2014). Approximately 90 percent of the population was in the proposed ROW and in a large TEWA immediately south of the ROW. Approximately 10 percent was outside of the construction area. Direct effects of the proposed action would consist of temporary disturbance and permanent loss or alteration of habitat by directly removing or damaging plants, compacting soils, or disturbing the soil layers. The Project could also potentially impact the hydrology of this site because construction activities would disturb soil composition and potentially influence erosion and water retention properties. A source seep is located approximately 200 feet from the centerline.

Indirect effects could include removal of currently unoccupied but suitable habitat such as wet meadows, wet prairies, and wetland and riparian areas. Construction activities could create opportunities for invasive species that could outcompete and/or exclude Bellinger's meadowfoam from areas previously inhabited. Fugitive dust from construction activities could also indirectly affect populations of Bellinger's meadowfoam.

Although Project activities would affect the local population between MPs 154.7 and 154.8, the species would not necessarily be eliminated from the site as it is able to grow on disturbed soil (Rolle 2014). Additionally, although the site that would be affected is one of only a few

Bellinger's meadowfoam sites on NFS land, a large number of sites are known from BLM and private land in eastern Jackson County and many more undocumented sites are likely to occur on unsurveyed private lands (Rolle 2014). Consequently, the expected loss of individuals and habitat at this site is not expected to affect the viability of Bellinger's meadowfoam over the broader geographic area of the low mountains and foothills of eastern Jackson County (Rolle 2014).

Cumulative Effects

The Bellinger's meadowfoam cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River National Forest. Construction of the pipeline and associated facilities would affect 722 acres within the cumulative effects analysis area, or 0.2 percent of the total watershed area (Table 14). Project impacts include removal of individuals, and habitat modification, although these effects would be minimized and mitigated as described below under Conservation Measures and Mitigation.

Noxious weeds and non-native invasive plant species began to appear and spread with European settlement and continue to arrive today. The introduction of non-native invasive plants has increased dramatically in the past decade. Local spread of noxious weeds can be natural; but human activities such as, recreation, vehicle travel, and the movement of contaminated equipment, products, and livestock often greatly increase the distance and rate of dispersal. This spread of noxious weeds degrades native habitats, and has decreased suitable Bellinger's meadowfoam habitat.

Wetlands in the cumulative effects analysis area have been lost due to draining and conversion to other land uses. Continued canopy closure of wet meadows resulting from years of fire suppression may continue to alter habitat and reduce the size of existing populations of Bellinger's meadowfoam. In addition, grazing of wet meadows and development of cattle troughs and irrigation ditches that dry down wetlands may also contribute to the decline of this species. Though one-third of Oregon wetlands are estimated to have been lost since the late 1700s, wetlands are now protected under federal law (Dahl 1990) and the NWFP protects wetlands on federal lands (Forest Service and BLM 1994). Riparian areas have also decreased dramatically from historic conditions, their acreage and connectivity lost to development, timber clearing, and grazing. The NWFP protects riparian areas by designating protected areas with specific management objectives around streams, ponds, and lakes. Further, the NWFP has special land use allocations around riparian areas, streams, lakes, ponds, and wetlands that protect these resources. Meadows are further protected under the NWFP through measures that conserve great gray owl habitat by prohibiting tree-clearing within 300 feet of a meadow's edge. These management activities may result in improved quantity and quality of Bellinger's meadowfoam habitat in the analysis area in the future.

On the Rogue River National Forest, other planned projects that could potentially impact suitable habitat for Bellinger's meadowfoam include livestock grazing, which could introduce weeds or change hydrology (Table 13). The planned projects would affect 8,711 acres, or 2.2 percent of the watersheds.

The proposed Project, including mitigation actions, would affect approximately 3,015 acres. Combined with 8,711 acres of overlapping reasonably foreseeable activities, approximately 11,726 acres within the cumulative effects analysis area would be affected, or 3.0 percent of the total watershed area (Table 14). The proposed action as well as planned projects would remove individuals and degrade habitat; however, Project impacts would be mitigated through site restoration and noxious weed control as described below. Therefore, cumulative impacts on Bellinger's meadowfoam are expected to be insignificant because the combined impacts to the 3.0 percent of the watershed area are not expected to have a measurable effect on the species.

Conservation Measures and Mitigation

In order to avoid impacts to the Bellinger's meadowfoam site observed at MP 154.1 during surveys in 2008, Pacific Connector adopted a minor route adjustment and the site is now approximately 95 to 255 feet south of the ROW and TEWA and the Project is not expected to affect this site. Measures to avoid the site discovered in 2010 between MPa 154.7 and 154.8, were considered but excluded in order to avoid a rare fungus, *Gymnomyces abietis*, which was also found at the same location on the north end of the meadow at MP 154.8.

The Forest Service recommends the following specific conservation measures for the Bellinger's meadowfoam site between MPs 154.7 and 154.8:

- Collect seeds prior to pipeline construction.
- During and after pipeline construction in the meadow, clean machinery, people, and tools of soil and debris to avoid the spread or introduction of invasive plants.
- After construction, conduct ground scarring and recontouring to return the site to vernally moist conditions. This would include creating ground contours to prevent the meadow from draining excessively, and retaining some compacted areas and shallow swales.
- Re-seed the area with the collected seeds. Other native species could be included in seed mixes at this location, but not in proportions that would lessen the ability of Bellinger's meadowfoam to re-establish from the re-seeding effort.
- For 3 years following construction, use formulations of the herbicide glyphosate to spot spray invasive weeds, especially the locally abundant medusahead, while allowing native grasses and Bellinger's meadowfoam to grow (Rolle 2014; glyphosate is recommended because imazapic tends to run from the site of application and will follow the slope to the Bellinger's meadowfoam population).

Additional mitigation measures that would minimize impacts include site restoration, and implementation of measures outlined in Pacific Connector's Air, Noise, and Fugitive Dust Control (Appendix B of the POD) and Integrated Pest Management plans (Appendix N of the POD). In addition, the containment and safe disposal of hazardous materials and pollutants would minimize soil contamination and are discussed in Pacific Connector's Spill Prevention, Containment, and Countermeasures Plan (Appendix X of the POD).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Bellinger's meadowfoam because the large number of occurrences of the species outside of NFS lands, this species' tolerance of disturbance, and the proposed conservation and mitigation measures described above that would minimize impacts to the species on NFS land.

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Appendix A: Sensitive Species that Are Not Expected to Be Impacted by the Project

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Table A-1. Forest Service Sensitive Terrestrial Wildlife Species Not Expected to be Impacted by the Project			
Common Name and *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Mammals			
Pygmy rabbit *Brachylagus idahoensis*	Tall dense clumps of sagebrush, also in greasewood. Deep, friable soils for burrows.	S – FWI	No habitat affected on Winema National Forest.
Sierra Nevada red fox *Vulpes vulpes necator*	Open conifer woodlands and mountain meadows near treeline.	D – RRS D – UMP D – FWI	Impacts to individuals and habitat are not anticipated from the pipeline due to the limited range of the species from lack of habitat
Birds			
Yellow rail *Coturnicops noveboracensis*	Freshwater and coastal estuary marshes. Requires areas with shallow water and vegetative cover.	D – FWI S – UMP	Does not occur in Project vicinity
Greater sage-grouse *Centerocercus europhasianus*	Big sagebrush, preferring areas where big sagebrush cover is 15-50%. Leks in open areas.	D – FWI	No habitat affected on Winema National Forest.
Black swift *Cypseloides niger*	Associated with steep, tall waterfalls	D – UMP	No suitable habitat in analysis area
Northern waterthrush *Parkesia noveboracensis*	Wooded swamps and riparian thickets in forests and scrub	S – RRS	Extremely limited breeding range in Oregon that occurs >50 miles from the Project area.
Amphibians			
Siskiyou Mountains salamander *Plethodon stormi*	Loose rock rubble or talus on north-facing slopes or in dense wooded areas.	D – RRS	Outside of known range.
Black salamander *Aneides flavipunctatus*	Near streams, in talus slopes or under rocks and logs. Inhabits open woodlands, and mixed coniferous and mixed-coniferous-deciduous forests.	D – RRS	Outside of known range
California slender salamander *Batrachoseps attenuatus*	Lower-elevation forests along the southern coast, including hardwood, redwood, and other coniferous forests. Also in open areas with scattered trees. Under rocks, logs, or other objects on the ground.	D – RRS	Outside of known range
Northern leopard frog *Lithobates pipiens*	Marshes, wet meadows, vegetated irrigation canals, ponds, and reservoirs. Prefers quiet or slow flowing waters.	S – FWI	Outside of known range
Columbia spotted frog *Rana luteiventris*	Rarely far from permanent quiet water; usually at grassy/sedgy margins of streams, lakes, ponds, springs, and marshes; may disperse into forest, grassland, during wet weather.	S – FWI	Outside of known range
Terrestrial Invertebrates			
Oregon shoulderband *Helminthoglypta hertleini*	Rocky areas, including talus deposits and outcrops generally within 98 feet of herbaceous vegetation and deciduous leaf litter; woody debris used as refugia.	S – RRS D – UMP	Not located on National Forest land during surveys.

Table A-1. Forest Service Sensitive Terrestrial Wildlife Species Not Expected to be Impacted by the Project			
Common Name and *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Coastal greenish blue butterfly *Plebejus saepiolus littoralis*	Associated with blooming clover in coastal dune areas along stream edges, bogs, and wet meadows, also drier meadow habitat.	S – RRS	Does not occur in Project vicinity
Green sideband *Monadenia fidelis beryllica*	Generally inhabit deciduous stands (including alder) and brush in wet, relatively undisturbed forest; low elevation; low coastal scrub.	D – RRS	Not located during surveys
Modoc Rim sideband *Monadenia fidelis ssp. nov.*	Talus and wetted rocky areas on lakeshore; mixed pine-Douglas-fir forest or open grasslands; associated with seeps and springs in talus deposits.	D – RRS D – FWI	Not located during surveys
Crater Lake tightcoil *Pristiloma crateris*	Mature conifer forests; perennially wet areas among rushes, mosses, and other surface vegetation or under rocks and woody debris within 30 feet of open water in wetlands, springs, seeps, and riparian areas.	D – UMP S – RRS D – FWI	Not located during surveys
Harney Basin duskysnail *Colligyrus depressus*	Shallow, cold springs at approximately 4,500 feet elevation in sage scrub habitat.	D – FWI	Not located during surveys
Leona's little blue butterfly *Philotiella leona*	Mazama ash and pumice fields east of Crater Lake with sub-surface moisture and spurry buckwheat (*Eriogonum spergulinum reddingianum*) caterpillar host plant.	D – FWI	Does not occur in Project vicinity

1/ Expected Habitat: Adamus et al. 2001, Csuti et al. 2001, NatureServe 2013; ORBIC 2006; Gilligan et al. 1994; Kozloff 1976, ISSSSP 2018, Hoffman 2005.

2/ Occurrence Key:

National Forest: FWI = Winema National Forest, RRS = Rogue River National Forest, UMP = Umpqua National Forest
D = Documented within Forest Service Management Area
S = Suspected within Forest Service Management Area

Table A-2. Forest Service Sensitive Fish and Aquatic Invertebrates Not Expected to be Impacted by the Project				
Common Name and *Scientific Name*[1/]	**Expected Habitat[2/]**	**Documented or Suspected Occurrence[3/]**	**Waterbodies Crossed by Project or within Vicinity of Project Area[4/]**	**Reason for Determination**
Anadromous fish				
Pacific lamprey *Entosphenus tridentatus*	Anadromous species, spawning habitat is similar to salmonids including cool, flowing water and clean gravel. Rearing areas are slow-moving backwaters with fine sediment. Larvae spend several years in freshwater before transforming and migrating to the ocean.	D-RRS D-UMP D-FWI	No	No anadromous waterbodies are crossed by the Project on NFS lands.
Chinook Salmon *Oncorhynchus tshawytscha*, Southern Oregon /Northern California Coastal ESU, Fall-run and Spring-run; Rogue SMU Spring-run	Anadromous species that rears in the Pacific Ocean for most of its life and spawns in freshwater streams. Most enter Oregon's coastal rivers April to December, but some start in February. Spawning generally occurs from October to early March. Preferred spawning and rearing areas have a low gradient (<3%); adults often ascend to higher gradient reaches to find spawning areas. Spawns and rears in a range of sizes of streams and rivers, and often uses estuaries for rearing. Adults require deep pools within proximity to spawning areas where they hold and mature between migration and spawning.	D-RRS	No	Natural barrier in the South Fork Little Butte Creek precludes presence upstream where waterbodies are crossed by Project.
Steelhead *Oncorhynchus mykiss* Oregon Coast ESU Coastal SMU – Summer-run	Anadromous species; juveniles rear in freshwater streams 1-4 years. Adults live in marine environment prior to spawning mostly in winter or spring. May spawn more than once.	D-UMP D-RRS	No	Does not occur upstream of Galesville Reservoir, impacted streams well upstream of occurrence area.
Aquatic Invertebrates				
Turban pebblesnail *Fluminicola turbinformis*	Freshwater, very cold in semi-arid sage scrub. Substrate is mud, basalt gravel, bedrock and gravel, with bedrock.	D – FWI	Unknown	Not located during surveys
Great Basin ramshorn *Helisoma newberryi newberryi*	Larger lakes, slow rivers, larger spring sources, spring-fed creeks; burrow in soft mud.	D – FWI	Upper Klamath Lake and Lost Sub-basin	Not located during surveys
Highcap lanx *Lanx alta*	Freshwater in Middle Rogue, Upper Klamath Sub-basins, possibly extirpated Larger tributaries and outcrops, on upper surfaces of bedrock and bedrock outcrops. Cold, fast-flowing, highly oxygenated, clear water. Semelparous with a lifespan of 1 to 2 years. Eggs are laid from spring to fall. Lack a larval stage. Feed through scraping.	D – UMP D – FWI S – RRS	Unknown	No suitable habitat in analysis area
Scale lanx *Lanx klamathensis*	Spring-influenced portions of large lakes and streams or limnocrene springs; boulder/cobble substrates; well-oxygenated, cold water.	D – FWI S – RRS	Lost, Upper Klamath	Not located during surveys
Rotund lanx *Lanx subrotunda*	The rotund lanx is found in unpolluted rivers and large streams at low to moderate elevations, in highly oxygenated, swift-flowing, cold water on stable cobble, boulder or bedrock substrates.	D – FWI S - RRS D – UMP	Upper Klamath	Not located during surveys

Table A-2. Forest Service Sensitive Fish and Aquatic Invertebrates Not Expected to be Impacted by the Project				
Common Name and *Scientific Name*[1/]	**Expected Habitat[2/]**	**Documented or Suspected Occurrence[3/]**	**Waterbodies Crossed by Project or within Vicinity of Project Area[4/]**	**Reason for Determination**
Montane peaclam *Pisidium ultramontanum*	The Montane peaclam is a local riparian endemic associated with lakes and springs. It is generally found on sand-gravel substrates in spring-influenced streams and lakes, and occasionally in large spring pools.	D-FWI	Upper Klamath	Closest known location greater than 10 miles from the Project on NFS land at Upper Klamath Lake.
Robust walker *Pomatiopsis binneyi*	Freshwater, possibly extirpated Coos Subbasin, seeps, rivulets, shallow mud banks and marsh seepages leading into shallow streams. Semi-aquatic.	D – RRS	Unknown	Not located during surveys
Pacific walker *Pomatiopsis californica*	The Pacific Walker is a riparian associate semi-aquatic snail characteristically found among wet leaf litter and vegetation, beside flowing or standing water in shaded situations where humidity remains high	S – RRS	Unknown	Does not occur in vicinity of project; historical range included narrow coastal fog belt of Pacific Coast.
Haddock's Rhyacophilan caddisfly *Rhyacophila haddocki*	Streams are perennial, fed by cold-water springs with discharge relatively stable year-round. Microhabitats include runs and glides with deep, well-aerated gravel and coarse sand.	S – RRS	Unknown	Does not occur in vicinity of project; currently known only from Benton and Curry county.
Lined rams-horn *Vorticifex effusa diagonalis*	Found in spring-fed lakes and limnocrenes, as well as large streams with spring influence. Very cold, highly oxygenated water on stable (boulder-gravel) substrate, at fair depth (not in shallows).	D-FWI	Upper Klamath	Does not occur in vicinity of project; currently known from Crater Lake and NE Upper Klamath Lake.

1/ ESU = Evolutionarily Significant Unit

2/ Life Histories and Expected Habitat References: Kostow 1995; NatureServe 2013; ODFW 2005; ISSSSP 2018; FWS 1994.

3/ Occurrence Key:

National Forest: FWI = Winema National Forest, RRS = Rogue River National Forest, UMP = Umpqua National Forest
D = Documented within the Forest Service management area
S = Suspected within the Forest Service management area
I = Forest Service Actions Influence Downstream

4/ Waterbodies Crossed: Pacific Connector 2017b

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Bryophytes			
Tiny notchwort *Anastrophyllum minutum*	On peaty soil >5,500 feet. In the *Tsuga mertensiana* zone, typically associated with ledges or at the base of cliffs.	S – FWI S – RRS S – UMP	Not documented in Project survey
Broad-leaved lantern moss *Andreaea schofieldiana*	Forms mats on dry and exposed to moist, shaded igneous rocks, montane to subalpine.	D – RRS S – UMP	No suitable habitat in survey area
Spidery threadwort *Blepharostoma arachnoideum*	Old growth forests, in mesic habitats, where it most often grows on rotten logs.	D – UMP	Not documented in Project survey
Giant fourpoint *Barbilophozia lycopodioides*	Forming mats on peaty soil on damp ledges of rock outcrops and cliffs at higher elevations (known sites in OR and WA: 3,400-7,500 feet).	S – FWI	Not documented in Project survey
Beautiful bryum *Bryum calobryoides*	Rock outcrops and shallow soil.	D – RRS D – UMP	Not documented in Project survey
Bog pouchwort *Calypogeia sphagnicola*	Sphagnum containing wetlands.	D – RRS D – UMP	No suitable habitat in survey area
Spiny threadwort *Cephaloziella spinigera*	Wetlands containing Sphagnum.	D – FWI D – RRS S – UMP	Not documented in Project survey
Cryptomitrium tenerum[3/]	Forms small to locally extensive mats on bare, usually shaded and humid soil on hillsides, rock outcrops, and streambanks. In OR, between sea level and 1,000 feet. Root balls and cutbanks are favored habitat in forests.	D – RRS	Not documented in Project survey
White-mouthed Extinguisher-moss *Encalypta brevicollis*	Deep, rocky ravine.	D – RRS S – UMP	Not documented in Project survey
Candle snuffer moss *Encalypta brevipes*	Soil on ledges and in crevices on cliffs, reported from both igneous and siliceous substrates.	D – RRS S – UMP	No suitable habitat in survey area
Banded cord-moss *Entosthodon fascicularis*	Seasonally wet, exposed soil in seeps or along intermittent streams. Usually hidden among grasses, other mosses, and litter. Known habitats: grassland, oak savanna, grassy balds, and rock outcrops. In OR, known at elevations below 3,000 feet.	S – RRS S – UMP	Not documented in Project survey

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Braided frostwort *Gymnomitrion concinnatum*	On peaty soil of cliffs and rock outcrops, full exposure or shaded. In OR and WA, it has only been found in subalpine parkland areas.	S – UMP	Not documented in Project survey
Great mountain flapwort *Harpanthus flotovianus*	Wet places, often with Sphagnum.	D – FWI D – RRS S – UMP	Not documented in Project survey
Jamesoniella autumnalis var. *heterostipa*[3/]	Reportedly an obligate aquatic taxon growing over rocks in moving water or forming sometimes extensive, loose mats in lakes.	S – UMP	Not documented in Project survey
Kurzia makinoana[3/]	In old growth forests. Occurs on rocky cliffs and ledges, soil banks and cuts and on decayed wood, rarely on the base of trees, in shaded moist sites or in bogs. Located in humic soils at lower elevations, especially stream terraces, often with liverworts.	S – RSS	Not documented in Project survey
Gillman's pawwort *Lophozia gillmanii*	Found on peaty soil, usually associated with cliffs or ledges. It is an obligate calciphile.	S – FWI D – RRS S – UMP	Not documented in Project survey
Marsupella emarginata var. *aquatica*[3/]	Old growth forests. Grows in robust colonies attached to submerged rocks in partially shaded cold, flowing, cold perennial stream habitats. Known occurrence at Waldo Lake, Willamette National Forest in the Oregon Cascades.	S – UMP	Not documented in Project survey
Orthodontium gracile[3/]	Occurs in old-growth or secondary growth redwood. May be found on the lower bark of trunks, below tree wounds, or downed redwood logs. Typically on redwood bark that has been burned or charred.	D – RSS	Not documented in Project survey
Translucent orthodontium *Orthodontium pellucens*	Forming dense cushions or mats on stumps, rotten logs and bark of living redwood trees, confined to redwood groves near the Pacific Ocean. Sometimes on charred wood, or below gaping wounds in trees. In OR, restricted to *Sequoia sempervirens* in extreme SW corner of the state.	D – RRS	No suitable habitat in survey area
Tuberous hornwort *Phymatoceros phymatodes*	On bare, mineral soil which remains moist until late spring or summer. From near sea level to 2,100 feet elevation.	D – RRS	Not documented in Project survey

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Dwarf rock haircap *Polytrichastrum sexangulare* var. *vulcanicum* (syn. *Polytrichum sphaerothecium*)	Base of cliffs and boulders in open lava field; on thin dry soil over rock; on dry shaded rock; on dry soil in graminoid meadow; and on dry exposed soil in alpine tundra near summit. Elevations range between 5,400 ft. to 7,000 feet.	S – FWI S – UMP	Not documented in Project survey
Hummock haircap moss *Polytrichum strictum*	Organic soils, particularly on top of Sphagnum hummocks, in coastal and montane bogs and fens.	S – UMP	Not documented in Project survey
Bolander's scalemoss *Porella bolanderi*	On a variety of rock types (siliceous, calcareous, and metamorphic) and trunks of *Quercus, Umbellularia*, and *Acer macrophyllum*. In the Pacific Northwest, known elevations range from 500-3,000 feet.	D – RRS S – UMP	Not documented in Project survey
Blunt water moss *Pseudocalliergon trifarium* (syn. *Calliergon trifarium*)	Calcareous fens.	S – RRS D – FWI	No suitable habitat in survey area
Racomitrium moss *Racomitrium depressum* (syn. *Codriophorus depressus*)	Forming mats on rocks in perennial or intermittent streams, and in the spray zone of waterfalls, between 400 and 11,000 feet elevation. Habitats are subject to scour at high water.	S – FWI S – RRS S – UMP	Not documented in Project survey
Rivulariella gemmipara[3/] (syn. *Chiloscyphus gemmiparus*)	Grows attached to rocks in moderately fast-moving water. Restricted to places where water flows over gravel or rocks.	S – FWI D – RSS S – UMP	Not documented in Project survey
Scapania obscura[3/]	On peaty soil close to streams below cold water springs and in snow melt seepage channels. At least in this region, it grows in full sun.	S – UMP	Not documented in Project survey
Schistidium moss *Schistidium cinclidodonteum*	On wet or dry rocks or on soil in crevices of rocks and boulders, often along intermittent streams, at elevations of 5,000-11,000 feet.	S – FWI D – RRS	Not documented in Project survey
Alpine masterwort *Schofieldia monticola*	Terrestrial, on peaty soil under heather or beside small streams; strictly subalpine-alpine.	S – UMP	Not documented in Project survey
Tetraphis geniculata[3/]	A moss that occurs in moist, coniferous forests with down logs; on the cut or broken ends or lower half of large (usually over 15" dbh), decay class 3, 4, and 5 rotted logs, or stumps, and occasionally on peaty banks in moist coniferous forests from sea level to subalpine elevations.	S – UMP	Not documented in Project survey

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Mucronleaf tortula moss *Tortula mucronifolia*	On soil or rock.	D – RRS	Not documented in Project survey
Asano's trematodon moss *Trematodon asanoi*	On moist bare soil along the edges of trails, streams and ponds in the subalpine zone. Soils usually have some organic content and are irrigated by meltwater from late-season snowbeds.	S – FWI S – UMP	Not documented in Project survey
Fungi			
Albatrellus avellaneus[3/]	Presumed mycorrhizal with pine trees, known from Shore Acres in Coos County, in T26S, R14W, Sec. 17 SWNE along Cape Arago area.	D – RSS	Not documented in Project survey
Chamonixia caespitosa[3/]	Forms sporocarps beneath the soil surface associated with various Pinaceae spp., particularly *Abies amabilis* and *Tsuga* spp. at high elevation and *Picea sitchensis, Pseudotsuga menziesii,* and *Tsuga heterophylla* in coastal forests.	D – RSS	Not documented in Project survey
Cortinarius barlowensis[3/] (syn. *Cortinarius azureus)*	Coastal to montane conifer forests up to at least 3,940 feet elevation; late successional old-growth association; fruits in autumn.	D – UMP	Not documented in Project survey
Dermocybe humboldtensis[3/]	Stabilized dunes on roots of pine and huckleberry species and conglomerate rock and gravelly loam soil with Douglas-fir and ponderosa pine.	S – RSS S – UMP	Not documented in Project survey
Gastroboletus vividus[3/]	Associated with *Abies magnifica* and *Tsuga mertensiana.*	S – FWI D – RSS S – UMP	Not documented in Project survey
Gastrolactarius camphoratus[3/]	Associated with the roots of *Tsuga heterophylla* and possibly *Picea sitchensis* from sea level to 3,040 feet elevation.	D – RSS	Not documented in Project survey
Gymnomyces fragrans[3/]	Populations have been located in the Pacific silver fir, mountain hemlock and Shasta red fir plant associations. Populations range from 4,803-6,853 feet elevation and are found on east-facing and west-facing slopes	D – RRS S – UMP	Not documented in Project survey
Phaeocollybia californica[3/]	Roots of Sitka spruce, Pacific silver fir and western hemlock	D – RSS	Not documented in Project survey

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Pseudorhizina californica[3/] (syn. *Gyromitra californica)*	Solitary or in small groups in conifer woods; fruiting in humus or on rotting wood in moist areas; also found on soil along streams, skid trails, and recently disturbed soil.	D – FWI D – RSS D – UMP	Not documented in Project survey
Ramaria amyloidea[3/]	In humus or soil under *Abies* ssp., Douglas-fir, and western hemlock from September to October.	D – FWI S – RSS D – UMP	Not documented in Project survey
Ramaria rubella var. *blanda*[3/]	Fruits on wood in conifer forests.	D – RSS	Not documented in Project survey
Rhizopogon chamaleontinus[3/]	Found in association with the roots of *Pseudotsuga menziesii* and scattered *Pinus lambertiana* at 3,600 feet elevation.	D – RSS	Not documented in Project survey
Rhizopogon ellipsosporus[3/]	Associated with roots of Douglas-fir and sugar pine in October.	D – RSS	Not documented in Project survey
Rhizopogon exiguus[3/]	Associated with the roots of *Pseudotsuga menziesii* and *Tsuga heterophylla* at 3,100 feet elevation.	D – RSS S – UMP	Not documented in Project survey
Rhizopogon inquinatus[3/]	Found in association with the roots of *Pinus jeffreyi, Pseudotsuga menziesii* and *Tsuga heterophylla* from 1,640 to 4,600 feet elevation.	S – UMP	Not documented in Project survey
Stagnicola perplexa[3/]	Colonizes plant debris in wet coniferous forest floor depressions and shallow pools.	D – RSS S – UMP	Not documented in Project survey
Lichen			
Bryoria subcana[3/]	Grows on conifer bark in forests of coastal bays, streams, dune forests, and high precipitation ridges within 30 miles (50 km) of the ocean. Inhabits areas of high humidity, mostly in late-seral to old-growth stands.	D – RSS	Not documented on NFS land during Project survey
Leptogium cyanescens[3/]	Occurs in mixed conifer and Douglas-fir stands, and in maple and willow thickets in both riparian and upland habitats.	S – RSS	Not documented in Project survey
Lobaria linita[3/]	On trees, shrubs, mossy rocks or alpine sod. Montane to alpine.	S – RSS D – UMP	Not documented in Project survey
Ramalina pollinaria[3/]	Bark and wood, usually in low elevation swamps.	S – RSS S – UMP	Not documented in Project survey

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Woven spore lichen *Texosporium sancti-jacobi*	Arid to semi-arid shrub-steppe, grassland or savannah communities up to 3,280 in elevation. It requires natural openings or gaps in arid vegetation that are not maintained by fire.	S – FWI	Not documented in Project survey
Vascular plants			
California maiden-hair *Adiantum jordanii*	Rocky areas in moist woods.	S – FWI D – RRS S – UMP	Not documented in Project survey
Peninsular onion *Allium peninsulare*	Dry open or wooded slopes and flats to 3,000 ft; valley grassland, foothill woodlands; March through June.	S – RRS	Not documented in Project survey
Rogue Canyon rockcress *Arabis modesta*	Known only from the Rogue River canyon near Galice, Josephine County.	D – RRS	Not documented on NFS land during Project survey
Gasquet (hairy) manzanita *Arctostaphylos hispidula*	Rocky serpentine soils or sandstone, open forests.	D – RRS	Outside of known (or probable) range
Shasta arnica *Arnica viscosa*	High elevation, open rocky sites; known in Deschutes, Klamath, Douglas Co, found at a few sites in wilderness along the Cascade Crest and on Pelican Butte.	D – FWI S – RRS D – UMP	Not documented in Project survey
Grass-fern *Asplenium septentrionale*	Grows on shady, moist, north faces of large rocks; only known in North Umpqua.	D – FWI D – RRS D – UMP	Not documented in Project survey
Lemmon's milk-vetch *Astragalus lemmonii*	Great Basin scrub, meadows and seeps, marshes and swamps (lake shores). NOTE: According to 10/23/2012 plant meeting in Corvallis, *A. lemmonii* should be *A. cooperi* (*A. lemmonii* not in OR).	D – FWI	Not documented in Project survey
Peck's milk-vetch *Astragalus peckii*	Very dry sites, on loose, sandy soil or pumice. Often found in/along dry water courses, in sagebrush or rabbitbrush openings in lodgepole pine forests (in the south) or in western Juniper woodlands (in the north), occ. on barren flats.	D – FWI	Not documented in Project survey

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Bensonia *Bensoniella oregana*	Wet meadows and moist streamside sites in pre-Cretaceous metasedimentary rock at elevations above 4,000 feet.	D – RRS	The single site observed during surveys (on BLM land) will be avoided.
Crenulate moonwort (Crenulate grape-fern) *Botrychium crenulatum*	Marshes, meadows above 4,000 feet	S – FWI	Not documented in Project survey
Pumice grape-fern *Botrychium pumicola*	Loose volcanic soil, frost pockets and lodgepole pine basins (1,520-4,985 2,470 m8,105 feet).	D – FWI S – RRS S – UMP	Not documented in Project survey
Brewer's reedgrass *Calamagrostis breweri*	Restricted to subalpine habitats in a narrow elevation range in Oregon. Most populations in Oregon occur between 5,000-6,000 feet. Usually found in moist meadows with limited vegetative competition.	S – UMP	Not documented in Project survey
Greene's mariposa lily *Calochortus greenei*	Grows on dry, bushy hillsides in southern Jackson County.	S – FWI	Not documented in Project survey
Howell's camassia *Camassia howellii*	Grassy wet meadows, swampy ground, and transitional areas between wet meadows and coniferous woodlands.	D – RRS	No suitable habitat in survey area
Slender-flowered evening primrose *Camissonia graciliflora* (*syn.Tetrapteron graciliflorum*)	Open rocky grassy and shrublands, usually clay soils.	D – RRS	Not documented in Project survey
Washoe suncup *Camissonia pusilla*	Dry, open to branchy slopes, flats, and roadsides on sandy soil with *Artemisia* to pinyon-juniper	S – FWI	Not documented in Project survey
Capitate sedge *Carex capitata*	Wet places.	D – FWI D – RRS	Not documented in Project survey
Bristly sedge *Carex comosa*	Wet places.	S – FWI S – RRS	Not documented on NFS land during Project survey
Cordilleran sedge *Carex cordillerana*	Naturally disturbed, rocky slopes with organic layer and leaf litter in mesic mixed forests, or disturbed, open, grassy slopes; 1,640-7,900 feet.	D – FWI	Not documented in Project survey

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Lesser panicled sedge *Carex diandra*	Meadows.	D – FWI S – RRS S – UMP	Not documented in Project survey
A sedge *Carex klamathensis*	Chaparral, cismontane woodland, meadows and seeps.	D – RRS	Not documented in Project survey
Slender sedge *Carex lasiocarpa* var. *americana*	Bogs, shallow water.	D – FWI S – RRS S – UMP	Not documented in Project survey
Pale sedge *Carex livida*	Moist to wet, shade-free habitats such as bogs, fens, swamps, stream banks and damp forests.	D – RRS	Not documented in Project survey
Spikenard sedge *Carex nardina*	Exposed arctic and alpine tundra, usually calcareous cliffs, rocky slopes, ridges, and summits; 150-10,800 m.	D – UMP	Not documented in Project survey
Sierra nerved sedge *Carex nervina*	Moist to wet places.	D – RRS	Not documented in Project survey
Russet sedge *Carex saxatilis*	Fens, bogs, wet tundra, roadside ditches, shores of lakes, ponds, and slow moving streams, often in shallow water, 0-12,150 feet.	S – FWI	Not documented in Project survey
Native sedge *Carex vernacula*	Moist alpine tundra, moist forest openings just below treeline.	D – FWI S – UMP	Not documented in Project survey
Green-tinged paintbrush *Castilleja chlorotica*	Grows on dry gravelly or sandy slopes; Elevation 6,000 – 8,000 feet; late June through mid-August. Found in shrub openings on slopes and ridges; On FWI found at one site near northeast corner of the Forest.	D – FWI	No suitable habitat in survey area
Split-hair paintbrush *Castilleja schizotricha*	Decomposed granite or marble at high elevations.	D – RRS	No suitable habitat in survey area
Coville's lip-fern *Cheilanthes covillei*	Rock outcrops, cliffs.	D – RRS	Not documented in Project survey

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Fee's lip-fern *Cheilanthes feei*	Calcareous cliffs and ledges, usually on limestone or sandstone; 300-12,470 feet.	S – FWI	Not documented in Project survey
Coastal lip-fern *Cheilanthes intertexta*	Rock outcrops, cliffs.	S – FWI S – RRS	Not documented on NFS land during Project survey
Narrow-leaved amole *Chlorogalum angustifolium*	Clay soils in dry grassland.	S – RRS	Not documented in Project survey
Oregon timwort *Cicendia quadrangularis*	Openings.	D – RRS	Not documented in Project survey
Mt. Mazama collomia *Collomia mazama*	Dry woods at high elevations; July and August; True fir/lodgepole pine forest, meadows, and meadow edges; On FWI, found in Lost Creek, Horse Creek, Rock Creek and Cherry Creek drainages, Klamath RD.	D – FWI D – RRS D – UMP	Not documented in Project survey
Coldwater corydalis *Corydalis aquae-gelidae*	Found in close proximity to seeps, springs, or streams with relatively cold water, a substrate of gravelly-sand, upper level canopy closure of 70% to 90%, and little herbaceous competition. Located in the Western Hemlock and Pacific Silver Fir Zones. Elevation range between 1,200-4,260 feet.	D – RRS	Not documented in Project survey
Milo baker's cryptantha *Cryptantha milo-bakeri*	Rocky or gravelly soils in conifer openings, chaparral or oak woodlands.	D – RRS	Not documented in Project survey
Short-pointed cyperus *Cyperus acuminatus*	Wet, low places in valley and lowlands, edges of temporary pools, ponds, streams, ditches	S – RRS	Not documented in Project survey
Red larkspur *Delphinium nudicaule*	Rocky openings, often in talus on moist slopes.	D – RRS	Not documented in Project survey
Few-flowered bleedingheart *Dicentra pauciflora*	Openings in coniferous forests, in volcanic and granitic soils; 3,900-8,900 feet.	D – RRS	Not documented in Project survey
Howell's whitlow-grass *Draba howellii*	Rocky summits, cracks in granite walls, rock crevices; 6,230-8,900 feet.	D – RRS	Not documented in Project survey

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Short seeded waterwort *Elatine brachysperma*	Occurs almost always under natural conditions in wetlands.	S – FWI S – UMP	Not documented in Project survey
Bolander's spikerush *Eleocharis bolanderi*	Fresh, often summer-dry meadows, springs, seeps, stream margins; 3,280-11,150 feet.	D – FWI	Not documented in Project survey
Oregon willow herb *Epilobium oreganum*	Grows in bogs at low elevations. Known only from Josephine County.	D – RRS	No suitable habitat in survey area
Siskiyou willow herb *Epilobium siskiyouense*	Scree and talus on Serpentine ridges.	D – RRS	No suitable habitat in survey area
Golden fleece *Ericameria arborescens*	Dry foothill slopes, in chaparral; 300-6,560 feet.	D – RRS	Not documented in Project survey
Siskiyou daisy *Erigeron cervinus*	Rocky streamsides; dry, stony soil of grasslands, sagebrush steppe, woodlands, fellfields, open forest.	D – RRS	Not documented in Project survey
Cliff (rock) daisy *Erigeron petrophilus*	Rocky foothills to montane forest.	D – RRS	Not documented in Project survey
Lobb's buckwheat *Eriogonum lobbii*	Gravelly to rocky or talus slopes, mixed grassland, buckbrush, manzanita, and sagebrush communities, montane, subalpine, or alpine conifer woodlands.	D – RRS	Not documented in Project survey
Prostrate buckwheat *Eriogonum prociduum*	Areas of barren rocky or gravelly volcanic soils within juniper or sagebrush habitat.	D – FWI	Not documented in Project survey
Green buckwheat *Eriogonum umbellatum* var. *glaberrimum*	Sandy to gravelly slopes, sagebrush communities, aspen and montane conifer woodlands; 5,250-7,550 feet.	D – FWI	Not documented in Project survey
Acker Rock wild buckwheat *Eriogonum villosissimum*	Grows exclusively on quartz rock at high elevations.	D – UMP	No suitable habitat in survey area
Howell’s adder’s tongue *Erythronium howellii*	Found in open woods primarily in the upper Illinois River basin, mostly in serpentine soil; April and May.	D – RRS	Outside of known (or probable) range

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Gold poppy *Eschscholzia caespitosa*	Grows on dry, brushy slopes and flat areas, mostly along roadsides; known in southern Douglas County; March through early June.	S – RRS	No suitable habitat in survey area
Wayside aster *Eucephalis vialis* (*Aster vialis*)	Areas of natural and man-made disturbance, edges and openings in woodlands and forests, both in second and old-growth, and shaded roadsides.	S – UMP	Not documented on NFS land during Project survey
Umpqua swertia *Frasera umpquaensis*	Elevations 4,500 – 6,500 feet in conifer forests, in damp, shaded or sometimes open environments; June through August.	D – RRS D – UMP	Not documented in Project survey
Warner Mt. bedstraw *Galium serpenticum* ssp. *warnerense*	Meadows in subalpine forest.	D – FWI	Not documented in Project survey
Newberry's gentian *Gentiana newberryi* var. *newberryi*	High alpine meadows of the Cascade Mountains; wet meadows and meadow edges, generally 5,000 ft and above; August and September.	D – FWI D – RRS S – UMP	Not documented in Project survey
Elegant gentian *Gentiana plurisetosa*	Meadows in lodgepole forest, red fir forest, or yellow pine forest.	D – RRS	Not documented in Project survey
Waldo gentian *Gentiana setigera*	Meadows in yellow pine forest, red fir forest, wetland-riparian. Almost always under natural conditions in wetlands.	D – RRS	Not documented in Project survey
Boggs lake hedge-hyssop *Gratiola heterosepala*	Restricted to clay soils in or near shallow water such as at the margins of lakes and vernal pools.	S – FWI	Not documented in Project survey
Beautiful stickseed *Hackelia bella*	Forest openings, roadsides.	D – RRS	Not documented in Project survey
Purple-flowered rush-lily *Hastingsia bracteosa* var. *atropurpurea*	Wetland area soils, seeps and rills; seepage areas, *Darlingtonia* bogs, hillside marshes, fens, or small streams.	D – RRS	Not documented in Project survey
Large-flowered rush-lily *Hastingsia bracteosa* var. *bracteosa*	It is found in lowland forests up to an elevation of 1,640 feet.	D – RRS	Not documented in Project survey
Salt heliotrope *Heliotropium curassavicum*	Moist to dry saline soils.	D – FWI	No suitable habitat in survey area

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Baker's cypress *Hesperocyparis bakeri* (syn. *Cupressus bakeri*)	Scattered on dry wooded slopes, usually in serpentine soil.	D – RRS	Not documented in Project survey
Shaggy hawkweed *Hieracium horridum*	Rocky places.	S – RRS	Not documented in Project survey
Henderson's horkelia *Horkelia hendersonii*	Endemic to summits of a few granite peaks in southern Jackson County.	D – RRS	No suitable habitat in survey area
Three-toothed horkelia *Horkelia tridentata* ssp. *tridentata*	Montane forests, associated with conifer trees.	D – RRS	Not documented in Project survey
Shockley's ivesia *Ivesia shockleyi*	Subalpine forest, bristle-cone pine forest, alpine fell-fields.	D – FWI	Not documented in Project survey
Tiehm's rush *Juncus tiehmii*	Bare granitic sands of seeps, streambanks, meadows to 10,000 feet.	D – FWI	Not documented in Project survey
Fragrant kalmiopsis *Kalmiopsis fragrans*	Cliffs and rock outcrops, known only from North Umpqua River.	D – UMP	Not documented in Project survey
Bush beardtongue *Keckiella lemmonii*	Conifer forests and chaparral of coastal and inland mountain ranges.	D – RRS	Not documented in Project survey
Columbia lewisia *Lewisia columbiana* var. *columbiana*	Reported on three mountains in the southeastern portion of Douglas County; May through July.	D – UMP	Not documented in Project survey
Lee's lewisia *Lewisia leana*	Grows on high elevation serpentine ridges; late May through August.	D – RRS S – UMP	Not documented in Project survey
Slender meadow-foam *Limnanthes gracilis* ssp. *gracilis* (syn. *L. alba* ssp. *gracilis*)	Found in Douglas, Jackson, and Josephine counties in very wet areas (early spring) and often in serpentine soil; March through May. Vernal pools.	D – RRS	Not documented in Project survey
Aristulate lipocarpha *Lipocarpha aristulata*	Wet soil at an elevation of 100 to 400 m. In Washington, has been found along shorelines and islands below high water on silty substrates.	S – FWI	Not documented in Project survey
Englemann's desert-parsley *Lomatium engelmannii*	Chaparral, red fir forest, yellow pine forest.	D – RRS	No suitable habitat in survey area

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Stipuled trefoil *Lotus stipularis*	Open forests, chaparral, disturbed sites.	D – RRS	Not documented in Project survey
Mt. Ashland lupine *Lupinus aridus* ssp. *ashlandensis* (syn. *L. lepidus ashlandensis*)	Sandy or gravelly soils at low to alpine elevations.	D – RRS	No suitable habitat in survey area
Tracy's lupine *Lupinus tracyi*	Dry open montane forest.	D – RRS	Not documented in Project survey
Bog club-moss *Lycopodiella inundata*	Bogs, muddy depressions, and pond margins. On FWI one site in Yoss Creek drainage on Chiloquin RD.	D – FWI	Not documented in Project survey
White meconella (fairy poppy) *Meconella oregana*	Grows in open areas that are wet in the spring at low elevations. Known from sites in the Willamette Valley and the Columbia Gorge.	D – RRS	Not documented in Project survey
Bolander's monkeyflower *Mimulus bolanderi* (syn. *Diplacus bolanderi*)	Openings in chaparral, burns and disturbed areas. Applegate Valley.	D – RRS	Not documented in Project survey
Congdon's monkeyflower *Mimulus congdonii* (syn. *Diplacus congdonii*)	Openings in oak woodland and chaparral. Applegate Valley.	S – RRS	Not documented in Project survey
Disappearing monkeyflower *Mimulus evanescens* (syn. *Erythranthe inflatula*)	Vernally moist sites along perennial and intermittent streams; receding margins of lakes, ponds, and reservoirs within juniper/sagebrush habitats.	D – FWI	No suitable habitat in survey area
Tri-colored monkeyflower *Mimulus tricolor* (syn. *Diplacus tricolor*)	Grows at low elevations in clay soil, preferring vernal pools; scattered in Klamath County; late May through June.	D – FWI	Not documented in Project survey
Siskiyou monardella *Monardella purpurea*	Mixed evergreen forest, ponderosa pine forest.	D – RRS	Not documented in Project survey
Annual dropseed *Muhlenbergia minutissima*	Pinyon-juniper woodland, sagebrush scrub, yellow pine forest, wetland-riparia; between 4,000 and 7,500 feet.	S – FWI	Not documented in Project survey
Slender nemacladus *Nemacladus capillaris*	Dry slopes, burned areas.	S – RRS	Not documented in Project survey

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Adder's-tongue *Ophioglossum pusilum*	Open fens, wet meadows, grassy slopes, roadside ditches.	D – RRS D – UMP	Not documented in Project survey
Coffee fern *Pellaea andromedifolia*	Rock outcrops, cliffs.	S – RRS S – UMP	Not documented in Project survey
Bird's-foot fern *Pellaea mucronata ssp. mucronata*	Grows in various types of rocky habitat.	S – RRS	Not documented in Project survey
Blue-leaved penstemon *Penstemon glaucinus*	Openings in mid to high elevation pine, fir, and mountain hemlock communities. Well-drained volcanic soils along rocky points and ridges.	D – FWI	Not documented in Project survey
Red-rooted yampah *Perideridia erythrorhiza*	Moist meadows, forest edges below 4,500 ft.	D – FWI D – RRS S – UMP	Not documented in Project survey
Siskiyou phacelia *Phacelia leonis*	Red fir forests.	D – RRS	Not documented in Project survey
American pillwort *Pilularia americana*	Vernal pools, mud flats, lake margins.	D – FWI S – RRS	Not documented in Project survey
Whitebark pine *Pinus albicaulis*	Subalpine forests.	D – FWI D – RRS D – UMP	Not documented in Project survey
Coral seeded allocarya *Plagiobothrys figuratus* var. *corallicarpus*	Low elevation meadows and moist clearings and fields.	S – RRS	Not documented in Project survey
Greene's popcorn flower *Plagiobothrys greenei*	Vernal pools.	S – RRS	Not documented in Project survey
Desert allocarya *Plagiobothrys salsus*	Playas in alkali sink, wetland-riparian.	S – FWI	Not documented in Project survey
Oregon semaphoregrass *Pleuropogon oregonus* (syn. *Lophoclaena oregana*)	Wet meadows, marshlands, and streambanks. Standing or flowing water, at least early in the growing season, is important where populations are present.	D – FWI	Not documented in Project survey
Timber bluegrass *Poa rhizomata*	Dry Douglas-fir/ponderosa pine forests.	D – RRS S – UMP	Not documented in Project survey

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Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Profuse-flowered mesa mint *Pogogyne floribunda*	Vernal pools, seasonal lakes.	S – FWI	Not documented in Project survey
California sword-fern *Polystichum californicum*	Creek banks and canyons in redwoods and mixed evergreen forests.	S – RRS D – UMP	Not documented in Project survey
Rafinesque's pondweed *Potamogeton diversifolius*	Shallow water, ditches, ponds, lakes.	S – FWI	Not documented in Project survey
Siskiyou fairy bells *Prosartes parvifolia*	Roadsides, disturbed areas, and burned areas.	D – RRS	Not documented in Project survey
Toothleaf pyrola *Pyrola dentata*	Dry, scrubby edge of coniferous forests.	S – RRS	Not documented in Project survey
California chicory *Rafinesquia californica*	Chaparral, recent burns, in the Applegate Valley.	D – RRS	Not documented in Project survey
Redberry *Rhamnus ilicifolia*	Chaparral in Applegate Valley.	D – RRS	Not documented in Project survey
White beakrush *Rhynchospora alba*	Marshes, bogs.	D – RRS	Not documented in Project survey
Straggly gooseberry *Ribes divaricatum* var. *pubiflorum*	Coastal bluffs, forest edges; 0-4,900 feet.	S – RRS	Not documented in Project survey
Thompson's mistmaiden *Romanzoffia thompsonii*	Sunny, vernally wet mossy rocks.	D – RRS D – UMP	Not documented in Project survey
Columbia cress *Rorippa columbiae*	Along intermittent and perennial streams and lakeshores: banks, sandbars, vernal pools, lakebeds, and ditches.	D – FWI S – RRS	Not documented in Project survey
Lowland toothcup *Rotala ramosior*	Open, wet gravelly soil around ponds (5-400 feet in western Oregon).	S – FWI S – UMP	Not documented in Project survey
Joint-leaved saxifrage *Saxifragopsis fragarioides*	Grows on dry cliffs in the high Siskiyou Mountains.	D – RRS	Not documented in Project survey
Scheuchzeria *Scheuchzeria palustris* ssp. *americana*	Grows in ponds and along streams in Oregon Cascades.	D – FWI D – RRS D – UMP	Not documented in Project survey

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Water clubrush *Schoenoplectus subterminalis* (syn. *Scirpus subterminalis*)	Wetlands and bogs.	D – FWI D – RRS D – UMP	Not documented in Project survey
Drooping bulrush *Scirpus pendulus*	Marshes, wet meadows, ditches.	S – FWI D – RRS	Not documented in Project survey
California fetid adderstongue *Scoliopus bigelovii*	Redwood and coastal coniferous forests, mossy mountain stream banks, shaded slopes; 0-1,650 feet.	D – RRS	Not documented in Project survey
Rogue river stonecrop *Sedum moranii*	Steep south to west facing slopes and rock outcrops; 650-900 feet.	D – RRS	Not documented in Project survey
Verrucose sea-purslane *Sesuvium verrucosum*	Valley grassland, coastal sage scrub, alkali sink, wetland riparian.	S – FWI	Not documented in Project survey
Coast checkermallow *Sidalcea malviflora* ssp. *patula*	Open Coastal Forest.	D – RRS	Not documented in Project survey
Bolander's catchfly *Silene hookeri* ssp. *bolanderi*	Oak and Douglas-fir woodlands (330-3,280 feet).	S – RRS	Not documented in Project survey
Parish's horse-nettle *Solanum parishii*	Chaparral, dry conifer openings, recent burns.	D – RRS	Not documented in Project survey
Western sophora *Sophora leachiana*	Dry, open areas, open mixed woodlands, roadcuts and clearcuts; 460-1,500 feet.	D – RRS	Not documented in Project survey
Common jewel flower *Streptanthus glandulosus* ssp. *josephinensis*	Serpentine areas. (Note: this source lists the subspecies *S. g. josephinensis* as occurring in Oregon.)	D – RRS	Not documented in Project survey
Howell's streptanthus *Streptanthus howellii*	Dry, serpentine slopes, mixed evergreen forests, open pine woods or brushy areas; 1,590-4,000 feet.	D – RRS	Not documented in Project survey
Howell's tauschia *Tauschia howellii*	Granitic gravel ridgetops above 6,000 feet.	D – RRS	No suitable habitat in survey area
Siskiyou trillium *Trillium kurabayashii*	Rich, moist conifer-hardwood forest, slopes, especially lower slopes, predominantly deciduous flat woods along streams, edges of Sequoia groves, and alder, vine maple, and fern thickets along streams, especially older, higher flood terraces, not the lowest and wettest; at higher elevations, both in forests and in open grassy meadows with scattered oak trees.	D – RRS	Not documented in Project survey

Table A-3. Forest Service Sensitive Plant (Vascular and Non-Vascular) and Fungi Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Lesser bladderwort *Utricularia minor*	Shallow water.	D – FWI D – RRS D – UMP	Not documented in Project survey
Northern bladderwort *Utricularia ochroleuca*	Shallow water on Shpagnum mats.	S – FWI S – UMP	Not documented in Project survey
Western bog violet *Viola primulifolia* ssp. *occidentalis*	Serpentine bogs.	D – RRS	No suitable habitat in survey area
Dotted water-meal *Wolffia borealis*	Freshwater ponds and slow flowing ditches in which water has somewhat high levels of organic material. Occurs in natural ponds as well as in log and sewage treatment ponds; 350-1,500 feet.	S – UMP	Not documented in Project survey
Columbia water-meal *Wolffia columbiana*	Free floating in quiet water.	S – RRS S – UMP	Not documented in Project survey
Small-flowered death camas *Zigadenus fontanus*	Meadows	D – RRS	Not documented in Project survey

1/ ORNHIC 2006; Eastman 1990; Pojar and MacKinnon 1994; Hickman 1993; BLM 2004; Hitchcock et al. 1969; Castellano et al. 1999; Arora 1986; Christy and Wagner 1996; Lawton 1971; Norris and Shevok 2004a; Norris and Shevok 2004b; McCune and Geiser 1997; Brodo et al. 2001, ORBIC 2013.

2/ Occurrence Key:

National Forest: FWI = Winema National Forest, RRS = Rogue River National Forest, UMP = Umpqua National Forest
D = Documented within Forest Service Management Area
S = Suspected within Forest Service Management Area

3/ No common name found for this species.

Appendix B: Summary of Construction and Operation-Related Disturbance to Each National Forest

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Table B-1. Summary of Construction-Related Disturbance (acres/) to Corresponding Habitat Category (Johnson and O'Neil 2001) in Umpqua National Forest																
			Pipeline Facilities								Subtotals					
General Vegetation Type	Mapped Vegetation Category Type	Forest Stand by Age	Construction Right-of-Way	Hydrostatic Discharge Sites [4]	Temporary Extra Work Areas	Uncleared Storage Areas	Rock Source/ Disposal	Access Roads (TARs/PARs/ Improvements)[5]	Pipe Yards	Aboveground Facilities - Klamath Compressor Station	Subtotal Late Successional – Old Growth	Subtotal Mid-Seral	Subtotal Clearcut or Regenerating	Subtotal by Habitat Type	*Percent of Vegetation Type*	*Percent of Total Vegetation Type*
	Westside Lowland Conifer-Hardwood	L-O [1]														
		M-S [2]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R [3]														
	Montane Mixed Conifer Forest	L-O [1]														
		M-S [2]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R [3]														
	Southwest Oregon Mixed Conifer-Hardwood Forest	L-O [1]	67.47		10.50	34.27		0.17								
		M-S [2]	20.27		11.14	7.59	0.03	0.04			112.42	39.07	35.15	186.64	*100.0%*	*87.9%*
		C-R [3]	29.36		4.95	0.81		0.02								
	Ponderosa Pine Forest and Woodland	L-O [1]														
		M-S [2]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R [3]														
	Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O [1]														
		M-S [2]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R [3]														
	Western Juniper and Mountain Mahogany	L-O [1]														
		M-S [2]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R [3]														
Subtotal Forest-Woodland by Age Class		L-O 1	**67.47**	**0.00**	**10.50**	**34.27**	**0.00**	**0.17**	**0.00**	**0.00**					***60.2%***	
		M-S 2	**20.27**	**0.00**	**11.14**	**7.59**	**0.03**	**0.04**	**0.00**	**0.00**	112.42	39.07	35.15	186.64	***0.3%***	*87.9%*
		C-R 3	**29.36**	**0.00**	**4.95**	**0.81**	**0.00**	**0.02**	**0.00**	**0.00**					***0.0%***	
Subtotal Forest-Woodland			**117.10**	**0.00**	**26.59**	**42.68**	**0.03**	**0.24**	**0.00**	**0.00**	**112.42**	**39.07**	**35.15**	**186.64**		**87.9%**
Percent of All Forest-Woodland			***62.7%***	***0.0%***	***14.2%***	***22.9%***	***0.0%***	***0.1%***	***0.0%***	***0.0%***	***60.2%***	***20.9%***	***18.8%***			
Grasslands-Shrubland	Shrub-steppe													0.00	*0.0%*	*0.0%*
	Westside Grasslands													0.00	*0.0%*	*0.0%*
	Eastside Grasslands													0.00	*0.0%*	*0.0%*
Subtotal Grasslands-Shrubland			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**				**0.00**	***0.0%***	***0.0%***
Wetland / Riparian	Westside Riparian-Wetlands/Eastside Riparian-Wetlands	L-O [1]													*0.0%*	
		M-S [2]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R [3]													*0.0%*	
		PSS	0.11		0.05									0.15		
	Herbaceous Wetlands		0.01											0.01	*0.0%*	*0.0%*
Subtotal Wetland / Riparian			**0.11**	**0.00**	**0.05**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.16**	***0.1%***	***0.1%***

Table B-1. Summary of Construction-Related Disturbance (acres[/]) to Corresponding Habitat Category (Johnson and O'Neil 2001) in Umpqua National Forest

General Vegetation Type	Mapped Vegetation Category Type	Forest Stand by Age	Pipeline Facilities: Construction Right-of-Way	Pipeline Facilities: Hydrostatic Discharge Sites [4]	Pipeline Facilities: Temporary Extra Work Areas	Pipeline Facilities: Uncleared Storage Areas	Pipeline Facilities: Rock Source/ Disposal	Pipeline Facilities: Access Roads (TARs/PARs/ Improvements)[5]	Pipeline Facilities: Pipe Yards	Aboveground Facilities - Klamath Compressor Station	Subtotals: Subtotal Late Successional – Old Growth	Subtotals: Subtotal Mid-Seral	Subtotals: Subtotal Clearcut or Regenerating	Subtotals: Subtotal by Habitat Type	Subtotals: *Percent of Vegetation Type*	*Percent of Total Vegetation Type*
Agriculture	Agriculture, Pastures, and Mixed Environs													0.00	*0.0%*	*0.0%*
Subtotal Agriculture			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**				**0.00**	***0.0%***	***0.0%***
Developed / Barren	Urban and Mixed Environs				7.74		4.31							12.05	*5.7%*	*5.7%*
	Beaches													0.00	*0.0%*	*0.0%*
	Roads		6.56		6.21	0.50	0.02	0.00						13.28	*6.3%*	*6.3%*
Subtotal Developed / Barren			**6.56**	**0.00**	**13.95**	**0.50**	**4.32**	**0.00**	**0.00**	**0.00**				**25.33**	***11.9%***	***11.9%***
Open Water	Open Water - Lakes, Rivers, and Streams		0.17		0.12									0.29	*0.1%*	*0.1%*
	Bays and Estuaries													0.00	*0.0%*	*0.0%*
Subtotal Open Water			**0.17**	**0.00**	**0.12**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**				**0.29**	***0.1%***	***0.1%***
Subtotal Non-Forest			**6.85**	**0.00**	**14.12**	**0.50**	**4.32**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**25.78**	***12.1%***	***12.1%***
Percent of All Non-Forest			***26.5%***	***0.0%***	***54.7%***	***1.9%***	***16.8%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***			
Project Total			**123.95**	**0.00**	**40.70**	**43.17**	**4.35**	**0.24**	**0.00**	**0.00**	**112.42**	**39.07**	**35.15**	**212.42**		
Percent of Pipeline Facilities			***58.4%***	***0.0%***	***19.2%***	***20.3%***	***2.0%***	***0.1%***	***0.0%***	***0.0%***	***52.9%***	***18.4%***	***16.5%***			

1/ The "Late Successional and Old-Growth" category (L-O) describes those forest areas with a majority of trees over 80 years of age. Forests with stands greater than 175 years are considered to have old-growth characteristics.

2/ The "Mid-Seral" category (M-S) describes those forest areas with a majority of trees over 40 years of age but less than 80 years of age.

3/ The "Clearcut or Regenerating Forest" category (C-R) describes those forest areas that are either clear-cut (tree age 0-5 years) or regenerating (tree age 5 to 40 years). Forest areas in this category are divided into forest vegetation types based on their potential to become those types of forests.

4/ Small brush or trees may be cleared by a rubber-tired rotary or flail motor (brush hog) or by hand with machetes/chainsaws. Minimal soil disturbance would occur. A rubber-tired hoe would be utilized to lay the discharge line and to remove the saturated hay bales or filter bags upon completion of hydrostatic discharge.

5/ Portions of some of the PARs are located within the construction right-of-way and there is some duplication in the acreage calculations.

Table B-2. Summary of Operation-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil 2001) in Umpqua National Forest

Mapped Vegetation Category Type		Forest Stand by Age	Pipeline Facilities							Aboveground Facilities																		Total Operation Impacts by Vegetation Type6
			30-foot Maintenance Corridor	Permanent Access Roads	Subtotal Late Successional Old-Growth Forest	Subtotal Mid-Seral Forest	Subtotal Clearcut / Regenerating Forest	Subtotal Pipeline Facilities By Vegetation Type	*Permanent Easement (50-foot)*	Jordan Cove MS & BVA #1 5	BVA #2	BVA #3	BVA #4	BVA #5	BVA #6, Clarks Branch Meter Station	BVA #7	BVA #8	BVA #9	BVA #10	BVA #11	BVA #12	BVA #13	BVA #14	BVA #15	BVA #16	Klamath CS, BVA #17, MS	Subtotal Aboveground Facilities	
Forest-Woodland	Westside Lowland Conifer - Hardwood Forest	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
	Montane Mixed Conifer Forest	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
	Southwest Oregon Mixed Conifer-Hardwood Forest	L-O 1	20.23						34.01																			
		M-S 2	6.55		20.23	6.55	9.94	36.72	10.91																		0.00	**36.72**
		C-R 3	9.94						16.49																			
	Ponderosa Pine Forest and Woodlands	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
	Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
	Western Juniper and Mountain Mahogany Woodlands	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
Subtotal Forest-Woodland by Age Class		L-O 1	***20.23***	***0.00***					*34.01*	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	***0.00***	***20.23***
		M-S 2	***6.55***	***0.00***	20.23	6.55	9.94	36.72	*10.91*	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	***0.00***	***6.55***
		C-R 3	***9.94***	***0.00***					*16.49*	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	***0.00***	***9.94***
Subtotal Forest-Woodland			**36.72**	**0.00**	**20.23**	**6.55**	**9.94**	**36.72**	***61.41***	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**36.72**
Grasslands-Shrubland	Sagebrush Steppe							0.00																			0.00	**0.00**
	Shrublands							0.00																			0.00	**0.00**
	Westside Grasslands							0.00																			0.00	**0.00**
	Eastside Grasslands							0.00																			0.00	**0.00**
Subtotal Grasslands-Shrubland			**0.00**	**0.00**				**0.00**	***0.00***	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Table B-2. Summary of Operation-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil 2001) in Umpqua National Forest																												
Mapped Vegetation Category Type		Forest Stand by Age	Pipeline Facilities							Aboveground Facilities																		Total Operation Impacts by Vegetation Type6
			30-foot Maintenance Corridor	Permanent Access Roads	Subtotal Late Successional Old-Growth Forest	Subtotal Mid-Seral Forest	Subtotal Clearcut / Regenerating Forest	Subtotal Pipeline Facilities By Vegetation Type	*Permanent Easement (50-foot)*	Jordan Cove MS & BVA #1 5	BVA #2	BVA #3	BVA #4	BVA #5	BVA #6, Clarks Branch Meter Station	BVA #7	BVA #8	BVA #9	BVA #10	BVA #11	BVA #12	BVA #13	BVA #14	BVA #15	BVA #16	Klamath CS, BVA #17, MS	Subtotal Aboveground Facilities	
Wetland/ Riparian	Westside Riparian-Wetlands / Eastside Riparian-Wetlands	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
		Shrub	0.03					0.03	0.06																		0.00	**0.03**
	Herbaceous Wetlands							0.00																			0.00	**0.00**
Subtotal Wetland/Riparian			**0.03**	**0.00**				**0.03**	**0.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**
Agriculture	Agriculture, Pastures, and Mixed Environs							0.00																			**0.00**	**0.00**
Subtotal Agriculture			**0.00**	**0.00**				**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Developed / Barren	Urban and Mixed Environs							0.00																			**0.00**	**0.00**
	Beaches							0.00																			**0.00**	**0.00**
	Roads		2.47					2.47	3.92																		**0.00**	**2.47**
Subtotal Developed / Barren			**2.47**	**0.00**				**2.47**	**3.92**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.47**
Open Water	Open Water - Lakes, Rivers, and Streams		0.07					0.07	0.10																		**0.00**	**0.07**
	Bays and Estuaries							0.00																			**0.00**	**0.00**
Subtotal Open Water			**0.07**	**0.00**				**0.07**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.07**
Subtotal Non-Forest			**2.57**	**0.00**	**0.00**	**0.00**	**0.00**	**2.57**	**4.09**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.57**
Project Total			**39.29**	**0.00**	**20.23**	**6.55**	**9.94**	**39.29**	**65.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**39.29**

1/ Acres disturbed were evaluated using GIS; footprints for each component (aboveground facilities, 50-foot permanent easement, and 30-foot maintenance corridor) were overlaid on the digitized vegetation coverage.

2/ The "Late Successional and Old-Growth" category (L-O) describes those forest areas with a majority of trees over 80 years of age. Forests with stands greater than 175 years are considered to have old-growth characteristics.

3/ The "Mid-Seral" category (M-S) describes those forest areas with a majority of trees over 40 years of age but less than 80 years of age.

4/ The "Clearcut or Regenerating Forest" category (C-R) describes those forest areas that are either clear-cut (tree age 0-5 years) or regenerating (tree age 5 to 40 years).

5/ CT = Communications tower

6/ Total by Habitat Type includes the 30-foot maintenance corridor, permanent access roads, and only aboveground facilities with a meter station or compressor station (mainline block valves located within the 30-foot maintenance corridor).

General: If percentages were less than 1/100ths, they were not included in the table.

-Columns and rows do not necessarily sum correctly due to rounding.

Acres of impacts to non-vegetated areas are included within this table for consistency in values reported in Resource Reports and the EIS.

Table B-3. Summary of Construction-Related Disturbance (acres to Corresponding Habitat Category (Johnson and O'Neil 2001) in Rogue River National Forest

General Vegetation Type	Mapped Vegetation Category Type	Forest Stand by Age	Pipeline Facilities: Construction Right-of-Way	Pipeline Facilities: Hydrostatic Discharge Sites 4	Pipeline Facilities: Temporary Extra Work Areas	Pipeline Facilities: Uncleared Storage Areas	Pipeline Facilities: Rock Source/ Disposal	Pipeline Facilities: Access Roads (TARs/PARs/ Improvements)5	Pipeline Facilities: Pipe Yards	Aboveground Facilities – Klamath Compressor Station	Subtotals: Subtotal Late Successional – Old Growth	Subtotals: Subtotal Mid-Seral	Subtotals: Subtotal Clearcut or Regenerating	Subtotals: Subtotal by Habitat Type	Subtotals: *Percent of Vegetation Type*	*Percent of Total Vegetation Type*
	Westside Lowland Conifer-Hardwood	L-O 1/														
		M-S 2/									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R 3/														
	Montane Mixed Conifer Forest	L-O 1/	11.40		0.80	4.54										
		M-S 2/	6.48		0.17	3.90					16.74	10.55	40.69	67.98	*28.2%*	*23.6%*
		C-R 3/	18.88		10.98	10.82										
	Southwest Oregon Mixed Conifer-Hardwood Forest	L-O 1/	62.27		5.87	32.33										
		M-S 2/	9.98		0.31	3.76					100.47	14.05	58.94	173.46	*71.8%*	*60.3%*
		C-R 3/	33.25		13.72	11.97										
	Ponderosa Pine Forest and Woodland	L-O 1/														
		M-S 2/									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R 3/														
	Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O 1/														
		M-S 2/									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R 3/														
	Western Juniper and Mountain Mahogany	L-O 1/														
		M-S 2/									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R 3/														
Subtotal Forest-Woodland by Age Class		L-O 1/	**73.67**	**0.00**	**6.67**	**36.87**	**0.00**	**0.00**	**0.00**	**0.00**					***48.5%***	
		M-S 2/	**16.46**	**0.00**	**0.48**	**7.66**	**0.00**	**0.00**	**0.00**	**0.00**	117.20	24.61	99.63	241.44	***0.2%***	*84.0%*
		C-R 3/	**52.14**	**0.00**	**24.70**	**22.79**	**0.00**	**0.00**	**0.00**	**0.00**					***0.0%***	
Subtotal Forest-Woodland			**142.27**	**0.00**	**31.85**	**67.32**	**0.00**	**0.00**	**0.00**	**0.00**	**117.20**	**24.61**	**99.63**	**241.44**		***84.0%***
Percent of All Forest-Woodland			***58.9%***	***0.0%***	***13.2%***	***27.9%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***48.5%***	***10.2%***	***41.3%***			
Grasslands-Shrubland	Shrub-steppe		2.76		4.59	0.59								7.94	*2.8%*	*2.8%*
	Westside Grasslands		1.45		1.08	0.33								2.86	*1.0%*	*1.0%*
	Eastside Grasslands		0.29		0.10									0.38	*0.1%*	*0.1%*
Subtotal Grasslands-Shrubland			**4.50**	**0.00**	**5.77**	**0.91**	**0.00**	**0.00**	**0.00**	**0.00**				**11.18**	*3.9%*	***3.9%***
Wetland / Riparian	Westside Riparian-Wetlands/Eastside Riparian-Wetlands	L-O 1/													*0.0%*	
		M-S 2/									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R 3/													*0.0%*	
	Herbaceous Wetlands													0.00	*0.0%*	*0.0%*
Subtotal Wetland / Riparian			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	*0.0%*	***0.0%***

Table B-3. Summary of Construction-Related Disturbance (acres to Corresponding Habitat Category (Johnson and O'Neil 2001) in Rogue River National Forest

General Vegetation Type	Mapped Vegetation Category Type	Forest Stand by Age	Pipeline Facilities							Aboveground Facilities – Klamath Compressor Station	Subtotals					Percent of Total Vegetation Type
			Construction Right-of-Way	Hydrostatic Discharge Sites 4	Temporary Extra Work Areas	Uncleared Storage Areas	Rock Source/ Disposal	Access Roads (TARs/PARs/ Improvements)5	Pipe Yards		Subtotal Late Successional – Old Growth	Subtotal Mid-Seral	Subtotal Clearcut or Regenerating	Subtotal by Habitat Type	*Percent of Vegetation Type*	
Agriculture	Agriculture, Pastures, and Mixed Environs													0.00	*0.0%*	*0.0%*
Subtotal Agriculture			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**				**0.00**	*0.0%*	***0.0%***
Developed / Barren	Urban and Mixed Environs				10.76		4.91							15.67	*5.4%*	*5.4%*
	Beaches													0.00	*0.0%*	*0.0%*
	Roads		11.99		3.03	3.00		1						19.03	*6.6%*	*6.6%*
Subtotal Developed / Barren			**11.99**	**0.00**	**13.79**	**3.00**	**4.91**	**1.00**	**0.00**	**0.00**				**34.69**	*12.1%*	***12.1%***
Open Water	Open Water - Lakes, Rivers, and Streams		0.14			0.09								0.23	*0.1%*	*0.1%*
	Bays and Estuaries													0.00	*0.0%*	*0.0%*
Subtotal Open Water			**0.14**	**0.00**	**0.00**	**0.09**	**0.00**	**0.00**	**0.00**	**0.00**				**0.23**	*0.1%*	***0.1%***
Subtotal Non-Forest			**16.63**	**0.00**	**19.56**	**4.00**	**4.91**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**46.10**	*16.0%*	***16.0%***
Percent of All Non-Forest			***36.1%***	***0.0%***	***42.4%***	***8.7%***	***10.6%***	***2.2%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***			
Project Total			**158.91**	**0.00**	**51.41**	**71.33**	**4.91**	**1.00**	**0.00**	**0.00**	**117.20**	**24.61**	**99.63**	**287.55**		
Percent of Pipeline Facilities			***55.3%***	***0.0%***	***17.9%***	***24.8%***	***1.7%***	***0.3%***	***0.0%***	***0.0%***	***40.8%***	***8.6%***	***34.6%***			

1/ The "Late Successional and Old-Growth" category (L-O) describes those forest areas with a majority of trees over 80 years of age. Forests with stands greater than 175 years are considered to have old-growth characteristics.

2/ The "Mid-Seral" category (M-S) describes those forest areas with a majority of trees over 40 years of age but less than 80 years of age.

3/ The "Clearcut or Regenerating Forest" category (C-R) describes those forest areas that are either clear-cut (tree age 0-5 years) or regenerating (tree age 5 to 40 years). Forest areas in this category are divided into forest vegetation types based on their potential to become those types of forests.

4/ Small brush or trees may be cleared by a rubber-tired rotary or flail motor (brush hog) or by hand with machetes/chainsaws. Minimal soil disturbance would occur. A rubber-tired hoe would be utilized to lay the discharge line and to remove the saturated hay bales or filter bags upon completion of hydrostatic discharge.

5/ Portions of some of the PARs are located within the construction right-of-way and there is some duplication in the acreage calculations.

Table B-4. Summary of Operation-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil 2001) in Rogue River National Forest

Mapped Vegetation Category Type		Forest Stand by Age	Pipeline Facilities							Aboveground Facilities																		Total Operation Impacts by Vegetation Type6
			30-foot Maintenance Corridor	Permanent Access Roads	Subtotal Late Successional Old-Growth Forest	Subtotal Mid-Seral Forest	Subtotal Clearcut / Regenerating Forest	Subtotal Pipeline Facilities By Vegetation Type	*Permanent Easement (50-foot)*	Jordan Cove MS & BVA #1 5	BVA #2	BVA #3	BVA #4	BVA #5	BVA #6, Clarks Branch Meter Station	BVA #7	BVA #8	BVA #9	BVA #10	BVA #11	BVA #12	BVA #13	BVA #14	BVA #15	BVA #16	Klamath CS, BVA #17, MS	Subtotal Aboveground Facilities	
Forest-Woodland	Westside Lowland Conifer - Hardwood Forest	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
	Montane Mixed Conifer Forest	L-O 1	3.74						6.25																			
		M-S 2	2.23		3.74	2.23	6.49	12.46	3.54																		0.00	**12.46**
		C-R 3	6.49						10.54																			
	Southwest Oregon Mixed Conifer-Hardwood Forest	L-O 1	19.77						32.75																			
		M-S 2	3.07		19.77	3.07	10.85	33.69	5.13																		0.00	**33.69**
		C-R 3	10.85						17.96																			
	Ponderosa Pine Forest and Woodlands	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
	Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
	Western Juniper and Mountain Mahogany Woodlands	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
Subtotal Forest-Woodland by Age Class		L-O 1	***23.51***	***0.00***					*39.00*	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	***0.00***	***23.51***
		M-S 2	***5.30***	***0.00***	23.51	5.30	17.34	46.15	*8.67*	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	***0.00***	***5.30***
		C-R 3	***17.34***	***0.00***					*28.50*	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	***0.00***	***17.34***
Subtotal Forest-Woodland			**46.15**	**0.00**	**23.51**	**5.30**	**17.34**	**46.15**	***76.16***	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**46.15**
Grasslands-Shrubland	Sagebrush Steppe							0.00																			0.00	**0.00**
	Shrublands		0.96					0.96	1.57																		0.00	**0.96**
	Westside Grasslands		0.50					0.50	0.83																		0.00	**0.50**
	Eastside Grasslands		0.09					0.09	0.15																		0.00	**0.09**
Subtotal Grasslands-Shrubland			**1.56**	**0.00**				**1.56**	***2.55***	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.56**

Table B-4. Summary of Operation-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil 2001) in Rogue River National Forest

Mapped Vegetation Category Type		Forest Stand by Age	Pipeline Facilities							Aboveground Facilities																		Total Operation Impacts by Vegetation Type6
			30-foot Maintenance Corridor	Permanent Access Roads	Subtotal Late Successional Old-Growth Forest	Subtotal Mid-Seral Forest	Subtotal Clearcut / Regenerating Forest	Subtotal Pipeline Facilities By Vegetation Type	*Permanent Easement (50-foot)*	Jordan Cove MS & BVA #1 5	BVA #2	BVA #3	BVA #4	BVA #5	BVA #6, Clarks Branch Meter Station	BVA #7	BVA #8	BVA #9	BVA #10	BVA #11	BVA #12	BVA #13	BVA #14	BVA #15	BVA #16	Klamath CS, BVA #17, MS	Subtotal Aboveground Facilities	
Wetland/ Riparian	Westside Riparian-Wetlands / Eastside Riparian-Wetlands	L-O 1			0.00	0.00	0.00	0.00																			0.00	**0.00**
		M-S 2																										
		C-R 3																										
		Shrub						0.00																			0.00	**0.00**
	Herbaceous Wetlands							0.00																			0.00	**0.00**
Subtotal Wetland/Riparian			**0.00**	**0.00**				**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Agriculture	Agriculture, Pastures, and Mixed Environs							0.00																			**0.00**	**0.00**
Subtotal Agriculture			**0.00**	**0.00**				**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Developed / Barren	Urban and Mixed Environs							0.00																			**0.00**	**0.00**
	Beaches							0.00																			**0.00**	**0.00**
	Roads		2.71					2.71	5.30																		**0.00**	**2.71**
Subtotal Developed / Barren			**2.71**	**0.00**				**2.71**	**5.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.71**
Open Water	Open Water - Lakes, Rivers, and Streams		0.03					0.03	0.06																		**0.00**	**0.03**
	Bays and Estuaries							0.00																			**0.00**	**0.00**
Subtotal Open Water			**0.03**	**0.00**				**0.03**	**0.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**
Subtotal Non-Forest			**4.30**	**0.00**	**0.00**	**0.00**	**0.00**	**4.30**	**7.90**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.30**
Project Total			**50.45**	**0.00**	**23.51**	**5.30**	**17.34**	**50.45**	**84.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**50.45**

1 Acres disturbed were evaluated using GIS; footprints for each component (aboveground facilities, 50-foot permanent easement, and 30-foot maintenance corridor) were overlaid on the digitized vegetation coverage.
2 The "Late Successional and Old-Growth" category (L-O) describes those forest areas with a majority of trees over 80 years of age. Forests with stands greater than 175 years are considered to have old-growth characteristics.
3 The "Mid-Seral" category (M-S) describes those forest areas with a majority of trees over 40 years of age but less than 80 years of age.
4 The "Clearcut or Regenerating Forest" category (C-R) describes those forest areas that are either clear-cut (tree age 0-5 years) or regenerating (tree age 5 to 40 years).
5 CT = Communications tower
6 Total by Habitat Type includes the 30-foot maintenance corridor, permanent access roads, and only aboveground facilities with a meter station or compressor station (mainline block valves located within the 30-foot maintenance corridor).
General: If percentages were less than 1/100ths, they were not included in the table.
-Columns and rows do not necessarily sum correctly due to rounding.
Acres of impacts to non-vegetated areas are included within this table for consistency in values reported in Resource Reports and the EIS.

Table B-5. Summary of Construction-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil 2001) in Winema National Forest

General Vegetation Type	Mapped Vegetation Category Type	Forest Stand by Age	Pipeline Facilities							Aboveground Facilities - Klamath Compressor Station	Subtotals					Percent of Total Vegetation Type
			Construction Right-of-Way	Hydrostatic Discharge Sites [4]	Temporary Extra Work Areas	Uncleared Storage Areas	Rock Source/ Disposal	Access Roads (TARs/PARs/ Improvements)[5]	Pipe Yards		Subtotal Late Successional – Old Growth	Subtotal Mid-Seral	Subtotal Clearcut or Regenerating	Subtotal by Habitat Type	*Percent of Vegetation Type*	
	Westside Lowland Conifer-Hardwood	L-O [1]														
		M-S [2]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R [3]														
	Montane Mixed Conifer Forest	L-O [1]	5.53		0.53	3.16										
		M-S [2]	2.49		0.29	0.92					9.22	3.70	20.78	33.70	*38.8%*	*37.0%*
		C-R [3]	14.54		3.21	3.04										
	Southwest Oregon Mixed Conifer-Hardwood Forest	L-O [1]	30.67		4.13	3.12										
		M-S [2]	3.94		1.10	0.17					37.92	5.21	10.05	53.18	*61.2%*	*58.4%*
		C-R [3]	8.44		0.64	0.96										
	Ponderosa Pine Forest and Woodland	L-O [1]														
		M-S [2]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R [3]														
	Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O [1]														
		M-S [2]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R [3]														
	Western Juniper and Mountain Mahogany	L-O [1]														
		M-S [2]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R [3]														
Subtotal Forest-Woodland by Age Class		L-O 1	**36.20**	**0.00**	**4.66**	**6.28**	**0.00**	**0.00**	**0.00**	**0.00**					***54.3%***	
		M-S 2	**6.42**	**0.00**	**1.40**	**1.09**	**0.00**	**0.00**	**0.00**	**0.00**	47.14	8.91	30.83	86.88	***0.6%***	*95.4%*
		C-R 3	**22.97**	**0.00**	**3.85**	**4.00**	**0.00**	**0.00**	**0.00**	**0.00**					***0.0%***	
Subtotal Forest-Woodland			**65.60**	**0.00**	**9.91**	**11.37**	**0.00**	**0.00**	**0.00**	**0.00**	**47.14**	**8.91**	**30.83**	**86.88**		***95.4%***
Percent of All Forest-Woodland			***75.5%***	***0.0%***	***11.4%***	***13.1%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***54.3%***	***10.3%***	***35.5%***			
Grasslands-Shrubland	Shrub-steppe													0.00	*0.0%*	*0.0%*
	Westside Grasslands													0.00	*0.0%*	*0.0%*
	Eastside Grasslands		0.99		0.22	0.14								1.35	*1.5%*	*1.5%*
Subtotal Grasslands-Shrubland			**0.99**	**0.00**	**0.22**	**0.14**	**0.00**	**0.00**	**0.00**	**0.00**				**1.35**	***1.5%***	***1.5%***
Wetland / Riparian	Westside Riparian-Wetlands/Eastside Riparian-Wetlands	L-O [1]													*0.0%*	
		M-S [2]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		C-R [3]													*0.0%*	
		PSS	0.26											0.26		
	Herbaceous Wetlands													0.00	*0.0%*	*0.0%*
Subtotal Wetland / Riparian			**0.26**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.26**	***0.3%***	***0.3%***

Table B-5. Summary of Construction-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil 2001) in Winema National Forest																
			Pipeline Facilities								Subtotals					
General Vegetation Type	Mapped Vegetation Category Type	Forest Stand by Age	Construction Right-of-Way	Hydrostatic Discharge Sites [4]	Temporary Extra Work Areas	Uncleared Storage Areas	Rock Source/ Disposal	Access Roads (TARs/PARs/ Improvements)[5]	Pipe Yards	Aboveground Facilities - Klamath Compressor Station	Subtotal Late Successional – Old Growth	Subtotal Mid-Seral	Subtotal Clearcut or Regenerating	Subtotal by Habitat Type	*Percent of Vegetation Type*	*Percent of Total Vegetation Type*
Agriculture	Agriculture, Pastures, and Mixed Environs													0.00	*0.0%*	*0.0%*
Subtotal Agriculture			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**				**0.00**	***0.0%***	***0.0%***
Developed / Barren	Urban and Mixed Environs													0.00	*0.0%*	*0.0%*
	Beaches													0.00	*0.0%*	*0.0%*
	Roads		1.38		1.09	0.06								2.54	*2.8%*	*2.8%*
Subtotal Developed / Barren			**1.38**	**0.00**	**1.09**	**0.06**	**0.00**	**0.00**	**0.00**	**0.00**				**2.54**	***2.8%***	***2.8%***
Open Water	Open Water - Lakes, Rivers, and Streams		0.07											0.07	*0.1%*	*0.1%*
	Bays and Estuaries													0.00	*0.0%*	*0.0%*
Subtotal Open Water			**0.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**				**0.07**	***0.1%***	***0.1%***
Subtotal Non-Forest			**2.69**	**0.00**	**1.31**	**0.20**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.21**	***4.6%***	***4.6%***
Percent of All Non-Forest			***64.0%***	***0.0%***	***31.2%***	***4.8%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***			
Project Total			**68.29**	**0.00**	**11.23**	**11.57**	**0.00**	**0.00**	**0.00**	**0.00**	**47.14**	**8.91**	**30.83**	**91.09**		
Percent of Pipeline Facilities			***75.0%***	***0.0%***	***12.3%***	***12.7%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***51.8%***	***9.8%***	***33.8%***			

[1] The "Late Successional and Old-Growth" category (L-O) describes those forest areas with a majority of trees over 80 years of age. Forests with stands greater than 175 years are considered to have old-growth characteristics.
[2] The "Mid-Seral" category (M-S) describes those forest areas with a majority of trees over 40 years of age but less than 80 years of age.
[3] The "Clearcut or Regenerating Forest" category (C-R) describes those forest areas that are either clear-cut (tree age 0-5 years) or regenerating (tree age 5 to 40 years). Forest areas in this category are divided into forest vegetation types based on their potential to become those types of forests.
[4] Small brush or trees may be cleared by a rubber-tired rotary or flail motor (brush hog) or by hand with machetes/chainsaws. Minimal soil disturbance would occur. A rubber-tired hoe would be utilized to lay the discharge line and to remove the saturated hay bales or filter bags upon completion of hydrostatic discharge.
[5] Portions of some of the PARs are located within the construction right-of-way and there is some duplication in the acreage calculations.

Table B-6. Summary of Operation-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil 2001) in Winema National Forest

Mapped Vegetation Category Type		Forest Stand by Age	Pipeline Facilities							Aboveground Facilities																		Total Operation Impacts by Vegetation Type6
			30-foot Maintenance Corridor	Permanent Access Roads	Subtotal Late Successional Old-Growth Forest	Subtotal Mid-Seral Forest	Subtotal Clearcut / Regenerating Forest	Subtotal Pipeline Facilities By Vegetation Type	*Permanent Easement (50-foot)*	Jordan Cove MS & BVA #1 5	BVA #2	BVA #3	BVA #4	BVA #5	BVA #6, Clarks Branch Meter Station	BVA #7	BVA #8	BVA #9	BVA #10	BVA #11	BVA #12	BVA #13	BVA #14	BVA #15	BVA #16	Klamath CS, BVA #17, MS	Subtotal Aboveground Facilities	
Forest-Woodland	Westside Lowland Conifer - Hardwood Forest	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
	Montane Mixed Conifer Forest	L-O 1	1.67						2.81																			
		M-S 2	0.84		1.67	0.84	4.79	7.30	1.40																		0.00	**7.30**
		C-R 3	4.79						7.96																			
	Southwest Oregon Mixed Conifer-Hardwood Forest	L-O 1	9.94						16.55																			
		M-S 2	1.24		9.94	1.24	2.68	13.86	2.06																		0.00	**13.86**
		C-R 3	2.68						4.47																			
	Ponderosa Pine Forest and Woodlands	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
	Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
	Western Juniper and Mountain Mahogany Woodlands	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
Subtotal Forest-Woodland by Age Class		L-O 1	***11.61***	***0.00***					*19.36*	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	***0.00***	***11.61***
		M-S 2	***2.08***	***0.00***	11.61	2.08	7.47	21.16	*3.46*	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	***0.00***	***2.08***
		C-R 3	***7.47***	***0.00***					*12.43*	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	***0.00***	***7.47***
Subtotal Forest-Woodland			**21.16**	**0.00**	**11.61**	**2.08**	**7.47**	**21.16**	***35.25***	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**21.16**
Grasslands-Shrubland	Sagebrush Steppe							0.00																			0.00	**0.00**
	Shrublands							0.00																			0.00	**0.00**
	Westside Grasslands							0.00																			0.00	**0.00**
	Eastside Grasslands		0.37					0.37	0.60																		0.00	**0.37**
Subtotal Grasslands-Shrubland			**0.37**	**0.00**				**0.37**	***0.60***	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.37**

Table B-6. Summary of Operation-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil 2001) in Winema National Forest																												
Mapped Vegetation Category Type		Forest Stand by Age	Pipeline Facilities						*Permanent Easement (50-foot)*	Aboveground Facilities																		Total Operation Impacts by Vegetation Type6
			30-foot Maintenance Corridor	Permanent Access Roads	Subtotal Late Successional Old-Growth Forest	Subtotal Mid-Seral Forest	Subtotal Clearcut / Regenerating Forest	Subtotal Pipeline Facilities By Vegetation Type		Jordan Cove MS & BVA #1 5	BVA #2	BVA #3	BVA #4	BVA #5	BVA #6, Clarks Branch Meter Station	BVA #7	BVA #8	BVA #9	BVA #10	BVA #11	BVA #12	BVA #13	BVA #14	BVA #15	BVA #16	Klamath CS, BVA #17, MS	Subtotal Aboveground Facilities	
Wetland/ Riparian	Westside Riparian-Wetlands / Eastside Riparian-Wetlands	L-O 1																										
		M-S 2			0.00	0.00	0.00	0.00																			0.00	**0.00**
		C-R 3																										
		Shrub	0.10					0.10	0.17																		0.00	**0.10**
	Herbaceous Wetlands							0.00																			0.00	**0.00**
Subtotal Wetland/Riparian			**0.10**	**0.00**				**0.10**	**0.17**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**
Agriculture	Agriculture, Pastures, and Mixed Environs							0.00																			**0.00**	**0.00**
Subtotal Agriculture			**0.00**	**0.00**				**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Developed / Barren	Urban and Mixed Environs							0.00																			**0.00**	**0.00**
	Beaches							0.00																			**0.00**	**0.00**
	Roads		0.28					0.28	0.50																		**0.00**	**0.28**
Subtotal Developed / Barren			**0.28**	**0.00**				**0.28**	**0.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.28**
Open Water	Open Water - Lakes, Rivers, and Streams		0.02					0.02	0.03																		**0.00**	**0.02**
	Bays and Estuaries							0.00																			**0.00**	**0.00**
Subtotal Open Water			**0.02**	**0.00**				**0.02**	**0.03**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**
Subtotal Non-Forest			**0.77**	**0.00**	**0.00**	**0.00**	**0.00**	**0.77**	**1.29**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.77**
Project Total			**21.92**	**0.00**	**11.61**	**2.08**	**7.47**	**21.92**	**36.54**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**21.92**

1/ Acres disturbed were evaluated using GIS; footprints for each component (aboveground facilities, 50-foot permanent easement, and 30-foot maintenance corridor) were overlaid on the digitized vegetation coverage.

2/ The "Late Successional and Old-Growth" category (L-O) describes those forest areas with a majority of trees over 80 years of age. Forests with stands greater than 175 years are considered to have old-growth characteristics.

3/ The "Mid-Seral" category (M-S) describes those forest areas with a majority of trees over 40 years of age but less than 80 years of age.

4/ The "Clearcut or Regenerating Forest" category (C-R) describes those forest areas that are either clear-cut (tree age 0-5 years) or regenerating (tree age 5 to 40 years).

5/ CT = Communications tower

6/ Total by Habitat Type includes the 30-foot maintenance corridor, permanent access roads, and only aboveground facilities with a meter station or compressor station (mainline block valves located within the 30-foot maintenance corridor).

General: If percentages were less than 1/100ths, they were not included in the table.

-Columns and rows do not necessarily sum correctly due to rounding.

Acres of impacts to non-vegetated areas are included within this table for consistency in values reported in Resource Reports and the EIS.

Appendix C: Waterbodies Crossed by the Project on National Forest System Lands

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Table C-1: Waterbodies Crossed by the Project on National Forest Lands													
Waterbodies Crossed and Waterbody ID	**Identification Number (LLID) and Jurisdiction**	**Approximate Pipeline MP**	**Waterbody Type Size[1/]**	**Proposed Crossing Method Scour Level[2/]**	**Waterbody Crossing Rationale[3/]**	**ESA Species Present/Habitat[4/]**	**Anadromous Species Present [5/]**	**Resident Coldwater Species Present**	**EFH Species Present [6/]**	**EFH Component Present [6/]**	**Fishery Construction Window [5/, 7/]**	**Water Quality Status [8/]**	**Equipment Bridges [9/]**
Cascades Ecoregion, South Umpqua (HUC 17100302) Sub-basin, Upper Cow Creek (HUC 1710030206) Fifth field Watershed[8/], Douglas County, Oregon													
Ditch (Beaver Creek) (CDX-50)	Forest Service – Umpqua NF	105.41	Intermittent Intermediate	Dry Open-Cut	Dry open-cut methods feasible/ practical on small 1-4' wide intermittent roadside ditch within right-of-way if flowing at the time of construction.	None	None	None	None	None	N/A	Unknown	Y*
Ditch (CDX-49)	Forest Service – Umpqua NF	106.77	Intermittent N/A	Adjacent to centerline within ROW	N/A - small 1-4' wide intermittent roadside ditch within right-of-way if flowing at the time of construction.	None	None	None	None	None	N/A	Unknown	Y*
Roadside Ditch (CDX-47)	Forest Service – Umpqua NF	108.08	Intermittent Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small 1-3' wide intermittent roadside ditch within right-of-way if flowing at the time of construction.	None	None	None	None	None	N/A	Unknown	Y*
Roadside Ditch (CDX-48)	Forest Service – Umpqua NF	108.40	Intermittent Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small 1-3' wide intermittent roadside ditch within right-of-way if flowing at the time of construction.	None	None	None	None	None	N/A	Unknown	Y*
Ditch (GDX-15)	17100302034497 Forest Service – Umpqua NF	109.13	Intermittent N/A	Adjacent to centerline within TEWA	Dry open-cut methods feasible/practical on small headwater wetland/tributary-if flowing at the time of construction.	None	None	None	None	None	Jul 1 to Sep 15	Unknown	Y*
Trib. to East Fork Cow Creek (GSI-16/FS-HF-F)	17100302013838 Forest Service – Umpqua NF	109.33	Intermittent Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small 3' wide headwater intermittent tributary if flowing at the time of construction.	None	None	None	None	None	Jul 1 to Sep 15	Unknown	Y*

Table C-1: Waterbodies Crossed by the Project on National Forest Lands													
Waterbodies Crossed and Waterbody ID	Identification Number (LLID) and Jurisdiction	Approximate Pipeline MP	Waterbody Type Size[1/]	Proposed Crossing Method Scour Level[2/]	Waterbody Crossing Rationale[3/]	ESA Species Present/Habitat[4/]	Anadromous Species Present [5/]	Resident Coldwater Species Present	EFH Species Present [6/]	EFH Component Present [6/]	Fishery Construction Window [5/, 7/]	Water Quality Status [8/]	Equipment Bridges [9/]
East Fork Cow Creek (GSP-19/ASP-297/FS-HF-G)	17100302013839 Forest Service – Umpqua NF	109.47	Perennial Intermediate	Dry Open-Cut (Streambed-bedrock) [10/]	Dry open-cut methods feasible/practical on small headwater stream during low flow periods within ODFW in-water work period. No additional work areas proposed.	None	Unknown	Unknown	None	None	Jul 1 to Sep 15	3	Y
East Fork Cow Creek S-T09-002 (GSP-22 ASP-297/FS-HF-M)	17100302013839 Forest Service – Umpqua NF	109.68	Perennial Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small headwater stream during low flow periods within ODFW in-water work period. No additional work areas proposed.	None	None	Unknown	None	None	Jul 1 to Sep 15	Unknown	Y
Trib. to East Fork Cow Creek S-T09-001 (FS-HF-M)	17100302013840 Forest Service – Umpqua NF	109.74	Perennial Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small 2-4' headwater stream during low flow periods within ODFW in-water work period. No additional work areas proposed.	None	None	Unknown	None	None	Jul 1 to Sep 15	Unknown	Y
Cascades Ecoregion, South Umpqua Sub-basin (HUC 17100302), Upper Cow Creek (HUC 1710030206) Fifth field Watershed[8/], Jackson County, Oregon													
Trib. to East Fork Cow Creek (ESI-68/FS-HF-N)	17100302034587 Forest Service – Umpqua NF	110.96	Intermittent Intermediate	Dry Open-Cut	Dry open-cut methods feasible/practical on small 2-4' headwater tributary. Right-of-way necked down to 75' and no TEWAs utilized to minimize riparian impacts.	None	None	None	None	None	Jul 1 to Sep 15	Unknown	Y*
Cascades Ecoregion, Upper Rogue (HUC 17100307) Sub-basin, Trail Creek (HUC 1710030706) Fifth field Watershed[8/], Jackson County, Oregon													
Pond Trib. to W. Fork Trail Creek (EW-69)	Forest Service – Umpqua NF	110.57	Intermittent Pond	Within Peavine Quarry TEWA 110.73	Small ponded area within Peavine Quarry and TEWA; drainage expected to be dry during construction.	None	None	None	None	None	N/A	Unknown	N
Trib. to W. Fork Trail Creek (ESI-68) (EW-68)	17100307018629 Forest Service – Umpqua NF	110.57	Intermittent Minor	Within Peavine Quarry. Adjacent to centerline within TEWA 110.73	Small 1-2' wide ephemeral drainage located in Peavine Quarry within TEWA; drainage to be avoided by construction; drainage expected to be dry during construction.	None	None	None	None	None	N/A	Unknown	N –to be avoided

Table C-1: Waterbodies Crossed by the Project on National Forest Lands													
Waterbodies Crossed and Waterbody ID	**Identification Number (LLID) and Jurisdiction**	**Approximate Pipeline MP**	**Waterbody Type Size[1/]**	**Proposed Crossing Method Scour Level[2/]**	**Waterbody Crossing Rationale[3/]**	**ESA Species Present/Habitat[4/]**	**Anadromous Species Present [5/]**	**Resident Coldwater Species Present**	**EFH Species Present [6/]**	**EFH Component Present [6/]**	**Fishery Construction Window [5/, 7/]**	**Water Quality Status [8/]**	**Equipment Bridges [9/]**
Cascades Ecoregion, Upper Rogue (HUC 17100307) Sub-basin, Little Butte Creek (HUC 1710030708) Fifth field Watershed[8/,9/,11/], Jackson County, Oregon													
South Fork Little Butte Creek (ASP-165)	17100307000108 Forest Service-Rogue River NF	162.45	Perennial Intermediate	Dry Open-Cut Level 1	Dry-open cut feasible and practical on creek. ODFW fish passage barrier data (Record ID 51163) indicates that downstream irrigation diversion dam/barrier (~ 0.5 miles): is unladdered and impassible. USGS Gage Station 14339500 – located below diversion reports monthly mean flow of 14, 12 and 11 cfs, respectively for Jul, Aug & Sep. ROW necked down to 75 feet and TEWAs set back to minimize riparian impacts.	None	None	Trout, unspecified	None	None	Jun 15 to Sep 15	4A, 4C, and 5: 303(d)	Y-1i with mid-stream support
Daley Creek (ESI-76/ESI-84)	17100307000107 Forest Service-Rogue River NF	166.21	Intermittent Intermediate	Dry Open-Cut	Dry open-cut methods feasible/practical on small headwater intermittent trib. if flowing at the time of construction.	None	None	Trout, Unspecified	None	None	Jun 15 to Sep 15	Unknown	Y*
Trib. To South Fork Little Butte Creek	17100307005730 Forest Service- Rogue River-Siskiyou NF	167.80	Intermittent Minor	Bore	Trenchless (bore) crossing; proposed to avoid stream and Pacific Crest Crossing	None	None	Unknown	None	None	Jun 15 to Sep 15	Unknown	Y
Eastern Cascades Slopes and Foothills Ecoregion, Upper Klamath River (HUC 18010206) Sub-basin, Spencer Creek (HUC 1801020601) Fifth field Watershed[8/,9/,11/], Klamath County, Oregon													
Spencer Creek (WWW-001-013/EW-85)	18010206000968 Forest Service-Winema NF	171.07	Intermittent Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small < 10' wide stream with associated wetland. ROW necked down 75 feet and TEWAs set back or located to the edge of existing road disturbance to minimize riparian and wetland impacts. Conventional bore not practical because of topographic conditions and grading/excavation requirements on the south side of creek.	None	None	Unknown	None	None	Aug 1 to Sep 30	4C and 5: 303(d)	Y
Trib. to Spencer Creek SS-201-001 (GSP-7)	18010206005900 Forest Service-Winema NF	171.57	Intermittent Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small < 2' wide intermittent trib/wetland. if flowing at the time of construction.	None	None	Unknown	None	None	Aug 1 to Sep 30	Unknown	Y*

Table C-1: Waterbodies Crossed by the Project on National Forest Lands													
Waterbodies Crossed and Waterbody ID	**Identification Number (LLID) and Jurisdiction**	**Approximate Pipeline MP**	**Waterbody Type Size1/**	**Proposed Crossing Method Scour Level2/**	**Waterbody Crossing Rationale3/**	**ESA Species Present/Habitat4/**	**Anadromous Species Present 5/**	**Resident Coldwater Species Present**	**EFH Species Present 6/**	**EFH Component Present 6/**	**Fishery Construction Window 5/, 7/**	**Water Quality Status 8/**	**Equipment Bridges 9/**
Trib. to Spencer Creek (ESI-106a)	18010206000678 Forest Service-Winema NF	173.74	Intermittent Intermediate	Dry Open-Cut	Dry open-cut methods feasible/practical on small < 5' wide ephemeral trib. if flowing at the time of construction.	None	None	Unknown	None	None	Aug 1 to Sep 30	Unknown	Y

1/ FERC waterbody definitions:

Minor = less than or equal to 10 feet wide
Intermediate = greater than 10 feet wide but less than or equal to 100 feet wide
Major = greater than 100 feet wide

2/ Level 1 and 2 waterbodies have been identified; all others are Level 0. According to GeoEngineers 2013 Channel Migration and Scour Analysis for the Project, channel migration is defined as the lateral movement, over time, of an entire channel segment perpendicular to the direction of stream flow; channel avulsion is the sudden abandonment of an active channel for a newly created or previously abandoned channel located on the floodplain; channel widening is defined as erosion and subsequent recession of one or both stream banks that widens the channel without changing the channel location; streambed scour is erosion of the streambed resulting in the development of deep pools and/or the systematic lowering of the channel floor elevation.

Level 0 = streams not likely subject to migration, avulsion and/or scour
Level 1 = streams with a moderate potential for migration, avulsion and/or scour
Level 2 = streams with a high potential for migration, avulsion and/or scour

3/ Dry open-cut crossing methods include Flume or Dam and Pump procedures. Dam and Pump methods would be utilized where streambed blasting is anticipated to eliminate blasting around the flume. The Dam and Pump crossing method is the preferred crossing procedure in steep incised drainage valleys where worker safety may be compromised when placing ("threading") the pipe string under the flume pipe and where there is a risk of upsetting the flume during this operation. The Dam and Pump crossing method is also the preferred crossing method on small streams under low flow conditions during the recommended ODFW-recommended in-water work period. Pacific Connector requests permission for temporary/short-term fish passage restriction when completing Dam and Pump crossings within the ODFW-recommended in-water work period.

4/ FWS, NMFS, and StreamNet. T = Threatened, E = Endangered, CH = Critical Habitat

5/ ODFW 2012.

6/ PFMC 1999; ODFW 2012.

7/ Pacific Connector understands that fisheries' construction windows only apply to those waterbodies flowing at the time of construction.

8/ Oregon Department of Environmental Quality Water Quality Status:

Unknown = waterbody is not registered with Oregon Department of Environmental Quality (ODEQ 2012)
3 = Insufficient data to determine whether a standard is met.
4A = Total maximum daily loads that will result in attainment of water quality standards have been approved.
4C = Impairment is not caused by a pollutant (e.g., flow or lack of flow is not considered a pollutant).
5: 303(d) = Data indicate a designated use is not supported or a water quality standard is not attained and a Total Maximum Daily Load is needed. This category constitutes the Section 303(d) list that EPA will approve or disapprove under the Clean Water Act.

9/ Y=Yes, Y* = Yes if flowing at time of construction, 1o = 1 pass required outside fish window 1i = 1 pass required inside fish window, if = set inside fish window, N=None

10/ Streambed bedrock based on Pacific Connector's Wetland and Waterbody delineation surveys (see the Wetland Delineation Report, submitted as a stand-alone document). Streambed bedrock may require special construction techniques to ensure pipeline design depth. Special construction techniques may include rock hammering, drilling and hammering, or blasting. The need for blasting would be determined by the contractor and would only be initiated after ODFW blasting permits are obtained.

11/ Key Watershed.

Appendix D: Estimates of Snags on National Forest Lands

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Table D-1. Estimate of Snags on National Forest Lands within Areas Impacted by the Proposed Action

Umpqua

Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	78	445	55	78	0
	Soft		8	78	78	39
MS	Hard	31	179	22	31	0
	Soft		3	31	31	16
CR	Hard	34	196	24	34	0
	Soft		3	34	34	17
Total	Hard	144	821	101	144	0
	Soft		14	144	144	72

Rogue River

Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	80	273	16	8	0
	Soft		0	48	16	8
MS	Hard	17	58	3	2	0
	Soft		0	10	3	2
CR	Hard	77	261	15	8	0
	Soft		0	46	15	8
Total	Hard	174	592	35	17	0
	Soft		0	104	35	17

Winema

Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	41	135	8	4	0
	Soft		0	16	4	0
MS	Hard	8	26	2	1	0
	Soft		0	3	1	0
CR	Hard	27	89	5	3	0
	Soft		0	11	3	0
Total	Hard	76	249	15	8	0
	Soft		0	30	8	0

National Forest Total

Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	199	853	79	90	0
	Soft		8	143	98	47
MS	Hard	56	263	27	34	0
	Soft		3	45	36	17
CR	Hard	138	545	45	45	0
	Soft		3	91	52	25
Total	Hard	394	1662	151	169	0
	Soft		14	279	186	89

Table D-2. Estimate of Snags on National Forest Lands within 700 feet of the Proposed Action

Umpqua							Rogue River						
Age class	Decay class	Forested acres	<13	13-24	25-36	>36	Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	1122	6396	786	1122	0	LO	Hard	1307	4442	261	131	0
	Soft		112	1122	1122	561		Soft		0	784	261	131
MS	Hard	663	3778	464	663	0	MS	Hard	306	1042	61	31	0
	Soft		66	663	663	331		Soft		0	184	61	31
CR	Hard	373	2125	261	373	0	CR	Hard	1093	3717	219	109	0
	Soft		37	373	373	186		Soft		0	656	219	109
Total	Hard	2158	12299	1510	2158	0	Total	Hard	2706	9201	541	271	0
	Soft		216	2158	2158	1079		Soft		0	1624	541	271
Winema							**National Forest Total**						
Age class	Decay class	Forested acres	<13	13-24	25-36	>36	Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	396	1306	79	40	0	LO	Hard	2825	12145	1126	1292	0
	Soft		0	158	40	0		Soft		112	2064	1423	692
MS	Hard	195	643	39	19	0	MS	Hard	1164	5463	564	713	0
	Soft		0	78	19	0		Soft		66	925	744	362
CR	Hard	477	1573	95	48	0	CR	Hard	1943	7415	575	530	0
	Soft		0	191	48	0		Soft		37	1219	639	296
Total	Hard	1067	3522	213	107	0	Total	Hard	5931	25022	2265	2535	0
	Soft		0	427	107	0		Soft		216	4208	2806	1349

Table D-3. Estimate of Snags on National Forest Lands within 3,200 feet of the Proposed Action

Umpqua

Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	4916	28022	3441	4916	0
	Soft		492	4916	4916	2458
MS	Hard	1965	11201	1376	1965	0
	Soft		197	1965	1965	983
CR	Hard	3008	17144	2105	3008	0
	Soft		301	3008	3008	1504
Total	Hard	9889	56366	6922	9889	0
	Soft		989	9889	9889	4944

Rogue River

Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	5331	18124	1066	533	0
	Soft		0	3198	1066	533
MS	Hard	715	2429	143	71	0
	Soft		0	429	143	71
CR	Hard	7112	24182	1422	711	0
	Soft		0	4267	1422	711
Total	Hard	13158	44736	2632	1316	0
	Soft		0	7895	2632	1316

Winema

Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	1286	4244	257	129	0
	Soft		0	514	129	0
MS	Hard	297	980	59	30	0
	Soft		0	119	30	0
CR	Hard	2487	8206	497	249	0
	Soft		0	995	249	0
Total	Hard	4070	13431	814	407	0
	Soft		0	1628	407	0

National Forest Total

Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	11533	50390	4765	5578	0
	Soft		492	8629	6111	2991
MS	Hard	2977	14610	1578	2066	0
	Soft		197	2513	2138	1054
CR	Hard	12607	49532	4025	3968	0
	Soft		301	8270	4679	2215
Total	Hard	27116	114533	10368	11612	0
	Soft		989	19411	12927	6260

Table D-4. Estimate of Snags on National Forest Lands within 5 miles of the Proposed Action

Umpqua

Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	24896	141908	17427	24896	0
	Soft		2490	24896	24896	12448
MS	Hard	9503	54169	6652	9503	0
	Soft		950	9503	9503	4752
CR	Hard	19501	111153	13650	19501	0
	Soft		1950	19501	19501	9750
Total	Hard	53900	307230	37730	53900	0
	Soft		5390	53900	53900	26950

Rogue River

Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	32672	111085	6534	3267	0
	Soft		0	19603	6534	3267
MS	Hard	8436	28684	1687	844	0
	Soft		0	5062	1687	844
CR	Hard	42449	144325	8490	4245	0
	Soft		0	25469	8490	4245
Total	Hard	83557	284094	16711	8356	0
	Soft		0	50134	16711	8356

Winema

Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	33121	109300	6624	3312	0
	Soft		0	13249	3312	0
MS	Hard	3083	10173	617	308	0
	Soft		0	1233	308	0
CR	Hard	25791	85111	5158	2579	0
	Soft		0	10316	2579	0
Total	Hard	61995	204583	12399	6199	0
	Soft		0	24798	6199	0

National Forest Total

Age class	Decay class	Forested acres	<13	13-24	25-36	>36
LO	Hard	90689	362293	30586	31475	0
	Soft		2490	57748	34743	15715
MS	Hard	21022	93025	8956	10655	0
	Soft		950	15798	11499	5595
CR	Hard	87740	340589	27298	26325	0
	Soft		1950	55286	30569	13995
Total	Hard	199452	795908	66840	68455	0
	Soft		5390	128832	76811	35306

APPENDIX F.8

Federal Lands Review

Appendix F8(a)	**Analysis of Potential Impacts to Wilderness, Inventoried Roadless Areas, Potential Wilderness Areas and Other Undeveloped Areas from the Construction and Operation of the Proposed PCGP Project**
Appendix F8(b)	**Visual Quality Assessment and Mitigation Plan Rogue River, Winema and Umpqua National Forests**
Appendix F8(c)	**Scoping Report -- Proposed Actions of the Bureau of Land Management and Forest Service for the Proposed Pacific Connector Gas Pipeline**
Appendix F8(d)	**Compliance with the Requirements of the Final Supplemental Environmental Impact Statement for Management of Port-Orford Cedar in Southwest Oregon**

Jordan Cove Natural Gas Liquefaction and Pacific Connector Gas Pipeline Project

Final EIS

Appendix F8(a)

Analysis of Potential Impacts to Wilderness, Inventoried Roadless Areas, Potential Wilderness Areas and Other Undeveloped Areas from the Construction and Operation of the Proposed PCGP Project

Pacific Connector Gas Pipeline

Umpqua, Rogue River, and Winema National Forests

Prepared for:

USDA Forest Service

Prepared by:

Stantec Consulting Services Inc

October 2019

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1.0 INTRODUCTION AND DEFINITION OF TERMS

This section describes and analyzes the effects of the PCGP project on the characteristics which define Wilderness areas, inventoried roadless areas (IRA), potential Wilderness areas (PWA) and other undeveloped areas on National Forest System Lands. This section also describes the step-by-step methods used to identify any PWA that could be impacted by the proposed PCGP Project.

Wilderness areas, IRAs and PWAs, are discussed together because they share a set of terminology and interrelated history. In contrast, a wide range of terms and references have been used by respondents, the courts, and the Forest Service when referring to topics such as roadless, unroaded, non-inventoried roadless, and undeveloped areas. The terms and definitions as stated below will be used in this site-specific analysis. They are based on current law, regulation, agency policy, and the Land and Resource Management Plans as amended, for the Umpqua, Rogue River, and Winema National Forests.

1.1 WILDERNESS

A Wilderness area is designated by congressional action under the Wilderness Act of 1964 and other Wilderness acts. The Wilderness Act of 1964, Section 2(c) defines Wilderness, in part, as:

> [A]n area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements of human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; …

1.2 INVENTORIED ROADLESS AREAS

IRAs were identified in the 2001 Roadless Area Conservation Rule in a set of inventoried roadless area maps, contained in the Forest Service Roadless Area Conservation Final Environmental Impact Statement, volume 2, dated November 2000, which are held at the National headquarters office of the Forest Service, or any subsequent update or revision of those maps (36 CFR 294.11). These areas were set aside through administrative rulemaking and have provisions, within the context of multiple use management, for the protection of IRAs.

1.3 POTENTIAL WILDERNESS AREAS

This is not an official inventory. Official inventories of PWA areas are completed during forest planning. This document identifies PWAs only for purposes of assessing potential effects of the PCGP Project activities on Wilderness characteristics. PWAs are not a land designation decision (does not change current land management allocations), they do not imply or impart any particular level of management direction or protection, they are not an evaluation of potential Wilderness (FSH 1909.12, Chapter 72), and they are not preliminary administrative recommendations for Wilderness designation (FSH 1909.12, Chapter 73). The inventory of PWAs does not change the administrative boundary of any IRA or any congressionally designated Wilderness. The original designated management area (e.g., Matrix) would remain the land designation even if areas in the PCGP project planning area meet the handbook criteria for PWA. PWAs are evaluated (in regard to making recommendations to Congress for inclusion in the National Wilderness Preservation

System) during the development or revision of land management plans, in other words at the forest planning level and not at the project planning level.

PWAs qualify for placement on the inventory if they meet one or more of the following criteria

(FSH 1909.12, Chapter 71.1):

1. The area contains 5,000 acres or more.
2. Areas contain less than 5,000 acres, but can meet one or more of the following criteria:
   a. Area can be preserved due to physical terrain and natural conditions.
   b. Areas are self-contained ecosystems, such as an island, that can be effectively managed as a separate unit of the National Wilderness Preservation System.
   c. Areas are contiguous to existing Wilderness, primitive areas, Administration endorsed Wilderness, or potential Wilderness in other Federal ownership, regardless of their size.
3. Areas do not contain forest roads (36 CFR 212.1) or other permanently authorized roads, except as permitted in areas east of the 100th meridian.

Areas may meet either criteria 1 and 3, or criteria 2 and 3. If the criteria in section 71.1 of FSH 1909.12 are met, criteria in section 71.11 of FSH 1909.12 (criteria for including improvements) must also be met. This analysis used the following project specific criteria to delineate areas characterized as undeveloped and roadless, yet included improvements:

- Roads (as defined in 36 CFR 212.1) were excluded per FSH 1909.12, section 71.1. Mapped areas were at least 300 feet from NFS roads. This distance was selected because tree harvest is commonly permitted within 300 feet of open forest roads for personal-use firewood. In addition, danger tree removal occurs at various distances from open forest roads depending on tree height, topographic slope, and other factors.

- Timber harvest areas where logging, as evidenced by stumps, and prior skid trails or roads are substantially unrecognizable, or areas where clearcuts have regenerated to the degree that canopy closure is similar to surrounding uncut areas per FSH 1909.12, section 71.11.

1.4 OTHER UNDEVELOPED AREAS

Other undeveloped areas refer to those areas that do not meet inventory criteria as PWAs, and are not an IRA or designated Wilderness area. There are no forest-wide or management area standards and guidelines specific to other undeveloped areas in the Umpqua, Rogue River and Winema NF LMPs. All lands, including undeveloped areas, are managed consistent with forest-wide standards and guidelines and by designated LMP management area allocations. Other undeveloped areas are identified because they may contain special resource values that warrant an evaluation differently than other parts of the project area.

2.0 METHODOLOGY

The analysis for PWAs within the PCGP Project area was conducted through a series of GIS map making, a review of aerial photography, and the use of professional judgment. The methodology utilized the application of specific PWA inventory criteria (described in Section 1 above). For each national forest crossed by the proposed PCGP Project the first step was to define the analysis area for identifying any PWAs that could be impacted by the PCGP Project. The analysis area included the consideration of any other adjacent federal lands (e.g. BLM lands).[1] The second step applied GIS map layers to each analysis area depicting the proposed pipeline corridor, existing Wilderness and IRAs, and the existing system roads on Federal lands.[2]

Forest roads have associated permitted uses and maintenance activities which have removed trees and created visible stumps within the road corridor. During initial road construction trees were felled within a clearing limit to provide for safe and efficient construction. Past clearing of trees along forest roads created stumps that are evident and recognizable. Road maintenance occurs to varying degrees along each road according to an assigned maintenance level and available funding. Road maintenance includes the periodic clearing of brush and falling of danger trees that present a hazard to forest visitors, employees, and contractors. Past removal of danger trees along forest roads created stumps that are evident and recognizable. Personal-use firewood gathering is generally permitted within 300 feet of open forest roads consistent with project NEPA decisions and motorized travel and access management plan decisions. Past firewood gathering along open forest roads created stumps that are evident and recognizable. Based on local knowledge, and professional judgment regarding the evidence of recognizable stumps, skid trails, etc. which occur to varying degrees adjacent to forest roads, and to facilitate easy on-the-ground identification of a uniform, measurable boundary along a semi-permanent, human-made feature, the boundary was set at 300 feet on each side of forest roads.

Step 3 consisted of utilizing aerial photography of each analysis area to evaluate other man-made improvements such as timber harvest areas.[3] Step 4 consisted of identifying any resulting undeveloped areas that would be impacted by the PCGP Project and meet the criteria for PWA. The Forest Service used professional judgment and local knowledge regarding any unique, site-specific conditions of each area being considered for placement on the inventory of potential Wilderness.

[1] FSH 1909.12 section 71.1 directs the Forest Service when identifying PWAs to consider areas that are contiguous to existing Wilderness, primitive areas, Administration endorsed Wilderness, or potential Wilderness in other Federal ownership. There are BLM lands adjacent to these areas of the Umpqua, Rogue River, and Winema NFs. In the fall of 2012, the BLM updated its inventory of lands with wilderness character. These updates were part of the Analysis of the Management Situation process associated with the proposed revisions of BLM LMPs for Western Oregon. The results of this most recent inventory were compared to the proposed pipeline route and no areas of overlap were discovered. The adjacent BLM lands along the proposed route of the PCGP Project have been evaluated and were found to not have Wilderness character. There are no other adjacent Federal lands. Therefore, there are no contiguous potential Wilderness areas in other Federal ownership along the proposed PCGP route.

[2] The current travel management plans for each Forest were used to identify the roads on the transportation system. In some areas there may be older roads that are no longer on the transportation system but may still be identifiable on the ground.

[3] Timber harvest areas were identified by locating the most visible and recognizable areas using aerial photographs (dating as far back as 1994), and generally represent the more recent or clear-cut harvested areas. Past human activities in these areas are easily recognized by stumps, skid trails, and landing areas. Older or less identifiable harvested areas based on aerial photography are not included here and as a result the amount of past timber harvesting in these areas may be underestimated.

3.0 ANALYSIS

3.1 UMPQUA NATIONAL FOREST

This section discusses the PWA analysis in relation to the PCGP Project on the Umpqua NF. Figure 3-1 displays the area of analysis and the location of the pipeline corridor, existing roads, and any existing Wilderness or IRAs. The analysis area is a logical portion of the Umpqua NF in relation to the proposed PCGP project and extends to the Forest boundary to the North, South, and West of the PCGP Project and to areas of non-federal lands to the East.

The map in figure 3-1 demonstrates the proposed PCGP Project would generally follow existing roads through the Umpqua NF with the exception of one short section (less than 1/2 mile long) in the north end of the project area within the Umpqua NF. This area is the only occurrence on the Umpqua NF where the proposed pipeline would impact an area that is relatively undeveloped[4]. The undeveloped area polygon that would be affected by the proposed PCGP Project is displayed in figure 3-2 along with past timber harvesting areas as evidenced by aerial photography. This short section of proposed pipeline construction is at the far western edge of the polygon near the Forest boundary.

Undeveloped area Polygon #1 on the Umpqua NF is 1,792 acres in size. Because this undeveloped area is less than 5,000 acres in size it does not meet PWA criteria #1. This area also does not meet criteria #2 for PWA less than 5,000 acres in size [FSH 1909.12, section 71.1(2)] for the following reasons. Using local knowledge and professional judgment, this area is not an area that can be preserved due to physical terrain or natural conditions. The boundaries of this undeveloped polygon traverses varied terrain and portions are bounded by private property lines that do not follow physical terrain features or natural conditions. This area is also not a self-contained ecosystem, and is not contiguous to existing Wilderness or IRAs, or potential Wilderness in other Federal ownership.

3.2 ROGUE RIVER NATIONAL FOREST

This section discusses the PWA analysis in relation to the PCGP Project on the Rogue River NF. Figure 3-3 displays the area of analysis and the location of the pipeline corridor, existing roads, and any existing Wilderness or IRAs. The analysis area is a logical portion of the Rogue River NF in relation to the proposed PCGP project and extends to the Forest boundary to the East, South, and West of the PCGP Project and to the IRA and Wilderness to the North.

The map in figure 3-3 demonstrates the proposed PCGP Project generally follows or is near existing roads with the exception of one short section (approximately 1.5 miles long) at the west end of the project area within the Rogue River NF. This area is the only occurrence on the Rogue River NF where the proposed pipeline would impact an area that is relatively undeveloped. This undeveloped area polygon is displayed in figure 3-4 along with past timber harvesting areas as evidenced by aerial photography. The other areas impacted by the proposed project in the Rogue

[4] This area burned in the 2015 Stouts Creek Fire and as a result there are additional alterations in this area from fire suppression efforts. In addition to the changed vegetation conditions the surrounding landscape has also changed as a result of salvage logging on industrial forest lands immediately to the west of this area.

River NF present a landscape that has been managed and is developed in nature due to the road system density and past timber harvest activities (see figure 3-4).

Undeveloped area Polygon #1 on the Rogue River NF is 1,955 acres in size. Because this undeveloped area is less than 5,000 acres in size it does not meet PWA criteria #1. This area also does not meet criteria #2 for PWA less than 5,000 acres in size [FSH 1909.12, section 71.1(2)] for the following reasons. Using local knowledge and professional judgment, this area is not an area that can be preserved due to physical terrain or natural conditions. The boundaries of this undeveloped polygon traverses varied terrain and portions are bounded by private property lines that do not follow physical terrain features or natural conditions. This area is also not a self-contained ecosystem, and is not contiguous to existing Wilderness or IRAs, or potential Wilderness in other Federal ownership.

3.3 WINEMA NATIONAL FOREST

This section discusses the PWA analysis in relation to the PCGP Project on the Winema NF. Figure 3-5 displays the area of analysis and the location of the pipeline corridor, existing roads, and any existing Wilderness or IRAs. The analysis area is a logical portion of the Winema NF in relation to the proposed PCGP project and the Forest boundary. There were no undeveloped lands in this area on the adjacent Rogue River NF (see figure 3-4 above). Figure 3-5 demonstrates that the proposed PCGP Project would follow existing roads through the Winema NF and there would be no undeveloped areas affected.

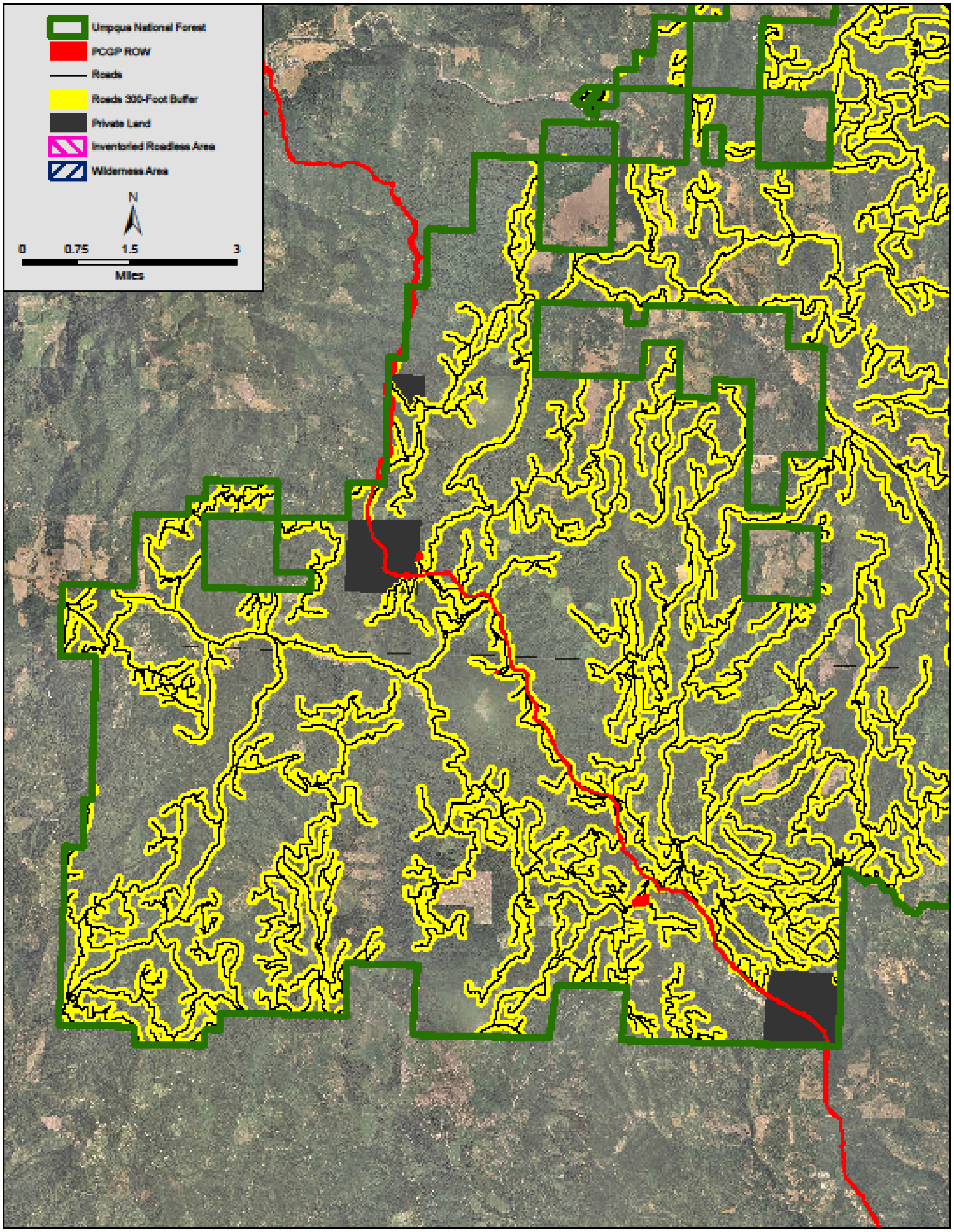

Figure 3-1. Map of roaded areas in relation to the PCGP Project on the Umpqua NF

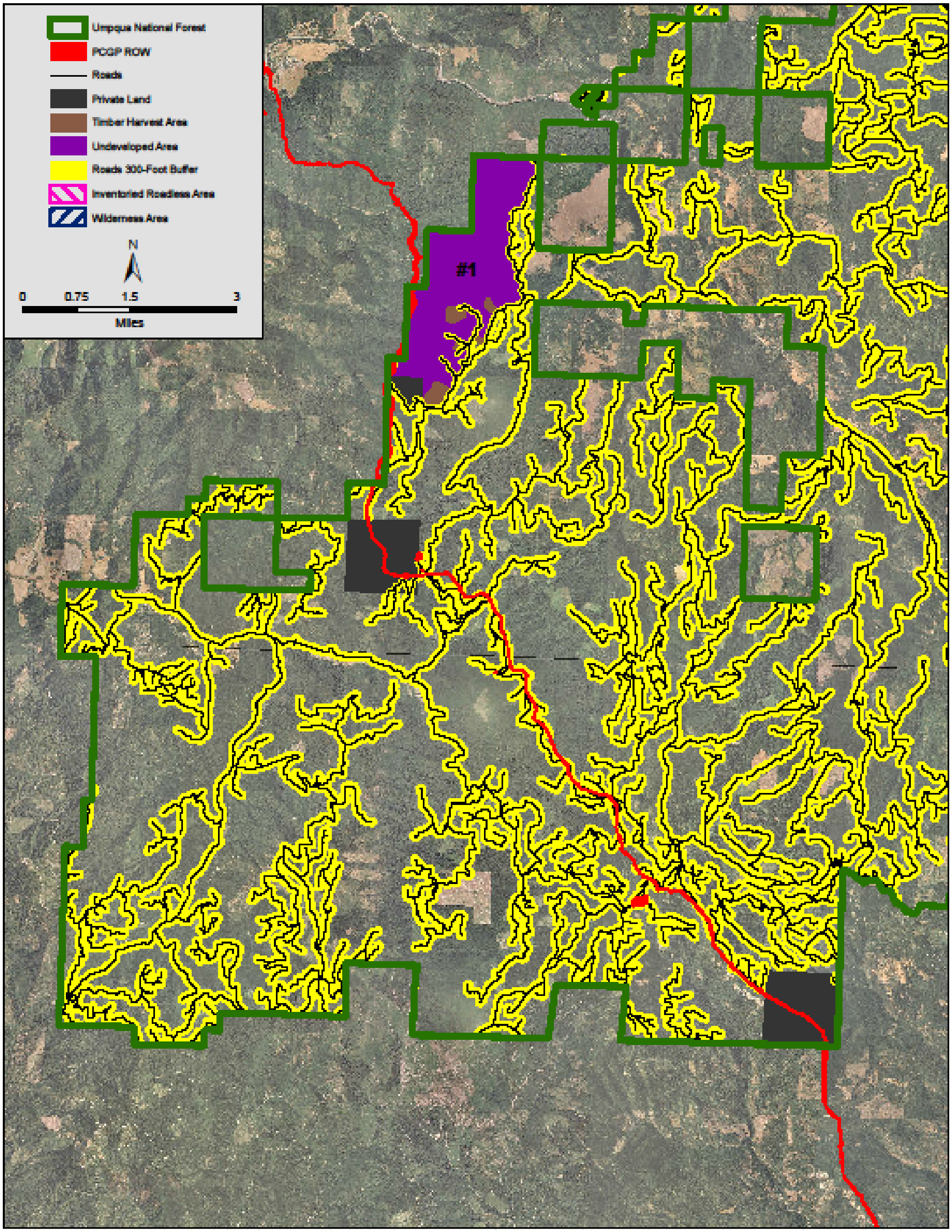

Figure 3-2. Map of other undeveloped areas and the PCGP Project on the Umpqua NF

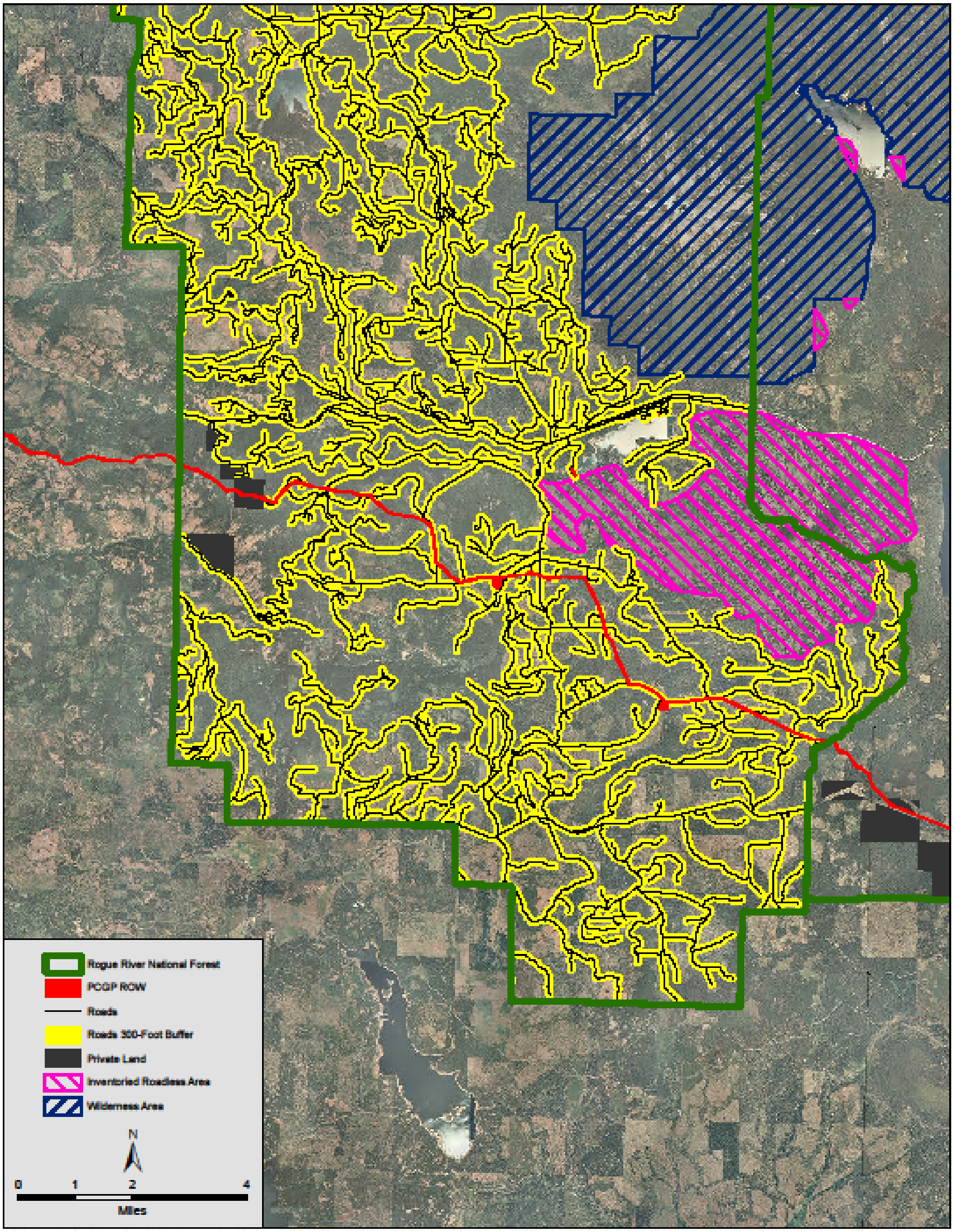

Figure 3-3. Map of roaded areas in relation to the PCGP Project on the Rogue River NF

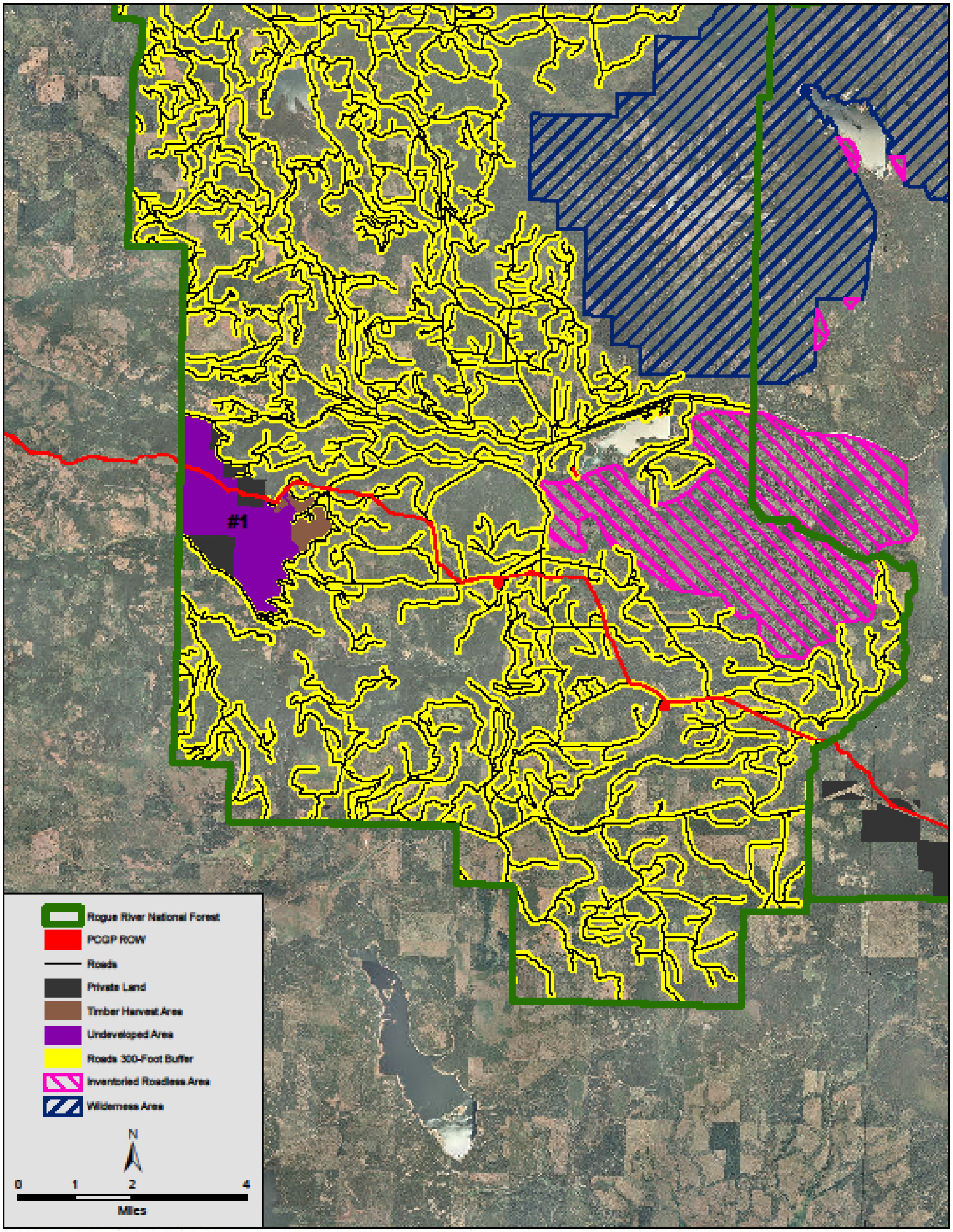

Figure 3-4. Map of other undeveloped areas and the PCGP Project on the Rogue River NF

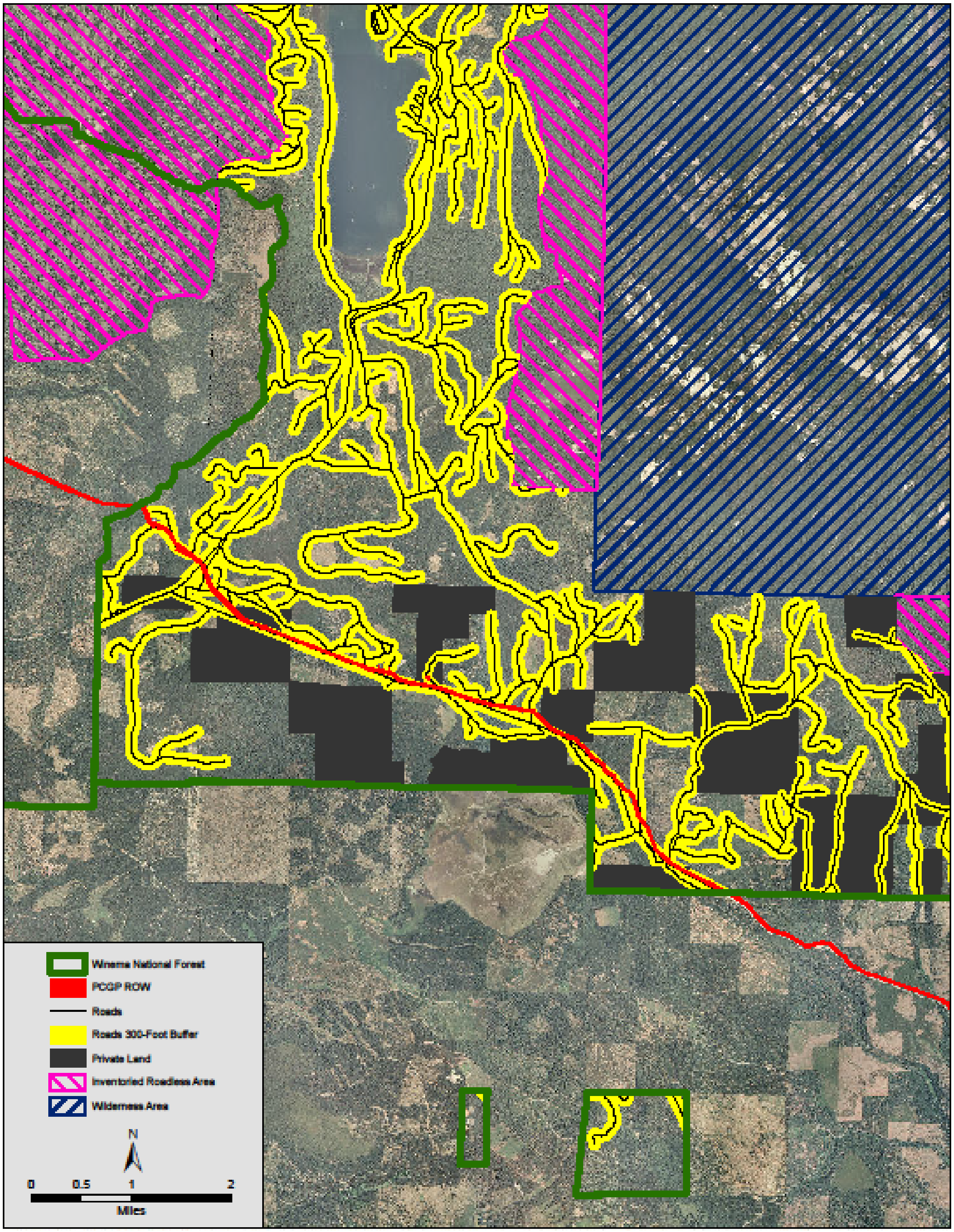

Figure 3-5. Map of roaded areas in relation to the PCGP Project on the Winema NF

4.0 EVALUATION OF EFFECTS

4.1 WILDERNESS

4.1.1 Existing Condition

Two Wilderness Areas are in proximity to the proposed PCGP alignment; Sky Lakes Wilderness (113,590 acres) is in both the Winema and Rogue River National Forests and its southern tip is approximately 3.7 miles north of the pipeline alignment at MP 162.0; and Mountain Lakes Wilderness (23,071 acres), in the Winema National Forest, is approximately 2.3 miles north of MP 173.0 (see figures 3-3 and 3-5 above).

4.1.2 Environmental Effects

No project activities would occur within or adjacent to a Wilderness area. There would be no effects on designated Wilderness or Wilderness characteristics because the closest Wilderness (Mountain Lakes) is over 2 miles away. Because of this distance, project activities would typically not be seen or heard by anyone recreating in the Wilderness. The exceptions could be short duration views of smoke during burning activities. Smoke management mitigation measures would minimize the risk of smoke drifting into the Wilderness.

4.2 INVENTORIED ROADLESS AREAS

4.2.1 Existing Condition

The nearest IRA is the Brown Mountain IRA, located on the Rogue River National Forest approximately 0.6 mile north of MP 162.0. On the Winema National Forest, the West Boundary IRA is about 2.2 miles northeast of MP 172.2 (see figures 3-3 and 3-5 above).

4.2.2 Environmental Effects

No project activities would occur within or adjacent to an IRA. There would be no effects on IRAs.

4.3 POTENTIAL WILDERNESS AREAS

4.3.1 Existing Condition

No undeveloped areas greater than 5000 acres would be crossed by the PCGP project on National Forest System Lands. All of the undeveloped areas crossed by the PCGP project are less than 5000 acres in size, are not contiguous to existing Wilderness or IRAs, and do not meet the PWA criteria for areas less than 5000 acres (see Section 3 above).

4.3.2 Environmental Effects

The PCGP project would not affect any PWA.

4.4 OTHER UNDEVELOPED AREAS

4.4.1 Existing Condition

There are approximately 3,747 acres of other undeveloped areas not meeting PWA criteria that would be crossed by the PCGP Project (see Section 3 above). Other undeveloped areas may have intrinsic ecological and social values because they do not contain roads (or the roads are no longer system roads) and evidence of past timber harvest. These values can include intrinsic physical and biological resources (soil, water, wildlife, recreation, fisheries, etc.), and intrinsic social values (apparent naturalness, solitude, remoteness).

Human influences have had limited impact to long-term ecological processes within these other undeveloped areas. Disturbance by insects and fire have likely been the factors with the most potential to have impacted the area. Opportunities for primitive recreation include camping, hiking, hunting, wildlife watching, and photography. Opportunities for a feeling of solitude, the spirit of adventure and awareness, serenity, and self-reliance are limited by the size and shape of the polygons. Distance to roads and topographic screening are also factors. The size of the area necessary to feel a sense of solitude varies by individual. However, areas that are long and narrow offer less opportunity for solitude due to less distance from noise at their midpoint. Nearby sounds of roads and timber harvest can often be heard and sometimes seen from within these undeveloped areas because they are all within approximately one mile or less of the nearest road from their midpoints.

4.4.2 Environmental Effects

There are two "other undeveloped areas" that would be impacted by the PCGP Project on Forest Service lands. One is on the Umpqua NF and the other is on the Rogue River NF (see figures 3-2 and 3-4 above). Table 4.4.2-1 provides a summary of the undeveloped areas and the acres that would be impacted by the PCGP Project on National Forest System lands.

TABLE 4.4.2-1

Summary of other undeveloped areas and acres impacted by the PCGP Project a/

National Forest	Polygon #	Acres Undeveloped	Acres impacted by the PCGP Project	Acres Unchanged
Umpqua NF	1	1,792	20	1,772
Rogue River NF	1	1,955	22	1,933
Winema NF	None	0	0	0
Totals	**2**	**3,747**	**42**	**3,705**

a/ Acres impacted include the pipeline corridor, temporary extra work areas, and acres used as un-cleared storage areas.

4.4.3 Intrinsic physical and biological resources (soil, water, wildlife, recreation, fisheries, etc.)

For other undeveloped areas within the PCGP Project area where proposed pipeline construction and operation would occur, the impacts to soil, water quality, air quality, forage, plant and animal communities, habitat for threatened, endangered, and sensitive species, developed recreation, noxious weeds, and cultural resources, etc. are essentially the same as disclosed in Chapter 4 of the DEIS and are not reiterated here.

4.4.4 Intrinsic social values (apparent naturalness, solitude, remoteness)

The proposed PCGP Project would impact the apparent naturalness, and solitude within these areas. Pipeline construction would alter the apparent naturalness on approximately 42 acres of these other undeveloped areas. Pipeline construction would increase the number of visible stumps, and the linear nature of the pipeline corridor clearing would be the most apparent visual change resulting from implementation. The linear nature of the cleared corridor would likely adversely affect the visual recreational experience of anyone using this area for dispersed recreation. This impact would be long-term due to a portion of the ROW being maintained as a low vegetation area for the life of the project. Although the proposed pipeline construction and operation would adversely affect visual resources in these areas it would not be inconsistent with the standards and guidelines for visual quality in the respective LMPs.

The sounds, smells, and sights of mechanical activities associated with the construction of the pipeline in and adjacent to these other undeveloped areas would reduce the sense of solitude and remoteness during construction activities. Other sights and sounds of ongoing and previously approved activities in areas adjacent to these other undeveloped areas would continue to have short-term effects on opportunities for solitude and remoteness. Overall there would be little change to the current availability of solitude or primitive recreation within these areas because only a very small amount (about 1% percent) would be impacted by the proposed PCGP Project (see table 4-1 above).

Pacific Connector Gas Pipeline Project

Final EIS

Appendix F8(b)

Visual Quality Assessment and Mitigation Plan

Rogue River, Winema and Umpqua National Forests

Prepared for:

USDA Forest Service

Prepared by:

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Submitted by:

Stantec Consulting Services Inc.

October 2019

Pacific Connector Gas Pipeline
Scenery Management Analysis
and
Mitigation Recommendations

Prepared by
Donna M. Mattson
Consulting Landscape Architect, US Forest Service
August 10, 2015
Revised by David Sheehan
Consulting Landscape Architect, US Forest Service
August, 2019

The Pacific Connector Gas Pipeline (PCGP) project traverses three National Forests along its route from Coos Bay to Klamath Falls. These Forests use the Visual Management System, (VMS) to manage the visual resources and to analyze visual effects of proposed projects. The VMS uses a rating system known as Visual Quality Objectives, (VQO) to establish standards for scenery resource management.

The Visual Management System, Handbook 462 was published in 1974. Since then, Handbook 701 updates the most current Forest Service direction for scenery management. The Landscape Aesthetics, Scenery Management System utilizes a very similar rating system as the VMS that is used to evaluate project impacts to the visual quality. In addition, an appendix has been adopted as part of this direction to address the stability of scenic attributes as well as the direct visual effects of a project. Appendix J utilizes a scenic stability indicator to rate the stability of scenic attributes and how a project will affect that stability. The three Forests involved in the PCGP planning process and route identification efforts have not formally adopted the Scenery Management System as Forest Plan standards. However, the direction to the Forest Service has been, since 1996, to incorporate the new system as we work on new projects. This analysis will utilize the existing visual quality objectives established in the land and resource management plans for the Rogue River, Winema and Umpqua National Forests, as well as apply the scenic stability indicator of Appendix J to address the conditions and trends that may place the scenery attributes and the proposed and recommended restoration efforts at risk.

The proponent’s Aesthetics Management Plan for Federal Lands (AMP) included as attachment A to their Plan of Development proposes restoration efforts and some minimal mitigation measures that broadly address the effects to scenery. However, where the route is in areas where the Visual Quality Objective is partial retention or retention these measures will not meet these objectives within the target time frame. This analysis has examined these areas and the proposed mitigations within the proponent’s AMP and shows why that plan, as proposed is insufficient and would not comply with Forest Service objectives for visual resources.

This analysis looks at the proponents AMP, and then makes recommendations for mitigation measures recommended to improve the restoration and mitigation efforts and determines what VQO would be met.

The PCGP project route traverses National Forest System (NFS) lands in areas that have very rocky and porous soils. It is expected that restoration efforts related to revegetation may require lengthy periods of time to meet the visual quality objectives. This is particularly true on the eastern side of the Cascade Range where rainfall is significantly less, the temperatures are colder and the species selection for revegetation is more limited.

PCGP Project Effects Incorporating the AMP

Construction Effects
The construction of this gas pipeline will require a 95 to 75-foot construction corridor for placement of the pipe itself. Additionally, temporary work areas (TEWAs) and uncleared storage areas (UCSAs) will be used at locations parallel to the actual pipeline excavation and laydown area. The construction and associated TEWAs would be cleared and graded to a level surface to provide a safe and stable work area. At the edges of this construction zone, the UCSAs will be used to store equipment during construction as well as excess boulders and root wads. The clearing of the right-of-way will create a sharp-edged linear feature across a contiguously forested landscape. A ditch zone of 10’ will be excavated for placement of the pipe while all tree stumps and shrubs will be removed except where specific design criteria specifies otherwise. (See PCT crossing site) The excavation will expose subgrade soils that will contrast with the color of the forest canopy. It is expected that the amount of boulders and root wads will be excessive in this landscape making it difficult to dispose of in a manner that will not affect scenery. Boulders scattered on top of the ground do not appear natural and root wads with cut stumps are very distracting if found in more than occasional amounts. The compaction of soils and loss of topsoil caused by construction equipment will affect the success of proposed revegetation.

Right-of-way Maintenance Effects
A thirty-foot corridor centered directly above the pipeline shall be maintained for the fifty-year life of the pipeline by removing trees greater than 15 feet and vegetation greater than 6 feet in height. Depending on the methods of clearing, the effects could be similar to road brushing which uses a thrashing technique that leaves a rough brushed appearance immediately after clearing. The 30-foot corridor, once the construction zone is revegetated and allowed to rehabilitate; will appear as a linear feature that is incongruent with natural terrain or even typical corridors such as roads that gradually climb the side hill rather than rise directly up a slope.

The construction techniques proposed by the proponent in designated visually sensitive areas are as follows:

a. Strategically place construction debris (slash, boulders, stumps,
b. Shape and blend the right of way to the extent practicable to conform with preconstruction contours and the characteristic landscape

c. Rock and log barriers used to prevent passage of OHV's.
d. Utilize rock and boulder material generated during construction as trench backfill material where appropriate.
e. Utilize storage methods to ensure enhancement and mitigation of visual resources along the right of way to the extent they are practicable and safe.
f. Revegetate all disturbed areas and replant trees in temporary extra work areas (TEWAs) that were previously forested.

Specific Mitigation for Key Observation Points

Big Elk Road (MP 161.41)

a. "Neck-down" construction zone across road from 95' to 50'
b. Route shall cross directly perpendicular to the road
c. Revegetate with native trees, shrubs, and plants
d. Plant a row or cluster of trees and/or shrubs across the right of way to provide visual screens at key road and trail crossings in sensitive viewsheds.
e. Shorten the potential visual corridor by turning the corridor on both sides of the crossing
f. UCSA's eliminated within "necked-down" zones.

Pacific Crest Trail Crossing (MP 167.7-167.84) (PCT)

a. Construct/install scenery mitigation measures under the guidance of a scenery specialist to be on-site during time of construction.
b. Bore underneath PCT at existing road crossing to avoid surface disturbance and minimize scenic impacts.
c. Reduce width of the corridor clearing to 75' in the visible immediate foreground from the trail crossing (out to 300').
d. Flush-cut all stumps in the immediate foreground to less than 6-inch height.
e. No grading of the corridor within the 75' neckdown segments below existing ground elevation to retain topsoil & shrubs with the exception of the 10' wide ditch zones and bore area.
f. The duff layer (O horizon and A horizon) of the ditch zone and bore area to be stripped, segregated, and stored, then laid down after backfilling.
g. Use timber mats during construction on the working-side of the 10' wide ditch zones and to protect soils and shrubs.
h. Retain shrubs within the neckdown segments by mowing to six inches in height and protect vegetation with timber mats.
i. Hydro-mulch seeding of all disturbed soils with colorant to reduce soil contrast.
j. Remove on-site shrubs and ground cover plants from the 10' wide ditch zone and bore area, heeled-in root balls in a safe storage location, and then transplanted back into the ditch zone and bore area.
k. Place duff with rubber-tracked equipment to avoid compaction, and hand crews rake the material out. Plant nursery trees along the edges in a scalloped arrangement.

l. Logs and fallen trees placed in the corridor consistent with Forest Service direction.
m. Provide adequate irrigation of plantings at Forest Service direction for 5 years after completion of the construction phase, and replacement of mortality that exceeds 30 percent.
n. Plant nursery stock trees ranging from 5 to 12' in height along corridor edge in a scalloped and irregular manner, and in clusters no closer than 30' feet apart across the entire ROW within the visible foreground from the PCT.
o. Root prune and transplant trees in a scalloped and irregular manner along corridor edge.
p. Retain a screen of existing vegetation east of the PCT crossing site along Forest Road 3720-700 to screen views of the bore site and cleared ROW.
q. Use a tree spade to transplant trees of 15-20 foot height into the ROW in clusters to immediately break up the linear edges and the barren swath, and plant clusters a minimum of 30-feet apart;
r. Bury any root wads or boulders in the ROW to at least 1/3 the height of the boulder or root wad in order to maintain natural appearance.
s. Monitor revegetation treatments on an annual basis to evaluate success and to determine if VQOs are being achieved or if additional efforts are needed. Continue monitoring efforts until the VQO of Foreground Partial Retention is achieved.
t. Plant 1-2 gallon size shrubs to decrease the amount of time needed to address soil color contrast and the single plane of the open forest floor.

Dead Indian Memorial Road

a. "Neck-down" construction zone from 95' to 75' across the road
b. UCSA's eliminated within "necked-down" zones.
c. Shorten the potential visual corridor by turning the corridor on both ends of the crossing
d. Plant a row or cluster of trees and/or shrubs across the right of way to provide visual screens at road crossing
e. Revegetate with native trees, shrubs, and plants
f. Place barrier to discourage Off-highway vehicle use

Clover Creek Road

a. Relocate Block Valve 12 (this was done prior to FEIS)
b. Regrade to approximate original contour
c. Reseed construction right-of-way (ROW) area
d. Scatter slash across the right of way
e. Replant with seedlings

Site Specific Analysis of Effects on Scenery Resources

Big Elk Road Crossing

Forest Plan Standards
VQO- Foreground Retention

Visibility

The pipeline crosses Big Elk Road (FS RD 37) in a west-east alignment which runs through a mixed conifer forest. The route would be viewed from a foreground distance; however, the duration of the view is very short for those traveling on the highway at an average speed of 50mph. The broad 75' construction swath perpendicular to the road will attract the eye because of the existing vegetation that creates a tunnel effect along the roadway. The visual effect of a cleared corridor will be similar to an intersecting road. The corridor will be the single deviation from the contiguous edge of the timber along the road.

Visual Absorption Capability

The heavy timber canopy is very contiguous, decreasing the visual absorption capability. The terrain is very flat in this area. The view of the ROW is limited by the width and depth to which the viewer can see down the ROW. The visual absorption capability is not a factor in immediate foreground viewing situations.

Visual Effects

The immediate visual effects created by the ROW will be a strong linear feature with strong edges at each side. The color contrast of the exposed soils will be evident, and the scale of the opening will be uncharacteristic to the surrounding landscape. The berm, boulders, and root wads created to block OHV users from accessing the site will draw attention to the corridor as these negative elements detract from the natural appearing landscape.

Seasonal Changes

The ROW corridor will be most evident in the winter when the snow creates the strongest contrast to the coniferous forest. Spring, summer, and fall will be similar in effects other than the changing color of the seeded grasses and shrubs.

Expected Results of Proposed Mitigation

The immediate effects of the PCGP corridor to the visual resource are unacceptable modification. The 75' swath with the tall adjacent tree line edges will be uncharacteristic to the surrounding landscape. A small cluster of trees with a height less than 40' will not screen the open swath created by the corridor. The logs and boulders proposed to be strewn across the PCGP are unacceptable. Placing root wads in the UCSAs is an unacceptable practice in all areas that are visible, regardless of the sensitivity level. After the grasses and shrubs begin to grow, the soil color contrast will be reduced as the exposed soils are covered. Shrubs will add texture and color variation to the flat plane.

It is expected that creating openings at this location will cause frost pockets and hamper revegetation efforts. Revegetation could take as long as 20-30 years if successful at all. This is seen in strip cut harvests in the area that have taken 30 years to revegetate. Once the PCGP corridor is revegetated the cleared width will be reduced to a minimum of 30 feet in width. The expected results of the proponent's restoration efforts will eventually meet modification, but not within five years. It is expected that it could take 20 to 30 years to fully revegetate and at that time the PCGP project is expected to meet partial retention.

Forest Service Mitigation Measures

Potential/Recommended Forest Service Mitigation Measures

The following mitigation measures shall be done in the construction ROW and TEWAs from the edge of Big Elk Road to where the corridor makes the turn and is no longer visible from the Big Elk Road.

1.0 Soil Color Contrast Mitigation

1.1 Chip slash to:

a. mulch ROW to manage slash production;
b. reduce soil erosion; and
c. retain soil moisture to increase revegetation success.

1.2 Where using hydro-mulch to avoid erosion, use colorant (commercially available) dark brownish green to reduce color contrast.

2.0 Edge/Form Mitigation

2.1 Scallop edges by removing trees in areas designated by the Forest Service landscape architect in consultation with Pacific Connector's Environmental Inspector(s) to reduce the straight linear edge and change shadow cast patterns.

2.2 Feather edges of ROW by cutting some tall trees (40'+) along the immediate edge, leaving trees with heights of 10-40' in height for a distance of 50-100'. Feathering shall be done in accordance to advisement of Forest Service landscape architect and in coordination with Pacific Connector's EI(s).

3.0 Revegetate for Reduction of Width and Improving Form

3.1 Transplant trees of 15' to 20' height into the ROW in clusters by using a tree spade to immediately reduce the sharp linear edge and break up the wide barren swath. Transplant 15- 20 trees per 1/8th mile to blend the corridor into existing tree densities, in accordance to advisement of Forest Service landscape architect and in coordination with Pacific Connector's EI(s).

4.0 Treatment of TEWAS in highly visible areas

4.1 Transplant trees into the TEWAS in clusters by using a tree spade. Combine with partially buried (1/3-1/2 recess) boulders to create groupings for wildlife use and to appear more natural.

4.2 Treat compacted soils by sub soiling to aerate the soils where necessary as discussed in the ECRP, Section 10.

5.0 Root wad and Boulder Placement in Immediate Foreground

5.1 Every effort shall be made to bury all root wads and boulders within the ROW.

5.2 Boulders larger than one foot in diameter that are placed in the immediate foreground (300') shall be partially buried to approximately 1/3 the height of the boulder. Root wads (that cannot be buried) and boulders within the foreground shall be placed in groupings of approximately 3 root wads and 2 boulders. There shall be no more than about one grouping per 1/8th mile within Retention areas or Class I areas. In partial retention areas/Class II areas there shall approximately 3 groupings per 1/8th mile. See Diagram C – Linear Guideline Template for typical construction. All mitigation measures shall be constructed under the on-site advisement of Forest Service landscape architect in consultation with Pacific Connector's EI(s) during the time of construction.

6.0 Treatment of Soil Compaction

6.1 Subsoiling and other soil compaction mitigations shall occur in areas determined necessary as per the ECRP to reduce soil compaction and to improve success of revegetation efforts.

7.0 Planting Shrubs

7.1 Plant 1-2 gallon sized shrubs and protect with plant guards. This will reduce the soil contrast and the single plane of the open forest floor. Plant as designated on the site plan for the immediate foreground of the site.

8.0 Blocking from OHV use

8.1 Construct a berm with boulders to discourage access from OHV use.

9.0 Screening

9.1 Modify the view of the corridor for the viewer by leaving specific trees near the roadway that can be worked around, and transplanting trees of 10-15ft height in groupings in the immediate foreground, as designated by the Forest Service landscape architect and in coordination with Pacific Connector's EI(s).

10.0 Plant deciduous trees and shrubs for fall color.

10.1 Plant willow, ceanothus, ribes, huckleberry, chinquapin as specified in the ECRP.

Site Specific Design Mitigations

See section with diagrams.

Expected Results of Recommended Mitigation

The expected result of the recommended mitigations is that the visual quality level may be partial retention in 10 years if revegetation efforts and mitigations are successful. The Scenery Management System does not specify a timeframe for meeting Retention or High Scenic Integrity; however, the Visual Management System requires that Retention VQO be met during or immediately after project completion.

Dead Indian Memorial Road Crossing

Forest Plan Standards
VQO- Foreground Retention

Visibility

The pipeline crosses Dead Indian Memorial Road (FS RD 37) in a west-east alignment which runs through a lodge pole ecotone vegetation type. The route would be viewed from a foreground distance; however, the duration of the view is very short. The broad 75' construction swath will attract the eye because the existing vegetation that creates a tunnel effect along the roadway. The northwest pipeline alignment bends approximately 600' from the edge of the road reducing the sight line distance down the corridor.

Visual Absorption Capability

The heavy timber canopy is very contiguous, decreasing the visual absorption capability. The terrain is very flat in this area. The view of the ROW is limited by the width and depth to which the viewer can see down the ROW.

Visual Effects

The immediate visual effects created by the ROW will be a strong linear feature with strong edges at each side. The color contrast of the exposed soils will be evident, and the scale of the opening will be uncharacteristic in the surrounding landscape. The proposed berm, boulders, and root wads created to block OHV users from accessing the site will draw attention to the corridor as these negative elements detract from the natural appearing landscape. This crossing will also likely create a 'daylight' cut into the cut bank along the edge of the road. This cut will also attract the eye to the corridor.

Seasonal Changes

The ROW corridor will be most evident in the winter when the snow creates the strongest contrast to the coniferous forest. Spring, summer, and fall will be similar in effects other than the changing color of the seeded grasses and shrubs.

Expected Results of Proposed Mitigation

The immediate effects of the ROW corridor are unacceptable modification. The 75' swath with the tall adjacent tree line edges will be uncharacteristic to the surrounding landscape. The proposed logs and boulders strewn across the ROW are unacceptable. Placing root wads in the uncleared storage areas is an unacceptable practice in all areas that are visible. After the grasses and shrubs begin to grow, the soil color contrast will be reduced as the exposed soils are covered.

It is expected that creating openings at this location will cause frost pockets and hamper revegetation efforts. Revegetation could take as long as 20-30 years if successful at all. This is seen in strip cut harvests in the area that have taken 30 years to revegetate. Once this occurs the cleared ROW will be reduced to a minimum of 30 feet width. These practices will eventually meet modification, but not within five years.

The Winema National Forest VQO in this area is foreground retention. This proposal does not meet this objective, and is never expected to meet it, although there will be a filling in of vegetation and softening of appearance overtime.

Forest Service Mitigation Measures

The following mitigation measures shall be done in the construction ROW and TEWA(s) from the edge of Dead Indian Memorial Road to 600 feet beyond the immediate foreground.

1.0 Soil Color Contrast Mitigation

1.1 Chip slash to mulch ROW to:

a. manage slash production;
b. reduce soil erosion; and
c. retain soil moisture to increase revegetation success.

1.2 Where using hydro-mulch to avoid erosion, use colorant (commercially available) dark brownish green to reduce color contrast.

2.0 Edge/Form Mitigation

2.1 Scallop edges by removing trees in designated areas to reduce the straight linear edge and change shadow cast patterns.

2.2 Feather edges of ROW by cutting tall trees (40'+) along the immediate edge, leaving tree heights of 10-40' for a distance of 50-100'. Feathering shall be done in accordance to advisement of Forest Service landscape architect and in coordination with Pacific Connector's EI(s).

3.0 Revegetation for Reduction of width and improving form

3.1 Transplant trees into the ROW in clusters by using a tree spade to immediately reduce the sharp linear edge and break up the wide barren swath.

4.0 Treatment of TEWAS in Scenic Areas

4.1 Transplant trees that are root pruned a year in advance, into the TEWAS in clusters by using a tree spade. Combine with boulders to create groupings for wildlife use and to appear more natural.

5.0 Root wad and Boulder Placement in Immediate Foreground

5.1 Every effort shall be made to bury all root wads and boulders within the ROW.

5.2 Root wads and boulders placed in the immediate foreground (300') should be partially buried to approximately 1/3 the height of the boulder and 1/3 the height of the root wad. Cut faces should be directed away from the viewer platform or concealed by boulders or berms. Root wads and boulders shall be placed in groupings of approximately 3 root wads and 2 boulders. There shall be about one grouping per 1/8th mile within Retention areas or Class I areas. In partial retention areas/Class II areas there shall be approximately 3 groupings per 1/8th mile. See Diagram C – Linear Guideline Template for typical construction. All mitigation measures shall be constructed under the on-site advisement of Forest Service landscape architect and in coordination with Pacific Connector's EI(s) during the time of construction.

6.0 Treatment of Soil Compaction

6.1 Subsoiling and other soil compaction mitigations shall occur in areas determined necessary as per the ECRP Section 4.2.3 to reduce soil compaction and to improve success of revegetation efforts.

7.0 Planting Shrubs

7.1 Plant 1-2 gallon size shrubs and protect with plant guards, in order to decrease the amount of time needed to address soil contrast and the single plane of the open forest floor. Plant as directed by the Forest Service landscape architect and in coordination with Pacific Connector's EI(s).

8.0 Blocking from OHV use

8.1 Construct a berm with partially recessed boulders to discourage the access from OHV use. Construct as designated by the Forest Service landscape architect and in coordination with Pacific Connector's EI(s).

9.0 Screening

9.1 Screen the corridor from the viewer by leaving specific trees near the roadway that can be worked around, and transplanting trees of 15-20ft height in groupings in the immediate foreground, as designated by the Forest Service landscape architect.

10.0 Plant deciduous trees and shrubs for fall color.

10.1 Plant willow, ceanothus, ribes, huckleberry, chinquapin as designated in the ECRP.

11.0 Reconstruct the cut bank

11.1 Recontour the cut bank to discourage OHV access, and to reduce the distractive effect of to the edge of the roadway as advised by Forest Service landscape architect and in coordination with Pacific Connector's EI(s).

12.0 Scenic Stability

12.1 Fund off-site mitigation actions for Forest Service project work related to design, NEPA, and implementation of thinning and a fuel break along the highway. This project would thin trees in a variable transition zone 50 to 500 feet in width along the highway, to reduce tree density, fuel loadings, and percent of canopy closure appropriate to the species. This mitigation project would open up the stands and reduce the risk of losing existing scenic attributes, and recommended mitigation efforts in the event of a large stand replacement fire.

Expected Results of Mitigation to Meet Partial Retention VQO

The expected result of the recommended mitigations is that the visual quality level may be Partial Retention in 10 years if revegetation and mitigations are successful. The Scenery Management System does not specify a timeframe for meeting Retention or High Scenic Integrity; however, the Visual Management System requires that Partial Retention VQO be met during the first year or immediately after project completion.

Mitigations to Meet Retention VQO

The forest plan standard for this area is Foreground Retention.
This means that impacts are not visually evident from a foreground view.

The pipeline would have continued effects of a 30' overstory strip opening, meaning that for a distance of 600ft in one direction and 600ft in the other there will be an open sky strip. This is due to the removal of trees over 15ft and shrubs over 6ft. Because this strip is retained throughout the existence of the pipeline in this location, retention would not ever be met; given the recommended mitigation measures within and along the edge of the ROW.

Granted this strip would be seen from a moving car only for a short period of time, but the Visual Management system does not address duration of the view of an impact, other than to consider duration in the scenic class inventory. Due to the sensitivity level of this road, along with the scenic attractiveness and viewed distance, this area was assigned a Retention VQO in the Forest Plan standards and guidelines.

The recommended visual mitigation calls for softening the strip effect by scalloping and feathering the edges (2.1 and 2.2). This would soften the effect but would not make the strip "not visually evident". In order to meet retention, the strip effect must be addressed. Address meaning make it "not visually evident". To do this the surrounding timbered area would need to be sufficiently "opened up" to allow the open sky to be visible to the viewer traveling along this route, so that when the viewer drives by the crossing the open sky is not differing from the visual experience provided on either side of the crossing. So, this would be a designed project that would create a gradual thinning that increased the open sky view as the viewer approached the crossing point until the opening sky view was no longer a strip within a contiguous forest, but just an open sky view afforded to the viewer that does not appear unnatural in form, line, color, and texture. This is a project that could occur beyond the ROW, probably a ¼ to ½ mile each direction of the crossing point, and for a 600ft on both sides of the road. This kind of project could mimic a natural occurrence such as an insect and disease opening that often occurs in this lodge pole vegetation type. Over time this type of thinning would have to be maintained or the contiguous forest would "come back", and the strip over the pipeline would once again become visually evident. This type of treatment could also be considered in the form of a fuel break, which would be considered, within appendix J of the SMS an action that could improve scenic stability by reducing the potential breadth of a stand replacement fire to a scale that is within the natural range of variability.

If this type of approach was included in the chosen alternative, then retention could be met as soon as soil color contrast mitigation was successful, and transplanted trees within the 75' corridor reached 20 feet in height. The transplanted tree density would need to mimic the modified basal area of the surrounding area to blend the corridor into the landscape. Retention would not be met immediately nor within a year or one growing season, but it could eventually be met.

Pacific Crest Trail Crossing

LRMP Standards
VQO- Foreground Partial Retention and Foreground Retention

Visibility

The PCGP ROW crosses the Pacific Crest Trail within late successional reserve timber, at the point where the trail crosses an existing road, Forest Road 3720-700. The pipeline would be bored underneath the road and the trail, requiring no surface disturbance of the trail or its immediate surrounds, and requiring no vegetation clearing within 115 feet either side of the trail. The bore site and ROW to the east of the trail and trail crossing point would be in Foreground Retention, but would be screened from view by retained existing vegetation. The ROW to the northwest of the crossing would be adjacent and parallel to Forest Road 3720-700, and would be visible from the road/trail intersection in the immediate foreground, from 115 to 300 feet from the trail, until the road and ROW curve out of view to the west.

Visual Absorption Capability

Although the contiguous forest is a landscape which cannot typically absorb a linear feature such as a corridor ROW, the existing Forest Road 3720-700 provides a similar feature that would help to absorb the visual impacts. By aligning the ROW with the road and clearing to the road edge, the ROW would appear as part of the existing road corridor, rather than as a separate corridor, which would help to absorb it into the existing landscape.

Visual Effects

The immediate visual effects would include soil color contrast to existing adjacent vegetation, excessive vegetative clearing uncharacteristic in width and breadth, hard, and hard linear edges.

As trees grow to a height of 20 feet, the edges would begin to soften as tree boughs would begin to blend with adjacent trees, and the width of the vegetation cleared on the ROW would eventually be reduced to 30 feet.

Seasonal Changes

The ROW corridor would be most evident in the winter when the snow would create the strongest contrast to the coniferous forest. Spring, summer, and fall would be similar in effects other than the changing color of the seeded grasses and shrubs.

Expected Results of Proposed Mitigation Measures

The immediate effects of the cleared ROW corridor would be unacceptable modification.

The broad linear opening would create an excessive amount of visual disturbance, with the effects of the proposed activity being visually unrelated to the characteristic landscape despite the visual absorption capacity lent by the existing road corridor. Seeding and transplanting would not be successful in blending the proposed changes in the foreground view with the existing landscape until the ground vegetation is restored and the hard linear edges of the clearing are softened. It is expected that the proposed mitigation measures would be successful in achieving partial retention within two years, given a revegetation survival rate of 70% or greater. Opening the forest canopy as proposed could create a frost pocket that would be difficult to revegetate in a timely manner; therefore, nursery stock, transplanting existing shrubs and trees, and irrigation would be necessary. Additionally, annual monitoring would be needed to evaluate revegetation success and recommend/implement any needed adjustments to attain partial retention within two years.

Proposed/Recommended Forest Service Mitigation Measures

The following mitigation measures shall be done in the construction ROW and TEWA(s) in the visible foreground, from the edge of the PCT to where the corridor makes the turn and is no longer visible from the PCT.

1.0 Soil Color Contrast Mitigation

1.1 Chip slash to mulch the cleared ROW to:
a. manage slash production
b. reduce soil erosion
c. retain soil moisture to increase revegetation success.

1.2 Where using hydro-mulch to avoid erosion, use colorant (commercially available) dark brownish green to reduce color contrast.

2.0 Edge/Form Mitigation

2.1 Scallop edges by removing trees in designated uncleared storage areas to reduce the straight linear edge and change shadow cast patterns.

2.2 Feather edges of ROW by cutting tall trees (40’+) along the immediate edge, leaving trees of heights at 10-40’ in height for a distance of 50-100’ to graduate the edge from mid-sized to full height. Feathering shall be done in accordance to advisement of forest service landscape architect and in coordination with Pacific Connector’s EI(s).

3.0 Revegetate for Reduction of width and improving form

3.1 Plant nursery stock trees of 10’ to 15’ height into the ROW in clusters by using a tree spade to immediately reduce the sharp linear edge and break up the wide barren swath. Transplant existing trees 15-20’ in height into the ROW. Space clusters a minimum of 30’ apart.

4.0 Treatment of TEWAS in highly visible areas

4.1 Plant nursery stock trees of 10’ to 15’ height into the ROW in clusters by using a tree spade to immediately reduce the sharp linear edge and break up the wide barren swath. Combine trees with groupings of boulders to create clumps for wildlife use and to appear more natural. Transplant trees 15-20’ in height into the ROW. Space clusters a minimum of 30’ apart.

5.0 Root wad and Boulder Placement in Foreground

5.1 Every effort shall be made to bury all root wads within the pipeline ROW where visible from the trail.

5.2 Root wads shall not be placed in the immediate foreground (300’). Those placed within the foreground should be partially buried to approximately 1/3 the height of the root wad. Cut faces should be directed away from the viewer and cut ends concealed with soil and boulder placement. Root wads and boulders shall be placed in groupings of approximately 2 root wads and 3 boulders. There shall be about one grouping per 1/8th mile within Retention areas or Class I areas. In partial retention areas/Class II areas there shall be approximately 3 groupings per 1/8th mile. See Diagram C – Linear Guideline Template for typical construction. All mitigation measures shall be constructed under the on-site advisement of a scenery specialist during the time of construction.

6.0 Treatment of Soils, Forbs and Shrubs

6.1 Timber mats shall be used on the working side of the ditch zone to reduce soil compaction and save the existing forb and shrub layer.
6.2 Subsoiling and other soil compaction mitigations shall occur in areas determined necessary as per the ECRP Section 10 to reduce soil compaction and to improve success of revegetation efforts.
6.3 The corridor shall not be stripped or graded outside of the ditch zone and bore area. Shrubs shall be mown to a 6” height and trees shall be flush cut. Protect vegetation with timber mats.
6.4 On site shrubs and ground cover plants dug from the 10’ wide ditch zone and bore area, heeled in root balls in a safe storage location, and then transplanted back into the trench zone.
6.5 The duff layer (O and A horizon) of the ditch zone and bore area shall be stripped, segregate, and stored, then laid down after backfilling. Duff shall be place with rubber-tracked equipment to avoid compaction, and hand crews shall rake the material out.

7.0 Planting Shrubs

7.1 Plant 1-2 gallon size shrubs and protect with plant guards to decrease the amount of time needed to address soil color contrast and the single plane of the open forest floor. Plant shrubs of varying sizes and species in groupings of 5 to 8.
7.2 Plant transplanted and root balled shrubs back into ROW and irrigate.
7.3 Replace all plants that are in exceedance of the 30% mortality criteria.

8.0 Plant Nursery Stock Trees and Transplant Trees

8.1 Plant nursery stock trees along the edges of the corridor to feather and scallop the edges. Trees shall be of varying heights from 5' to 12' in height and planted in an irregular manner along the edge to create a scalloped appearance. Root prune trees in areas designated by Forest Service representative one year in advance, and transplant root pruned trees with tree spade to the ROW edge.

9.0 Irrigation[1]

9.1 Maintain irrigation of planted and transplanted vegetation for 5 years after completion of the construction phase of the project. Irrigate all transplanted and nursery stock shrubs and trees. Replace vegetation as necessary to maintain 70% survival rate or better.

10.0 Scalloped Edge Treatment outside the ROW[2]

10.1 Thin the adjacent timber and scallop the edges of the corridor by removing trees to diminish the linear form of the ROW corridor, as directed by a Forest Service landscape architect.

Expected Results of Recommended Mitigation

The expected result of the recommended mitigations is that the visual quality level would meet a foreground partial retention visual quality objective within 2 years. The hikers along this trail are very observant and the speed at which they travel allows them ample to time to view the ROW, so it is expected that they would notice more of the effects of the corridor, but the edges would soften by vegetative growth. Plantings would soften the stark contrast of the corridor as they gain height and breadth; transplantation of 15-20' trees, distribution in irregular clumps, and use of uneven-aged plantings would hasten these effects. The ditch zone soils would quickly return to a color and texture that would blend with the existing ground layer with chip slash and hydro mulching to bring forbs and grasses into view.

The LRMP calls for partial retention within 2 years. This standard is expected to be achieved, provided the recommended mitigations are successful with a 70% survival rate of planted and transplanted trees, shrubs, forbs, and grasses. The corridor would be narrower and less linear; noticeable, but subordinate to the characteristic landscape.

[1] The irrigation System is to be part of the Compensatory Mitigation Plan

[2] Treatment outside of the ROW is to be part of the Compensatory Mitigation Plan

Clover Creek Road

LRMP Standards
VQO- Foreground Partial Retention

Visibility

The PCGP ROW is located directly adjacent to the Clover Creek Road for over 18 miles. Eight miles of these are NFS lands. The adjacent alignment will increase the apparent roadway corridor width from 54’ to 149’, almost tripling the existing width. This 95’ additional width for the ROW is fully visible in an immediate foreground view. The cumulative effect of the project area across all jurisdictions will dominate the view for the entire 18 miles.

Visual Absorption Capability

There is no absorption capability that will lessen the visibility of this proposed right of way and its effects.

Visual Effects

The immediate visual effects include soil color contrast to existing adjacent vegetation, grossly uncharacteristic scaled opening in width and breadth; hard, linear edge, extensive number root wads, and boulders strewn in the uncleared storage areas.

The logs and boulders strewn across the ROW are unacceptable. Permanently placing root wads in the uncleared storage areas is an unacceptable practice in all areas that are visible. (Pg. 39, National Forest Landscape Management, Vol. 2.) After the grasses and shrubs beginning to grow the soil color contrast will be reduced as the exposed soils are covered. Shrubs will add texture and color variation to the flat plane. As trees grow to a height of 20 feet, the ROW edges will be softened, and the width of the ROW will eventually be reduced to 30 feet. Where adjacent to the 54’ roadway, the full opening will be 84’.

Seasonal Changes

The ROW corridor will be most evident in the winter when the snow creates the strongest contrast to the coniferous forest. Spring, summer, and fall will be similar in effects other than the changing color of the seeded grasses and shrubs. Seasonal changes will not make enough difference to note in the foreground, because the scale of the opening and the adjacency to the road makes the effects undifferentiated by seasonal change.

Expected Results of Proposed Mitigation Measures

The immediate effects of the ROW corridor are unacceptable modification. The 95’ swath with the tall adjacent tree line edges will be uncharacteristic to the surrounding landscape. The extensive number of logs and boulders strewn across the ROW is unacceptable. Placing root wads in the uncleared storage areas is an unacceptable practice in all areas that are visible. After the grasses and shrubs beginning to grow the soil color contrast will be reduced as the exposed soils are covered. Revegetation could take as long as 20-30 years. Once this occurs the cleared ROW will be reduced to a minimum of 30 feet width. These practices will result in unacceptable modification.

Recommended Forest Service Mitigation Measures

The extensive project activities within immediate foreground of this road require site specific designed mitigation. See the Clover Creek mitigation measures by zone, and the template diagrams.

1.0 Soil Color Contrast Mitigation

1.1 Chip slash to mulch cleared ROW to: a. manage slash production, b. reduce soil erosion, and c. retain soil moisture to increase revegetation success.

1.2 Where using hydro-mulch to avoid erosion, use colorant (commercially available) dark brownish green to reduce color contrast.

2.0 Edge/Form Mitigation

2.1 Scallop edges by removing trees in designated areas to reduce the straight linear edge and change shadow cast patterns.

2.2 Feather edges of ROW by cutting tall trees (40'+) along the immediate edge, leaving trees of heights at 10-40' in height for a distance of 50-100'. Feathering shall be done in accordance to advisement of forest service landscape architect and in coordination with Pacific Connector's EI(s).

3.0 Revegetate for Reduction of Width and Improving Form

3.1 Transplant trees into the cleared ROW in clusters by using a tree spade to immediately reduce the sharp linear edge and break up the wide barren swath.

4.0 Treatment of TEWA(s) in highly visible areas

4.1 Transplant trees into the TEWA(s) in clusters by using a tree spade. Combine with groupings of recessed boulders to create clumps for wildlife use and to appear more natural.

5.0 Root wad and Boulder Placement in Immediate Foreground

5.1 Every effort shall be made to bury all root wads and boulders within Row clearing.

5.2 Root wads and boulders placed in the immediate foreground (300') should be partially buried to approximately1/3 the height of the boulder and 1/3 the height of the root wad. Cut faces should be directed away from the viewer and cut ends concealed with soil and or boulders. Root wads and boulders shall be placed in groupings of approximately 3 root wads and 2 boulders. There shall be about one grouping per 1/8th mile within Retention areas or Class I areas. In partial retention areas/Class II areas there shall be approximately 3 groupings per 1/8th mile. See Diagram C – Linear Guideline Template for typical construction. All mitigation measures shall be constructed under the on-site advisement of a Forest Service landscape architect and in coordination with Pacific Connector's EI(s) during the time of construction.

6.0 Treatment of Soil Compaction

6.1 Subsoiling and other soil compaction mitigations shall occur in areas determined necessary as per the ECRP Section 4.2.3 to reduce soil compaction and to improve success of revegetation efforts.

7.0 Planting Shrubs

7.1 Plant 1-2 gallon size shrubs and protect with plant guards to decrease the amount of time needed to address soil contrast and the single plane of the open forest floor. Plant as designated by the Forest Service landscape architect and in coordination with Pacific Connector's EI(s).

8.0 Screening

8.1 Screen the corridor from the view by leaving specific trees near the roadway that can be worked around. Transplant trees 15-20ft in height. Construct groupings in the immediate foreground, as designated by the FS Landscape Architect.

9.0 Plant deciduous trees and shrubs for fall color.

9.1 Plant willow, ceanothus, ribes, huckleberry, chinquapin as designated by the ECRP.

Specific Site Designed Mitigations by Zone and Topography

These zones are shown on the template diagrams.

Zone A – Uncleared Storage Areas

This UCSAs are areas not cleared for construction but used for storage of equipment, construction materials and root wads and boulders. This zone is near the edge of the construction corridor where vegetation remains, and where thick forest creates a strong edge or wall. This edge needs to be "feathered" by thinning the trees, leaving larger, fire resistant species. After construction this zone shall only be used for storing root wads and boulders in areas that are not visible from the road. The root wad and boulder storage should be fully screened by existing topography, or transplanted vegetation. Root wads and boulders can be buried under earthen berms that are designed as gentle rises in scale with other topographic variation in the area to blend with the existing natural environment. All berms shall be seeded/hydro mulched with native seed mix, mulched with chips generated from on-site slash and fertilized to promote rapid revegetation. Transplanted trees and shrubs planted to screen storage areas shall be an average height of 15-20 feet in height. See transplanted berm diagram.

Zone B – Offside Topsoil and Subsoil Storage Area

This zone is an area across the pipeline trench that is utilized during construction to store topsoil and excavated soils from the pipeline trench. After construction this area shall be seeded/hydro mulched with native seed mix, mulched with chips generated from on-site slash and fertilized to promote rapid revegetation. This zone shall have a minimum of 10 -15 transplanted trees depending on the density of trees in Zone A to immediately soften the edge of the clearing, and/or screen boulders and root wads. This zone may be used for burying boulders and root wads. See transplanted berm diagram.

Zone C – 30' Corridor Directly above Pipeline

This zone is centered directly over the pipeline and will remain open via clearing of trees greater than 15' in height, and shrubs greater than 6' in height. Within this 30' span root wads and boulders can be buried. After construction this area shall be seeded/hydro mulch with native seed mix, mulched with chips generated from onsite slash and fertilized to promote rapid revegetation. Boulder and root wad groupings may be designed into this corridor. See Boulder and Root wad Grouping Diagram. A maximum of about three groupings per quarter mile shall be placed within the entire block of zones. Groupings can be used to break up the open plan of the 30' corridor.

Zone D – Working Zone

This zone is between the existing road and the pipeline trench. During construction this area will receive the greatest level of equipment and truck traffic; therefore, soil compaction will be highest in this area. This area shall be wing subsoil treated to restore the soil aeration and improve the success of the restoration efforts. After construction this area shall be seeded/hydro mulched with native seed mix, mulched with chips generated from onsite slash and fertilized to promote rapid revegetation. Boulder and root wad groupings may be designed into this zone. Berms shall be designed to break up the flat plane of the construction working surface, and to bury boulders and root wads. Logs and slash shall be placed behind berm

Zone E – The Road Side Edge

The road side edge is the zone that is between the construction zone, and the edge of the existing road. This zone is the equivalent of an uncleared storage area in other areas, but adjacent to the Clover Creek Road, this area shall vary in width, usage and treatment depending on the existing topography and vegetation.

Where this zone is level, or within 5-10 feet of the roadway elevation, a minimum of 25% of the existing shrubs and trees shall be retained in clumps to provide diverse form, color and texture to the roadside edge. All areas that are impacted by construction shall be seeded/hydro mulched with native seed mix, mulched with chips generated from on-site slash and fertilized to promote rapid revegetation. There shall be no root wads, boulders or logs or slash placed in this zone.

Where this zone is sloping downward and away from the road at 30% or greater, vegetation high enough to screen the 30' corridor opening shall be retained. Root wads and boulders can be stored at the base of the slope meets the graded construction zone surface, where retained vegetation provides screening. Where this zone is sloping upward, and away from the road at 30% or greater, retained vegetation will provide diversity in form, color and texture. It is expected that where the road route is adjacent to a cut bank along the road that is greater than 10' in height, the PCGP ROW will be pulled back away from the cut bank by 20-30 feet. All areas that are impacted by construction shall be seeded/hydro mulched with native seed mix, mulched with chips generated from onsite slash and fertilized to promote rapid revegetation. There shall be no root wads, boulders or logs or slash placed in this zone.

Template Diagrams

The following template diagrams specify mitigation measures to be used based on the topography. The diagrams are to be used in conjunction with the linear guidelines. The diagrams are typical templates to be used under the advisement of the Forest Service landscape architect and in coordination with Pacific Connector's EI(s) that is available on site at the time of construction.

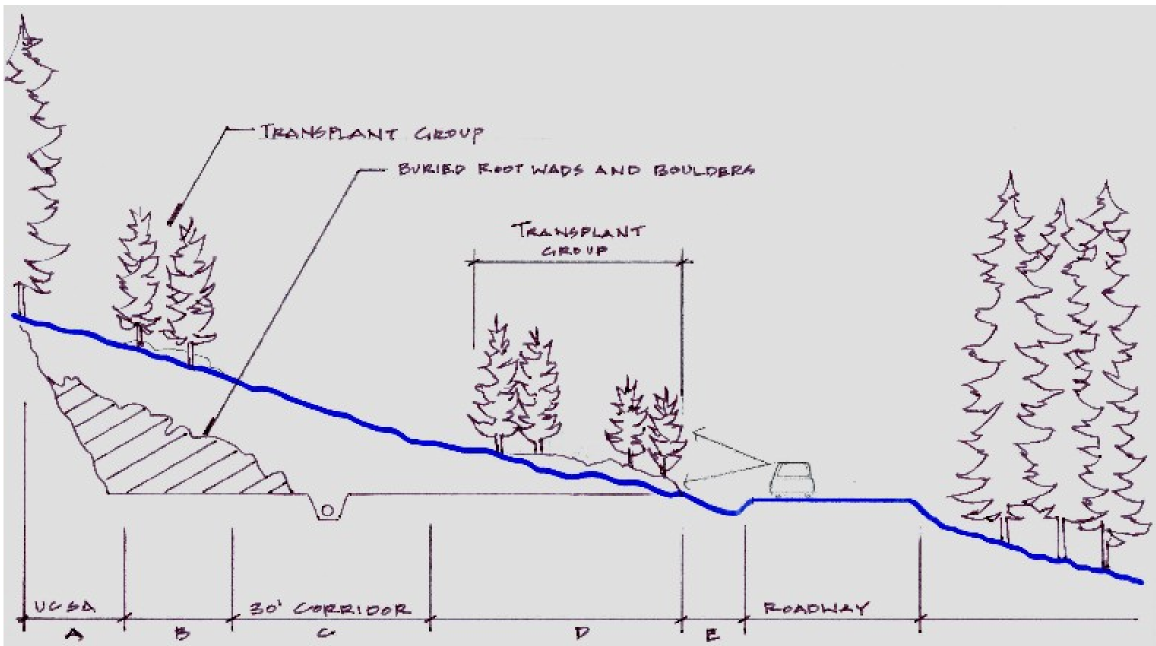

Diagram A –PCGP Above the Roadway

Bury root wads and boulders under the soil used to recontour the excavation zone. Construct transplant groupings as shown in the linear guideline diagram.

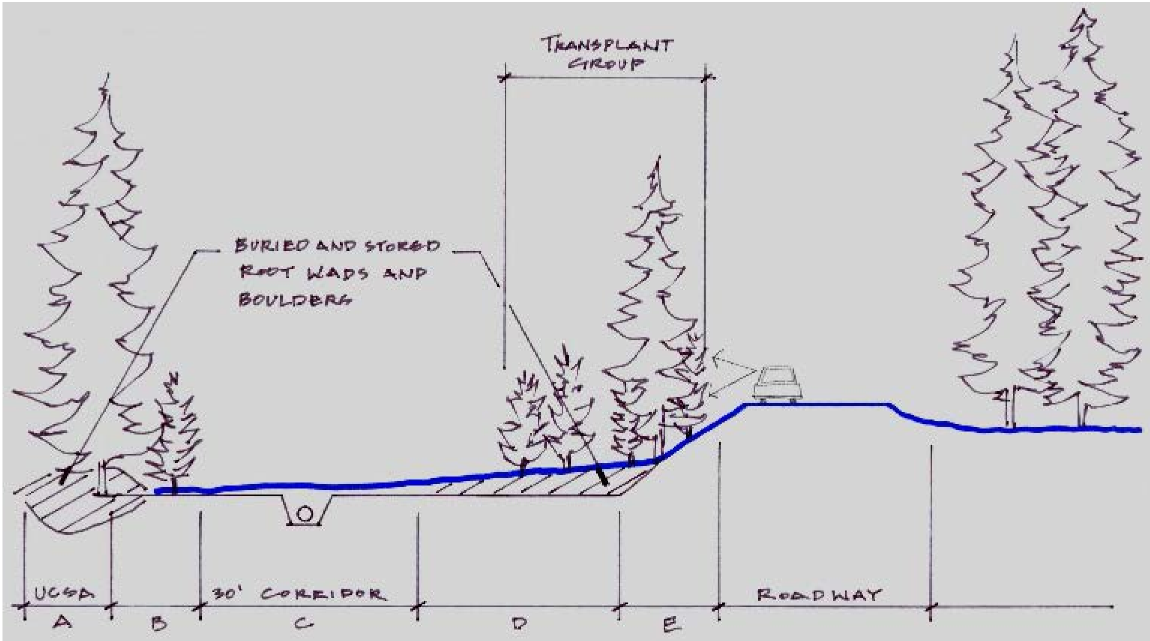

Diagram B –PCGP is below the roadway

Bury and store root wads and boulders where screened from the view of the viewer on the Clover Creek Road. Transplant trees and shrubs in groupings to create diverse spatial patterns, and to break up the strong linear form of the retained vegetation. Retain vegetation on the bank of the roadway.

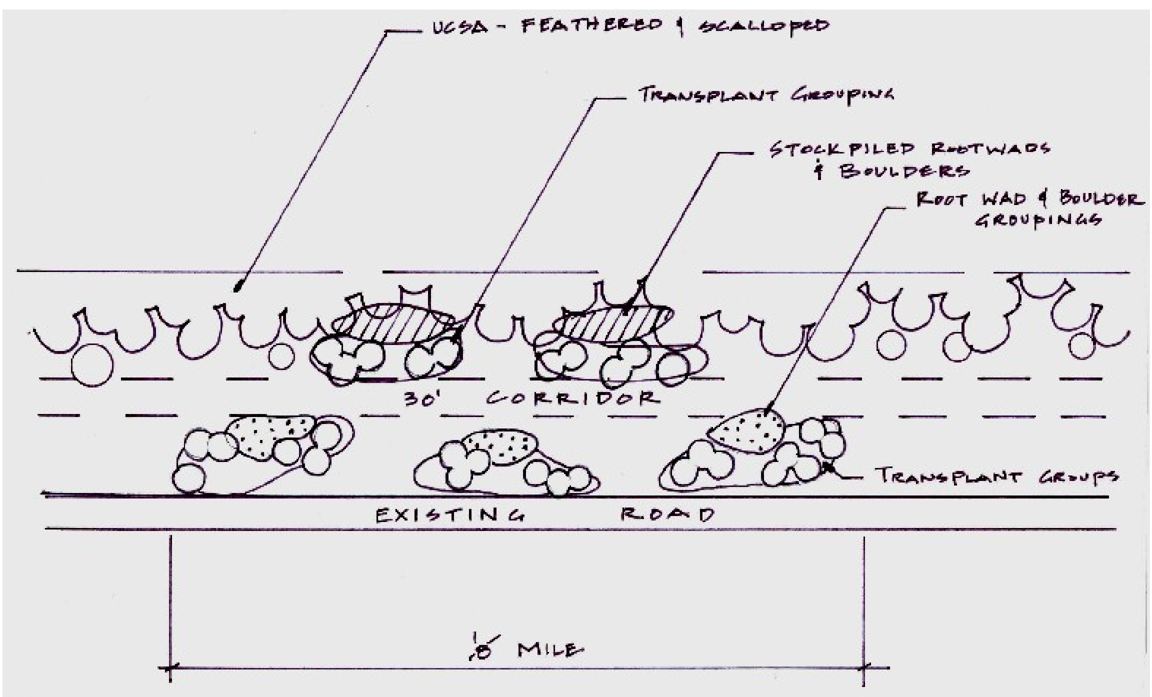

Diagram C – Linear Guideline Template for 1/8th Mile

Construct root wad and boulder groupings behind transplant groups.
Feather and scallop the uncleared storage areas, and stockpile root wads and

boulders behind transplant groupings. Limit root wad and boulder groupings to approximately 3 per 1/8th mile.

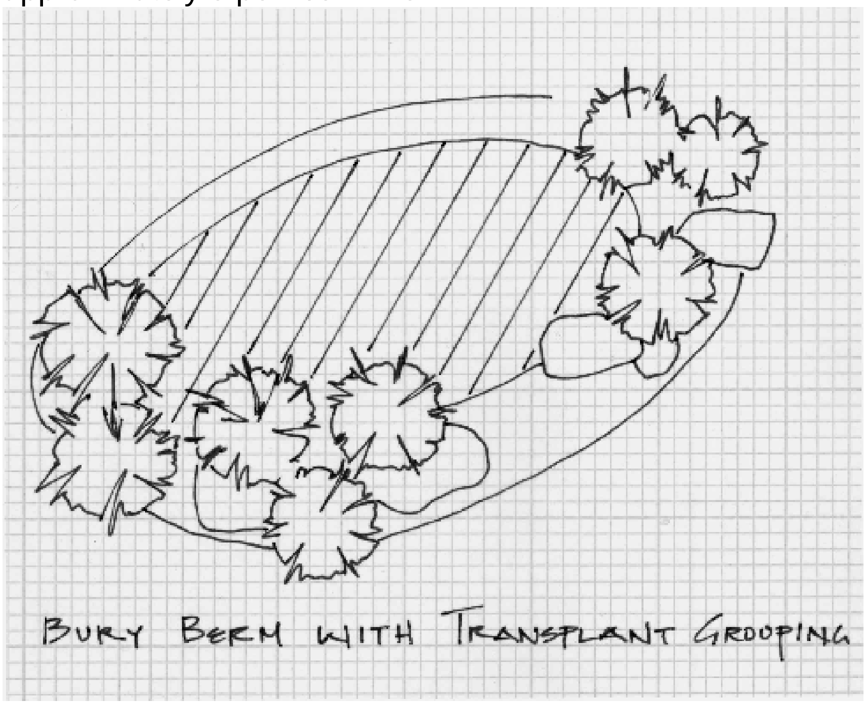

Diagram D – Bury Berm with Transplant Grouping

Bury root wads and boulders and construct a berm with retained topsoil. Plant the edges of the berm with transplanted trees, and place recessed boulders in the designed grouping.

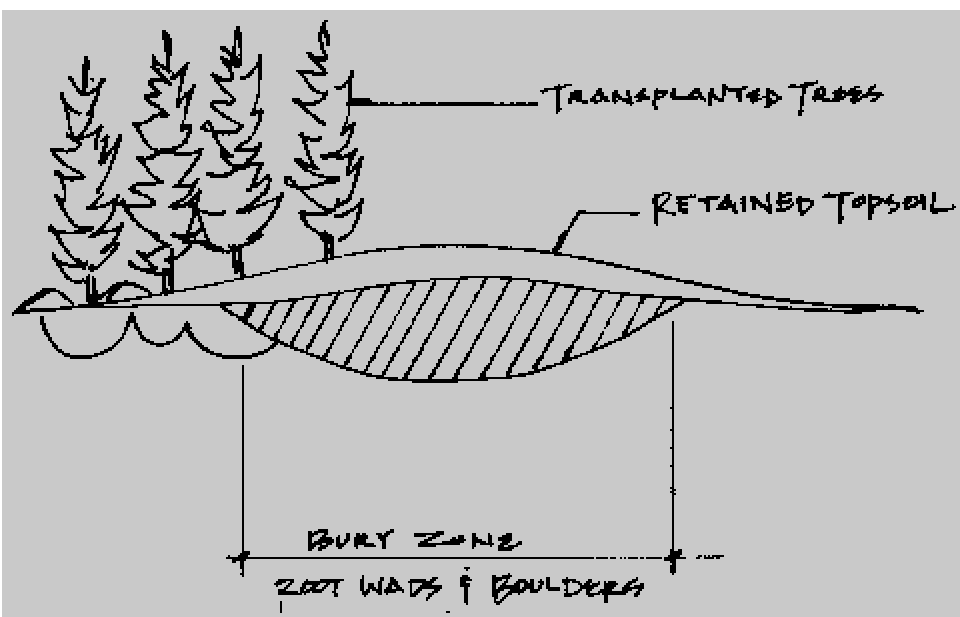

Diagram E – Bury Berm with Transplant Grouping

Plant at edges of bury zone.

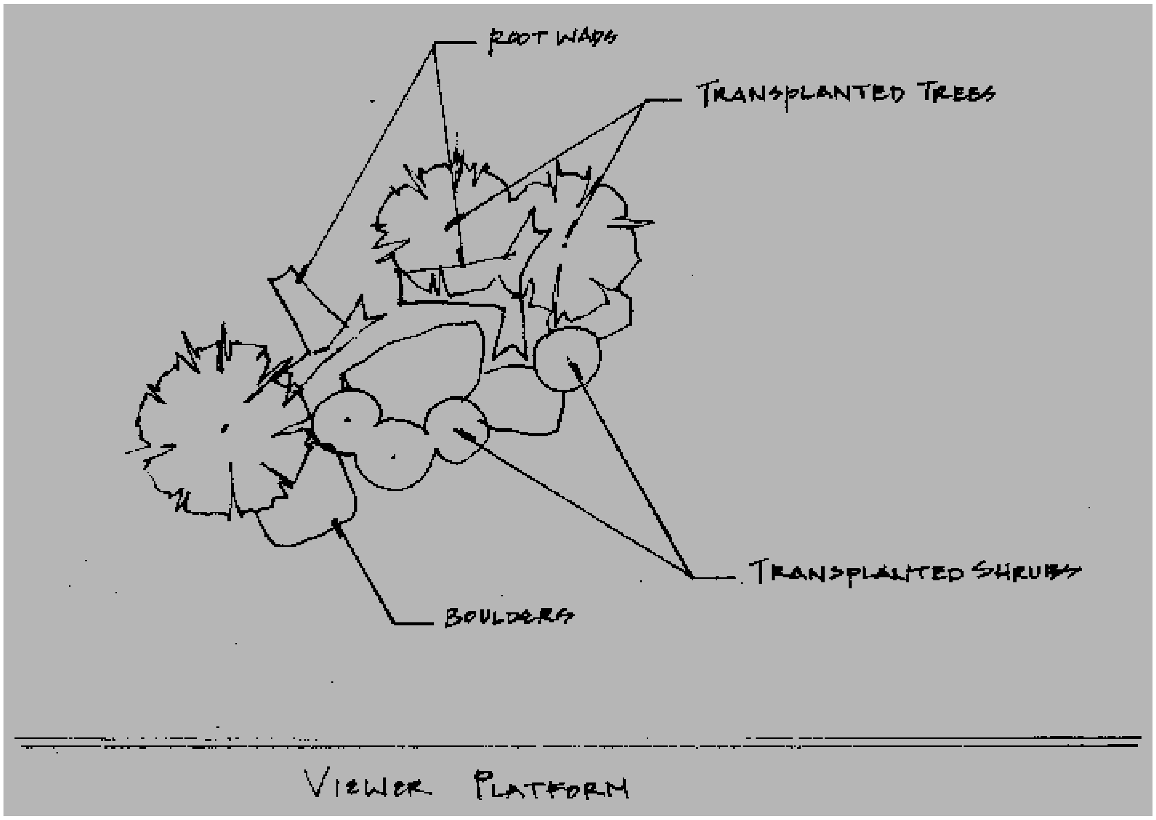

Diagram F – Root Wad and Boulder/Transplant Grouping

Construct groupings to vegetate the cleared ROW.

Expected Results of Mitigation to Meet Modification VQO

The expected results are based on the above mitigations and the specific site designed mitigation by zone and topography.

The immediate foreground of the Clover Creek Road, being heavily modified by pipeline construction would undergo extensive mitigation and over a long period of time will meet modification. Treating the soils by sub soiling, chip and hydro mulching, seeding and planting shrubs and grasses will address the impacts to the forest floor. Screening and burying boulders and root wads, designed berms and transplanted tree groupings will rebuild the foreground view, although the linear 30 foot ROW will always be evident.

It is expected that it will take approximately 10 to 15 years for this to be accomplished. Under the Scenery Management System this is an acceptable time frame, however under the Visual Management System, Partial Retention must be met within the second to third year after completion of the project.

Mitigation to Meet Partial Retention VQO

The forest plan standard for this area is foreground partial retention.
This means that impacts “remain visually subordinate to the characteristic landscape”.

The continued removal of trees over 15ft and shrubs over 6ft within the immediate foreground of the Clover Creek Rd for the extended length of approximately 18 miles (8 miles being NFS lands) would keep a 30ft corridor clear of vegetation less than 15ft in height. This is considered a linear corridor that is inconsistent with the characteristic landscape surrounding the project area. Because this strip is retained throughout the existence of the pipeline in this location, partial retention would not ever be met given the recommended mitigation measures within and along the edge of the ROW.

In order to meet partial retention, the corridor effect must be addressed. Address meaning make the corridor effect “visually subordinate”. To do this the surrounding timbered area would need to be sufficiently “opened up” to a degree that the corridor no longer appears as a contiguous linear feature but is more like openings that are consistent with those in the surrounding characteristic landscape. This means consistent in “size, amount, intensity, direction, pattern, etc.” Any introduced form, line, color, or texture that is introduced should remain subordinate to the visual strength of the characteristic landscape.”

To do this the surrounding timbered area would need to be sufficiently “opened up” to create a pattern that is both characteristic of natural occurrences and would blend the 30ft corridor into the modified surrounding landscape. Within the ponderosa pine type vegetation, this could be possible by designing a project that would create open stands of varying sized openings and clusters of trees. This project design would mimic a ponderosa pine stand that has frequent fire occurrences that create an “open park-like stand”, where small shrubs and grasses occur on the forest floor. This type of project is consistent with SMS in that it addresses scenic stability issues making the pine stands more resistant to large stand replacement fire. Combined with the all of the recommended mitigation measures of transplanting within the construction zone(B,C, D) and leaving trees in zone E, this approach would screen parts of the contiguous 30ft opening from the viewer while blending the opening into the newly opened up timbered area, making the impacts visually subordinate to the characteristic landscape.

If this type of approach was included in the chosen alternative, then partial retention could be met as soon as soil color contrast mitigation was successful, and transplanted trees within the 75’ corridor reached 20ft in height. The transplanted tree density would need to mimic the modified basal area of the surrounding area to blend the corridor into the landscape. Partial retention would not be met within the first year but could eventually be met.

These types of approaches were not addressed in the initial analysis, because it was considered beyond the limits of the project boundary. Whether that was an appropriate reason may be questionable but none the less it is why it was not included.

To be sure of achieving the required VQO, it is important to include measures such as:

- Replacement of trees that do not survive transplant
- Replacement of browsed shrubs

- Tilling, reseeding and mulching of areas where grasses do not take root

The survival rate of all transplanted and seeded plantings needs to be sufficient to meet the objectives of the mitigation. A survival rate of 70 percent should be achieved at the 5 year mark to ensure the success of the mitigations.

It is also important to use design features that address the larger project work, such as low cut stumps, slash treatment, skid trail treatments, etc. to ensure that these proposed methods do not compound the initial visual impacts.

Prepared by Donna M. Mattson Consulting Forest Landscape Architect
July 6, 2011 541-962-8515

Introduction

This scenery resource analysis review of the Pacific Connector Gas Pipeline was prompted by a previous analysis done by Tetra Tech consultant Lee Anderson. The Tetra Tech analysis noted that there are several sections visible from Hwy 140 known as Lake of the Woods Highway that would not meet the visual quality objectives of the forest plan. However, on site field work had not been done to determine whether the ROW in these sections would be visible from the Highway. An on site review of the sections along Highway 140 revealed that there are some visible segments and some areas that are obscured by landforms. This review is being done to determine if there are segments that will not meet the visual quality standards of the Forest Plan.
The map below (Figure 1) shows the segments in question.

The achievement of the visual quality objective is determined by what is visible from the viewer platform. Many of these segments are not visible from the viewer platform which has been identified as Hwy 140. The pipeline ROW runs along the top of the ridge that runs parallel to the highway. A visibility analysis was done by North State Resources to identify the ROW visibility from Hwy 140 (shown below in Figure 2). Via digital mapping a bare earth model was developed using digital elevations. The model is helpful in determining what areas are visible from the highway based on topography only. The visibility analysis below shows two segments (in yellow) that are visible. These segments correlate with my field work as being visible as well. (Segments 156.3-156.8, and 157.2-157.5) Although a bare earth analysis does not consider screening from vegetation, the result is similar to my findings in the field. The ground would not necessarily be visible, however what would be visible is the cut through the trees.

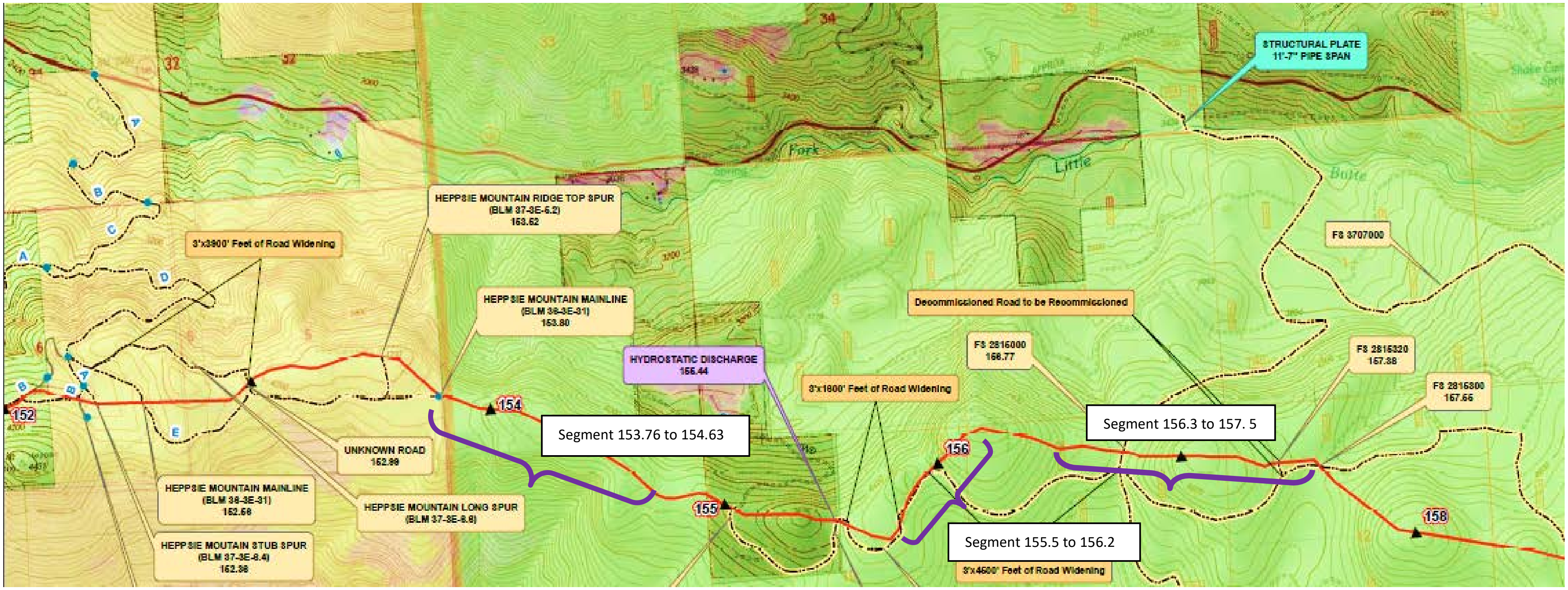

Figure 1: Hwy 140 and Pacific Connector Analysis Segments

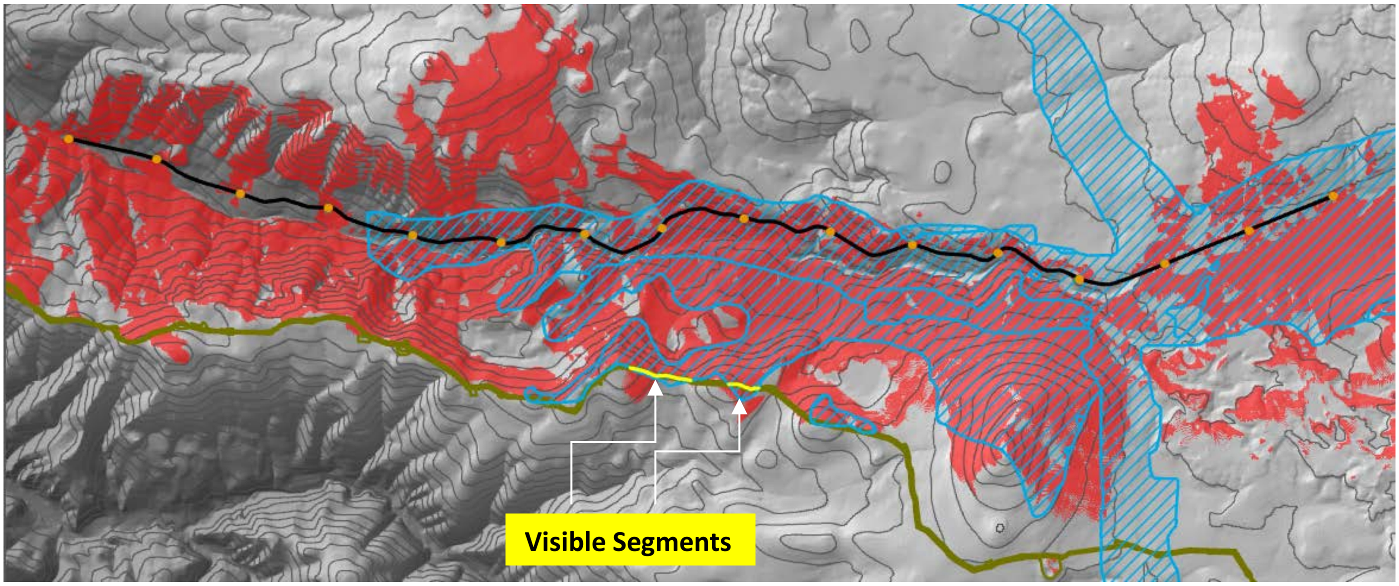

Figure 2: Visibility Analysis

Field work and Google Earth images confirm that these two segments are the only visible segments from Hwy 140. Upon further analysis it has been determined that some of the segments are not visible from Hwy 140 due to the location of the ROW related to the highway and the topography of the landscape between them.
The segments that were remaining in question are ***153.76 to 154.63***, ***155.80 to 155.82***, ***156.25 to 156.82 and 157.13 to 157.39.***

Segment MP 153.76 to 154.63

It appeared from satellite imagery and ROW maps that this segment could be visible from the highway looking southwest for a duration of approximately one mile. If this were the case, the ROW would not meet retention. The segment from ***MP 153.76 to MP 154.63*** of the ROW which lies within spotted owl habitat management area (Management Strategy 19). The visual quality objective for this area is retention; however this Standard & Guideline has been superseded in this case by the Northwest Forest Plan which makes the area a Late Successional Reserves. There is no stated visual quality objective for Late Successional Reserves. This means that maximum modification is allowable in this area. Having said that, it is still important to determine the impacts of the proposed ROW to the scenery resources as seen from the highway.
With the ROW draped over a Google Earth image, the visibility of the ROW was reviewed digitally and in the field. The onsite review in conjunction with a Google image review reveals that the segment in question is not visible from Hwy 140. It is screened by the ridge just west of the area. The angle of view from the Hwy coming from the west gives the viewer a long direct view which is aligned with the angle of the ROW. However, the long ridge coming off Heppsie Mountain, shown in the image below (Figure 3) obscures the ridge in question. The segment of the ROW is not visible from this angle nor is it visible from the east. Therefore, the visual impact of the ROW in this segment from Hwy 140 will meet retention.

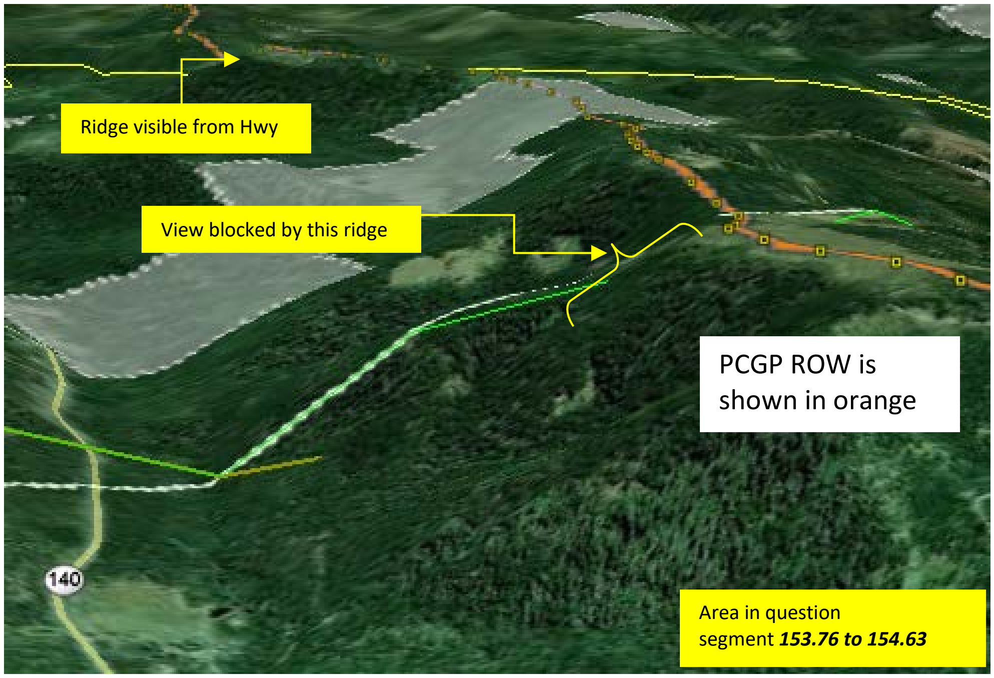

Figure 3: MP 153.73 to MP 154.63 displayed via Google Earth

The photos taken in the field of this segment were actually taken of the ridge east of the private land segment shown in gray. That segment is discussed further in this document. The Google earth image below shows the layout of the landscape as viewed from Hwy 140. The green line is the FS boundary, and the gray area private land.

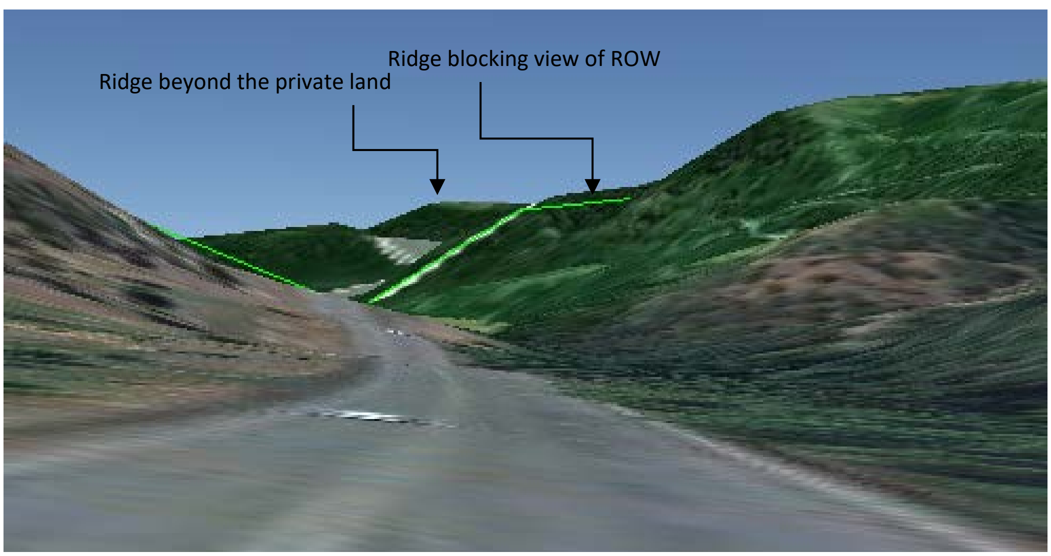

Figure 4: Google Earth View from Hwy 140

The segment ***153.76 to 154.63*** is screened from view by the ridge directly west.

The view from Hwy 140 looks up toward the ridge top from the platform which is below the ridge so the crest of the ridge often blocks the view of the ROW. However, in some cases, from a distant and oblique view the ROW is visible. In other cases the oblique views are blocked by vertical ridges that lie somewhat perpendicular to the angle of view as in the case of the segment ***155.80 to 156.20.***

Segment 155.80 to 155.20

The remaining segment in question is section that lies with ***155.80 to 156.20***. By using Google Earth and viewing the area in the field, it has been determined that this segment is not visible from Hwy 140. The view from the Hwy 140 is an upward angle to the crest of the ridge that is 3.5 to 4 miles away. From a Google Earth image it appears that there is potential for clearing impacts of the ROW to be slightly visible from the Highway. However, the route is not aligned with the angle of sight which was an initial concern, nor does the Google image display any vegetation height that could screen the project impacts. The ROW traverses the slope at an oblique angle from the line of sight and appears to be 200'-400' behind the crest of the ridge.

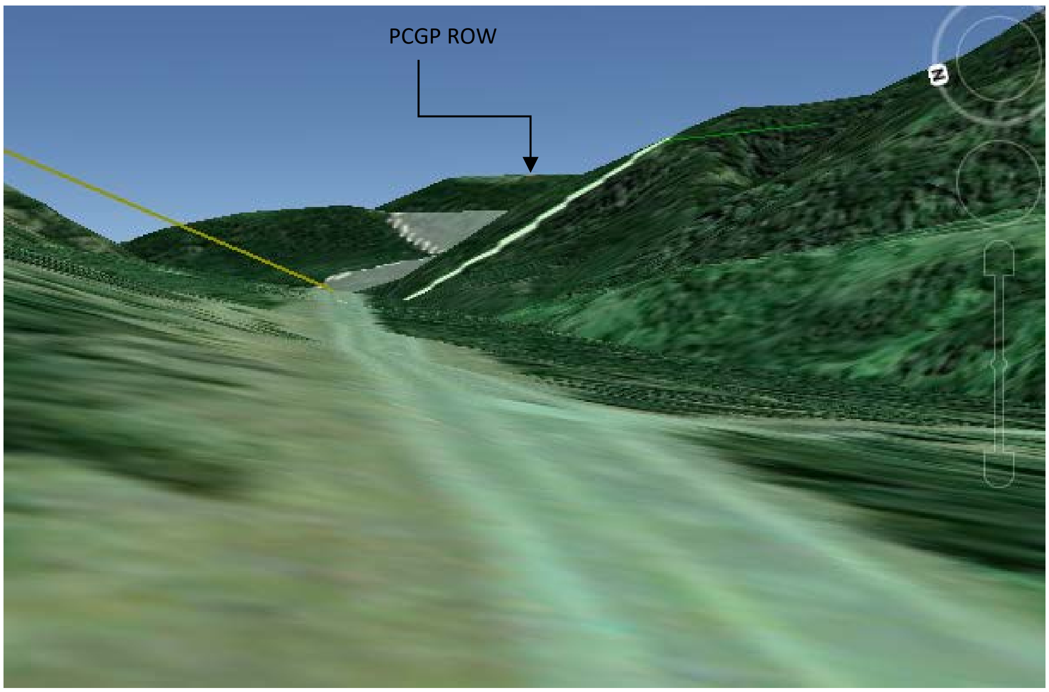

Figure 5: View from Hwy 140 via Google Earth as taken from photo point

This image above (Figure 5) shows the ROW showing up on the ridge to the east of the private land which is shown in gray with the sketchy white border. The visual quality objective of this area is partial retention from the crest of the ridge down toward the highway. It appears that the ROW is back from the crest, outside of partial retention, and would not be visible.

The photo below (Figure 4) shows the ridge on which the ROW would lie. The ROW, as shown in Figure 5; lies a distance ranging from 200 to 400 feet behind (south) of the crest of the ridge. This location of the ROW would allow enough room to leave an adequate screen of timber. It is expected that if this screening were retained the ROW would not be visible from Hwy 140.

Figure 6: Views from Hwy 140

View to ROW from Hwy 140 (42°23,786, 122°30,534)
The following images (Figure 7 and 8) show the location of the ROW along the ridge tops via Google Earth between ***155.80 to 156.20.*** The visibility of the ROW is determined by the line of sight from the view platform being Hwy 140. Therefore, if the crest of the ridge is in front of and between the viewer and the ROW then the line of sight is stopped or broken, and the ROW is not visible. It is recommended that the ROW be located as far to the south on this ridge as possible.

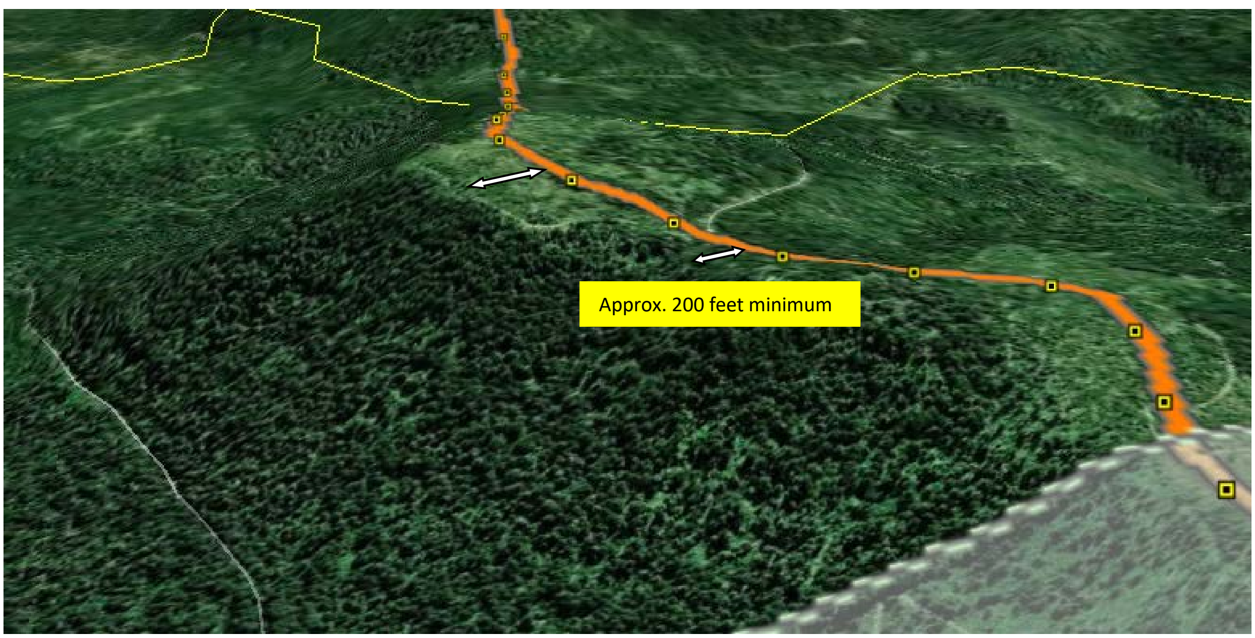

Figure 7: Google Earth Image showing distance from the crest of the ridge

Figure 8: Google Earth image from 5,284 ft elev.

This Google Earth image above (Figure 8) shows the location of the ROW being south of the top of the ridge as viewed from an elevation of 5248ft. The viewer on Hwy 140 is at an elevation of approximatelty 2545ft.
The Google Earth image above (Figure 8) shows the ROW just south of the ridge crest which is outside the view from Hwy 140. This segment would meet Partial Retention because it would be screened by the existing timber between the ROW and the crest of the ridge.

Segment 156.25 to 156.82 and 157.13 to 157.39

The segment ***156.25 to 156.82*** is located within a partial retention VQO. This segment would be visible from Hwy 140. The images below (Figure 9 & 10) show the ROW on a Google earth image and a similar view from a photo point located on the shoulder of Hwy 140. It is predicted that the visual impacts of the proposed ROW would create the equivalent of unacceptable modification at the point of project completion, (construction completed). The restoration efforts including revegetation within the 95ft ROW will eventually reduce the visual impact of the pipeline corridor. The timber on the northern edge of the ROW will eventually screen a majority of the pipeline corridor. However, the timeframe in which the visual quality objective of partial retention is to be met is within one year. (pg. 32 Natl Forest Landscape Management, Vol. 2) The vegetation screening is not expected to be in place within one year. The timber would need to reach a height of approximately 20ft to effectively screen the corridor in a manner that would reduce the visual impact enough to meet partial retention. The remaining 30ft corridor which will be “kept void of trees to facilitate corrosion and leak surveys and protect the pipeline from root damage” (ECRP) would be significantly screened and from this angle would eventually meet partial retention. The remaining 30ft corridor would essentially appear as a”straight linear gap” from the treetops in front of the ROW to the treetops behind the ROW. It is my judgement that this linear feature would be visually subordinate to the characteristic landscape.

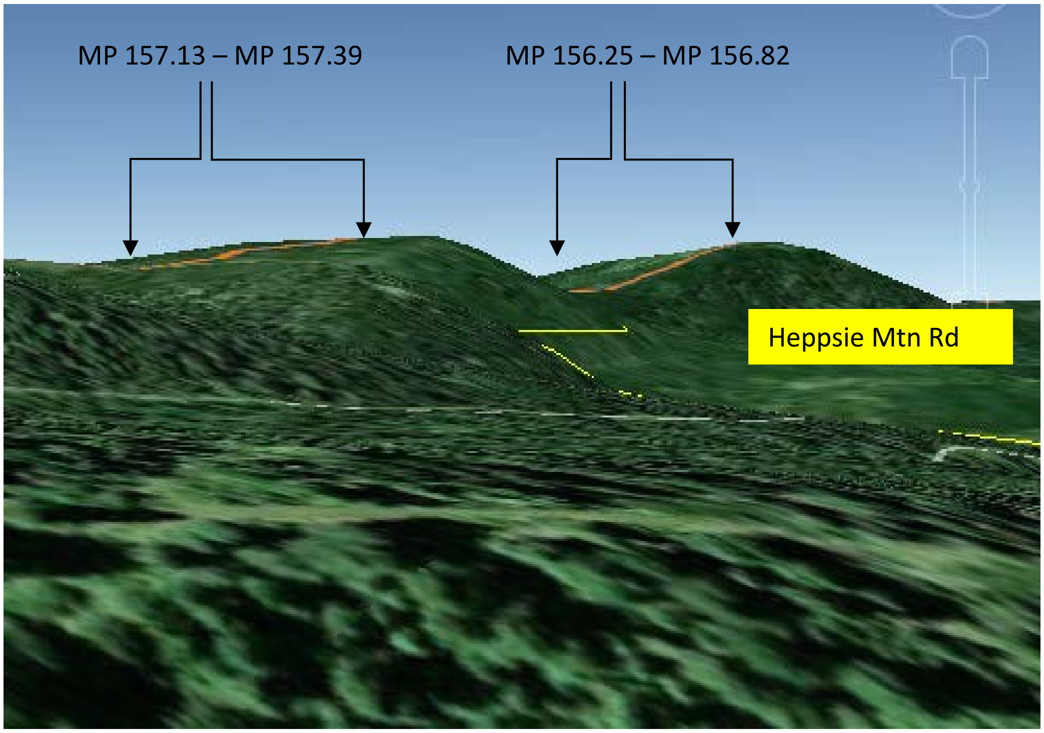

Figure 9: Google Earth image of segments visible from Hwy 140

Segment ***157.13 to 157.39*** is also visible from Hwy 140 at an oblique angle. Prior to restoration it is expected that this segment would appear as a linear feature that would draw the eye to the area and thus the construction ROW is not expected to meet partial retention until timber in front of the 95 ft ROW reached a height of 20 feet in height whereas the remaining 30 foot cooridor would be effectively screened. The remaining 30ft corridor is expected to meet partial retention due to screening of the trees to the north of the ROW. Once again, this achievement will not occur within one year of construction completion.

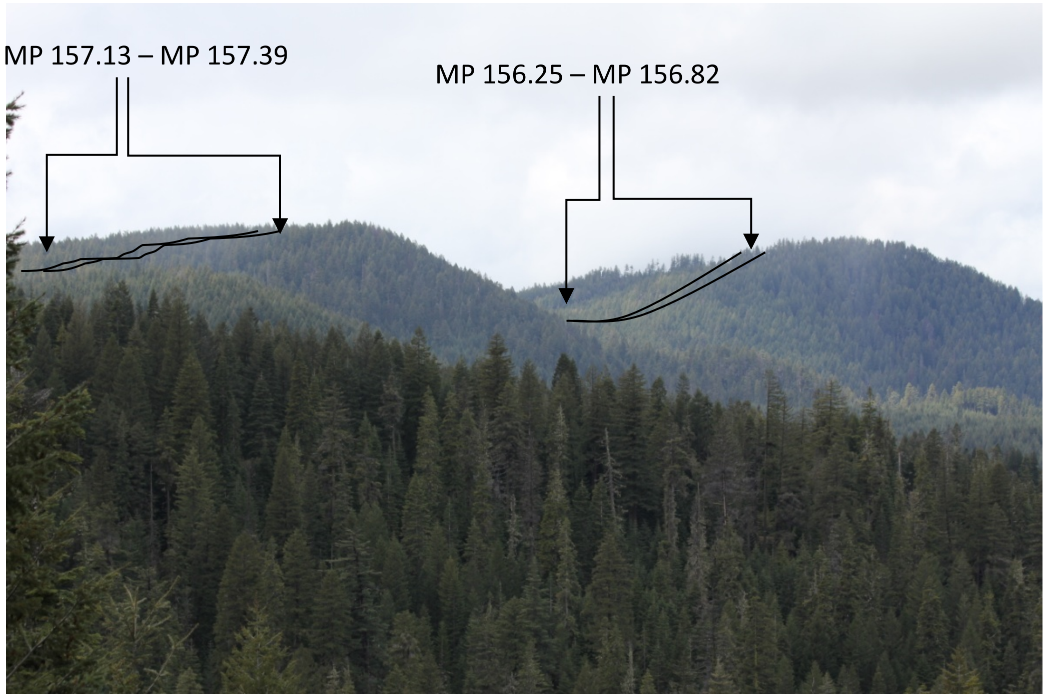

Figure 10: Segments Viewed from Hwy 140

Photo taken from Hwy 140 (42° 23.204, 122°23.056)

All other segments are not expected to be visible from Hwy 140.

Conclusion

Segments ***153.76 to 154.63*** and ***155.80 to 156.20*** of the proposed ROW are not expected to be visible from Hwy 140. Therefore, the project would meet the visual quality objectives assigned for those areas.

There are two segments (***156.25 to 156.82 and 157.13 to 157.39***) of the proposed ROW expected to be visible as shown above. These two segments lie within an area of partial retention. Partial retention is not expected to be achieved within one year of project completion. Restoration efforts are expected to eventually achieve partial retention but not within a one year period. These segments will require a site specific Forest Plan amendment for the duration in which it is necessary for restoration efforts to effectively screen the pipeline corridor.

Jordan Cove Natural Gas Liquefaction and Pacific Connector Gas Pipeline Project

Final EIS

Appendix F8(c)

Scoping Report
Proposed Actions of the Bureau of Land Management and Forest Service for the Proposed Pacific Connector Gas Pipeline

Pacific Connector Gas Pipeline

Coos Bay, Roseburg and Medford Districts and Klamath Falls Resource Area of the Lakeview District, Bureau of Land Management
Umpqua, Rogue River, and Winema National Forests, Forest Service

Prepared for:
Bureau of Land Management
USDA Forest Service

Prepared by:
Stantec Consulting Services Inc.

October 2019

Table of Contents

Tables

ACRONYMS

ACS	Aquatic Conservation Strategy
BLM	Bureau of Land Management
CMP	Compensatory Mitigation Plan
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
JCEP	Jordan Cove Energy Project
LSR	Late Successional Reserves
LRMP	Land and Resource Management Plan
LWD	Large Woody Debris
NEPA	Nations Environmental Policy Act
NF	National Forest
NOI	Notice of Intent
NWFP	Northwest Forest Plan
PCGP	Pacific Connector Gas Pipeline
POD	Plan of Development
RMP	Resource Management Plan
ROW	Right-of-Way
UCSA	Un-cleared Storage Areas

1.0 INTRODUCTION

1.1 NOTICE OF INTENT

On June 9, 2017 the Federal Energy Regulatory Commission (FERC) posted on their website a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) for the Jordan Cove Energy Project (JCEP) and Pacific Connector Gas Pipeline (PCGP). The projects were assigned Docket No. PF17-4-000. The notice also requested comments on environmental issues and provided notice of planned public scoping sessions. Included in the NOI were the proposed actions of the Bureau of Land Management (BLM) and United States Forest Service (Forest Service) as Cooperating Agencies with FERC. The proposed actions for the BLM included potential amendments to Resource Management Plans (RMP) of the Coos Bay, Roseburg, Medford, and Klamath Falls Districts, and the granting of a right-of-way (ROW) for the PCGP on federal lands. The proposed actions of the Forest Service included proposed amendments of Land and Resource Management Plans (LRMP) for the Umpqua, Rogue River, and Winema National Forests (NF). The NOI included additional details on the proposed actions of the BLM and Forest Service at the end of the document.

On June 15, 2017 FERC published the NOI in the Federal Register (Vol. 82, No. 114). However the Federal Register version of the NOI did not include the additional detailed descriptions of the BLM and Forest Service actions that had been included in the version on the FERC website. This was an inadvertent error and FERC posted a corrected NOI on June 26, 2017 (Vol. 82, No. 121) that did include the detailed descriptions of the proposed actions of the BLM and Forest Service.

In addition to the NOIs listed above, the Forest Service also posted on their website the proposed Forest Service actions and planning rule requirements for LRMP amendments. This notice was posted in the 'Projects' section of the website and contained the same information on the proposed amendments that was in the NOIs as well as maps of the proposed amendment locations.

1.2 PUBLIC SCOPING SESSIONS

FERC Staff along with representatives from the BLM and Forest Service held three scoping sessions for the planned JCEP and PCGP Projects. These sessions were held as follows:

Date and Time	Location
Session 1: Tuesday, June 27, 2017 4:00 p.m. to 7:00 p.m.	Sunset Middle School Library and Commons Rooms 245 South Cammann Street, Coos Bay, OR 97420
Session 2: Wednesday, June 28, 2017 4:00 p.m. to 7:00 p.m.	Umpqua Community College Jackson Hall, Rooms 11 & 12 1140 Umpqua College Road, Roseburg, OR 97470
Session 3: Thursday, June 29, 2017 4:00 p.m. to 7:00 p.m.	Oregon Institute of Technology College Union Building Mt. Bailey and Mt. Theilsen Rooms 3201 Campus Drive, Klamath Falls, OR 97601

FERC estimated each session was attended by approximately 100-150 people. Approximately 80-100 comments were received at each session. Written comments as well as the transcripts of recorded comments for each session were posted on the FERC website. In addition to the comments received at the public scoping sessions, FERC received hundreds of letters from commenters using either the electronic filing options on the FERC website or the mail.

1.3 SCOPING COMMENTS ON THE JCEP AND PCGP PROJECTS

Comments were received from a wide variety of interested parties including, the general public, affected land owners, environmental organizations, industry organizations/trade unions, State and Federal Agencies, local counties and cities, as well as State and Federal legislators. Most of the comments were in opposition to the proposed projects and cited impacts to the environment, affects to property owners, the threat of eminent domain, public safety, climate change, and the need to transition from fossil fuels as the primary reasons for their opposition. Support for the projects was received from industry organizations, trade unions, workers, along with some local chambers of commerce, and members of Congress from States that stand to benefit economically from the projects. The economic benefits of the projects, tax receipts, and job opportunities were the main reasons cited in support of the projects. The issues raised in the scoping comments on the proposed JCEP and PCGP projects will be addressed by FERC in the Draft Environmental Impact Statement (DEIS).

1.4 SCOPING COMMENTS ON BLM AND FOREST SERVICE ACTIONS

The BLM and Forest Service also reviewed the results of scoping to identify any concerns specific to their proposed actions including plan amendments and mitigation actions. These issues along with relevant DEIS references are summarized in the following table.

TABLE 1.4-1

Scoping Comments on BLM and Forest Service Actions

Scoping Comment	DEIS References
Scoping Comments on Amending Land Management Plans	
ISSUE: The Forest Service must develop new plan components to replace the obviated forest plan standards and guidelines for legal compliance with the 2012 planning rule.	DEIS sections 1.3.3 and 4.7.3.4 Appendix F2 Plan of Development (POD) I, J, P, U, BB
ISSUE: The 2012 planning rule does not permit the Forest Service to exempt a project from compliance with the provisions of the Northwest Forest Plan.	DEIS sections 1.3.3 and 2.1.3, 4.6.2.3, 4.7.3.4, 47.3.5, 4.7.3.6, Appendix F2, F3, F4, F5
ISSUE: The NOI provided too little information about proposed LMP changes and mitigation to allow for meaningful scoping comments and additional scoping should be allowed for the public once more information is released. The public should also be provided scoping maps for the BLM and Forest Service plan amendments.	DEIS sections 1.3.2, 1.3.3, 2.1.3 2.1.5 and 4.7.3.4 Appendix F2, F3, and F4
ISSUE: The notice of intent is not clear regarding whether forest plan amendments will be required for BLM plans. Because the BLM's RMPs are relatively new (finalized in 2016), FERC should be clear in analyzing what RMP provisions require amendment, and the legal authority for such amendments.	DEIS sections 1.3.2, 2.1.3.1, and 4.7.3.4
ISSUE: The project cannot simply whittle the Plans down piece by piece without having to go through the rigor of public input and review of developing a new Forest Plan, rather than amending the controlling RMP/LRMP for the forests impacted by the pipeline project.	DEIS sections 1.3.3, 2.1.3, and 4.7.3.4 Appendix F1, F2

TABLE 1.4-1

Scoping Comments on BLM and Forest Service Actions

Scoping Comment	DEIS References
ISSUE: Commenters stated; "The NWFP ROD does not provide for plan amendments that exempt pipeline construction from standards and guidelines pertaining to riparian reserves, survey and manage, soil protections or LSRs. Rather, the ROD anticipated pipeline construction and indicated that it should not be permitted unless the impacts could be mitigated and would achieve a neutral or beneficial result for LSR management. Yet the current proposal still calls for amending forest protection standards that conflict with the financial desires of the project applicant."	DEIS sections 1.3.3, 4.6.4.3, 4.7.3.4, 4.7.3.5, and 4.7.3.6 Appendix F2, F3, F4, F5 POD sections I, J, P, U, BB
Scoping comments on BLM and Forest Service Mitigation	
ISSUE: The proposed mitigation measures discussed by the planners are far too general to give the public a meaningful opportunity to comment. The Project planners must rectify their previous attempt to illegally deny the public an opportunity to comment on mitigation measures and include detailed mitigation plans in their NEPA analysis.	DEIS sections 1.3.3, 2.1.3., 2.1.5 and 4.7.3.4 Appendix F2, F3, F4
ISSUE: The NW Forest plan recommends reducing road density, and road decommissioning is a part of many forest management projects. The NEPA analysis must analyze and disclose how many of the roads proposed for decommissioning (as project mitigation) would be decommissioned anyway.	DEIS sections 2.1.5 and 4.7.3.4 Appendix F2, F3, F4
ISSUE: The project will result in immediate, significant and additional loss of forest habitat located in LSRs in return for the "protection" of some matrix forest stands in which logging might never have occurred anyway due to wildlife, social and watershed objectives. These concerns must be addressed in the NEPA analysis.	DEIS section 4.7.3.4 and 4.7.3.6 Appendix F2, F3
ISSUE: Road decommissioning, road resurfacing, instream LWD placement and culvert replacement would all occur regardless of the Pacific Connector project. The NEPA analysis must propose mitigation measures outside of those that are common and ongoing regardless of whether the pipeline is constructed or not, or propose alternatives that do not require mitigation.	DEIS sections 3.4, 2.1.5, 4.7.3.4 Appendix F2
ISSUE: Mitigations should include increasing acres of public lands, increasing protections in specific land allocations, and the purchase of conservation easement from private land.	DEIS section 2.1.5, 4.7.3.4 Appendix F2
ISSUE: An alternative should consider mitigation paid in the form of royalties, or continuing payments to the government, to be spent on restoration projects in the districts where the long-term degradation is occurring.	DEIS section 2.1.5, 4.7.3.4 Appendix F2
ISSUE: The EIS must describe the quality of habitat in the matrix lands being reallocated to LSR. If it is poor quality habitat, or if it has excessive roads or other edges, an alternative should be developed that considers other, higher quality habitat.	DEIS section 2.1.5, 4.7.3.4, 4.7.3.6 Appendix F2, F3
ISSUE: The DEIS should identify all non-harvestable matrix lands the pipeline is impacting to be able to consider adequate mitigation.	DEIS section 4.7.3.3, 4.7.3.4 Appendix F2, F3, F4
Scoping Comments on BLM and Forest Service Alternatives	
ISSUE: The pipeline project must be planned so as "to have the least possible adverse impacts on LSRs." The planners have shirked this duty. Resource Report 10 does not seriously analyze any action alternative that would reduce impacts to LSRs.	DEIS sections 3.4, 4.7.3.6 Appendix F3
ISSUE: Commenters stated; "Roads Route Alternative" to project planners in which pipeline construction would have paralleled existing roads and would have avoiding logging, clearing and construction activities within the Late Successional Reserve 227. FERC and the public cannot contrast this reasonable action alternative with the proposed action because project proponents and project planners refused to develop the alternative for consideration in the DEIS.	DEIS section 3.4
ISSUE: In previous iterations of the project, amendments to the guidelines for special status species were sought. Rather than trying to change the rules, alternatives that do not impact or minimize impacts to special status species should be developed and analyzed.	DEIS section 3.4, 4.6.4, 4.7.3.4 Appendix F2, F5

TABLE 1.4-1 **Scoping Comments on BLM and Forest Service Actions**	
Scoping Comment	**DEIS References**
ISSUE: The previous DEIS proposed to violate/amend soil standards to facilitate pipeline construction. The new NEPA analysis should consider alternatives that do not result in adverse effects to soil resources rather than trying to skirt legal obligations.	DEIS sections 4.2.3, 4.7.3.4 Appendix F2, F4
ISSUE: The NEPA analysis must determine and disclose the acreage of Riparian Areas that will be affected. Many of these lands are federally protected, falling under the ACS, the 2016 RMS, or Key Watersheds. The project designers must conform to these management strategies and legal requirements, rather than seek to have them changed.	DEIS 4.3.4, 4.7.3.3, 4.7.3.4, 4.7.3.5 Appendix F2, F4
ISSUE: The DEIS must consider an alternative to not applying the Survey and Manage regulations for rare species. The no-action alternative must consider if it is worth sacrificing rare species habitat for this project.	DEIS sections 3.1.2, 3.4, 4.6.4.3, 4.7.3.4 Appendix F2, F5
Scoping Comments on other topics related to BLM and Forest Service Actions	
ISSUE: The effects of logging in LSRs are not limited to acres removed. Habitat connectivity is a vital ecosystem value. The NEPA analysis must consider the effects of habitat fragmentation caused by cutting through these unique habitats. These effects must be quantified in both the short term and the long term.	DEIS sections 4.4.2, 4.5.1, 4.6, 4.7.3.5, 4.7.3.6, Appendix F2, F3, F4, F5
ISSUE: Construction and logging require road construction. Please note that page 4-204 of the previous DEIS indicated that additional undisclosed LSR acres will be logged and additional forest fragmentation would have occurred in order to widen existing logging roads in the LSR to facilitate the use of oversized trucks and loads associated with the pipeline project. The impacts, location, and acreage of this proposed additional logging must be analyzed and disclosed in the NEPA analysis.	DEIS sections 4.7.3.6, 4.10.2, 4.10.3 Appendix F3 POD Y
ISSUE: Resource Report 3 indicates the potential for widespread edge effects. (Resource Report 3, June 2017). Project edge effects must be analyzed and disclosed in the NEPA analysis.	DEIS sections 4.5.1, 4.6, 4.7.3.6 Appendix F2, F3
ISSUE: This project may increase risk of fire hazards in LSRs. By converting mature forest stands to into a continuous corridor of early seral plant communities the project increases fire hazard and decreases options for fire management in the LSRs. This is a direct and significant negative (as opposed to neutral or beneficial) impact on the ability of the LSR land use allocation to achieve its management objectives. These impacts must be addressed by the NEPA analysis.	DEIS section 4.7.3.6 Appendix F2, F3
ISSUE: In the past, FERC has claimed that FERC staff, contractors, BLM, and Forest Service will monitor construction, restoration, and mitigation programs. Is this monitoring still proposed for this iteration of the project? If so, the DEIS must describe this monitoring.	DEIS section 2.6
ISSUE: The BLM lands through which the pipeline pass are O&C lands, and managed in accordance with the O&C Act. Importantly, the O&C Act requires the BLM to manage those lands for permanent forest production 43 U.S.C. § 1181a. However, the pipeline right-of-way will be managed to be devoid from forest vegetation, thus permanently removing these acres from the timber base. FERC should explain how permanently removing forestland from the timber base for the Pacific Connector pipeline is consistent with the Act’s requirement that O&C lands be managed for permanent forest production.	DEIS section 2.1.3.1, 4.7.3.3
ISSUE: UCSAs can be as wide as 100’ on either side of the 100’ wide clear-cut needed for the right-of-way construction. This additional 200’ will suffer long lasting impacts, such as large rocks and stumps pushed there, compacted soil from trucks parking there, and loss of the understory trees and shrubs in the forest ecosystem. 100’ on either side of the clear-cut, for an additional 200’ through most of the 230-mile route, is a big area with large impacts. It even further restricts families from using their land. The EIS must fully consider the impacts of uncleared storage areas.	DEIS section 4.7.3.4, 4.7.3.5, 4.7.3.6 Appendix F2, F3, F4, F5 POD I, J, P, U

Jordan Cove Natural Gas Liquefaction and

Pacific Connector Gas Pipeline Project

Final EIS

Appendix F8(d)

Compliance with the Requirements of the Final Supplemental Environmental Impact Statement for Management of Port-Orford Cedar in Southwest Oregon

Pacific Connector Gas Pipeline

Coos Bay, Roseburg and Medford Districts,
Bureau of Land Management

Prepared for:

Bureau of Land Management

Prepared by:

Stantec Consulting Services Inc.

October 2019

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Tables

Attachments

1.0 INTRODUCTION

In 2004 the BLM published their Record of Decision for Management (ROD) of Port-Orford-cedar on the Coos Bay, Medford and Roseburg Districts (USDI BLM 2004). At the time of publication, the ROD for management of Port Orford cedar amended and was incorporated into the RMPs of the Coos Bay and Roseburg BLM Districts. In August 2016 the BLM published a revised Resource Management Plan (RMP) and Record of Decision (ROD) for Northwestern and Coastal Oregon that included BLM lands in the Coos Bay, Eugene, Salem Districts, and Swiftwater Field Office of Roseburg District (hereafter referred to as the NWC ROD). The Southwestern Oregon Record of Decision (hereafter referred to as the SWO ROD) and Approved Resource Management Plan provides management direction for the Klamath Falls Field Office of Lakeview District, Medford District, and South River Field Office of Roseburg District The 2016 NWC and SWO RODs noted that the 2004 ROD for management of Port Orford cedar remained valid within the 2016 revised RMP decision areas. This means that the Pacific Connector project must comply with the requirements of the Record of Decision for Management of Port-Orford-cedar in Southwestern Oregon (Coos Bay and Roseburg Districts; USDI BLM 2004). This appendix documents compliance with the requirements of the 2004 Port Orford Cedar ROD. The full text of the 2004 Port Orford cedar ROD is provided as Attachment 1 of this consistency evaluation.

2.0 KNOWN SITES INFESTED WITH POC ROOT DISEASE

Port-Orford-Cedar stands on or adjacent to the PCGP corridor known to be infested with *Phytophthora lateralis* are shown in Table 1. Application of the Risk Key from the 2004 POC ROD is documented in Table 2. Table 3 documents standards and guidelines (management direction in BLM RMPs) applicable to the Coos Bay, Roseburg and Medford BLM Districts. Table 3 documents project compliance requirements with applicable Standards and Guidelines. Table 1 shows that there are five sites on BLM lands within 0.5 miles of the Pacific Connector right of way that have Port Orford cedar stands that are infested with Port-Orford-cedar root disease (Phytophthora lateralis). Sites of POC infested trees would be updated when the final Pacific Connector clearing limits are finalized and preconstruction surveys are completed. Any uninfested 7th field watersheds crossed by the Pacific Connector project would be verified at that time. At the time of publication of the Draft EIS there are no known uninfested 7th field watersheds on the Pacific Connector right of way.

TABLE 1

Port Orford Cedar Root Disease within 0.5 miles of the Pacific Connector Right of Way

Milepost (if crossed by Pipeline)	Location Within Vicinity of Pipeline	Identified Insect or Disease	Number of trees, if known	Year	Landowner
	0.2 mi S of MP 1.23	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	1	2008	PV
	0.3 mi N of MP 2.3	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	2	2010	PV
	0.1 mi N of MP 2.43	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	1	2009	PV

TABLE 1

Port Orford Cedar Root Disease within 0.5 miles of the Pacific Connector Right of Way

Milepost (if crossed by Pipeline)	Location Within Vicinity of Pipeline	Identified Insect or Disease	Number of trees, if known	Year	Landowner
	Near Kentuck Slough; 0.4 mile NE of MP 6.4R	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	1	2014	PV
	0.7 mi W of MP 14.4BR	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	0.9 acre	2017	PV
	0.7 mi W of MP 15.2BR	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	0.99 acre	2011	PV
	0.1 mi W of MP 15.8BR	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	2.5 acres	2010	PV
	0.9 mi W of MP 21.7BR	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	0.5 acre	2010	PV
	0.2 to 0.5 mi SW of MP 21.8	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	5	2012, 2015	BLM
MP 23.1	Construction ROW	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	1	2013	PV
	0.1 mi SW of MP 23.2	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	1	2015	PV
	0.3 mi SW of MP 23.2	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	1	2014	BLM
	0.1 mi E of MP 30.2	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	2	2014	PV
	0.3 mi E of MP 30.5	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	2	2014	BIA
MP 30.44 – MP 30.50	Construction ROW	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	11	2004, 2011	PV
MP 30.84 – MP 30.89; TEWA 30.86	Construction ROW	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	1	2011	PV
	0.4 mi SW of MP 33.6	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	2	2010	BIA
	0.3 mi SW of MP 34.7	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	2	2008	BIA
	0.3 mi N of MP 34.9	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	10	2008, 2009	PV
	0.3 mi SE of MP 36.4	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	2	2012	BLM
	0.1 mi NW of MP 37.3	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	2	2012	PV
	0.07 mi S of MP 37.42	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	1	2011	BLM

TABLE 1

Port Orford Cedar Root Disease within 0.5 miles of the Pacific Connector Right of Way

Milepost (if crossed by Pipeline)	Location Within Vicinity of Pipeline	Identified Insect or Disease	Number of trees, if known	Year	Landowner
	0.2 mi N of MP 37.6	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	2	2011	BLM
	0.4 mi S of MP 39.4	Port-Orford-Cedar Root Disease (Phytophthora lateralis)	2	2016	PV
MP 39.65	Construction ROW	Root disease	10	2016	PV

Source: Table 1-2 of the Integrated Pest Management Plan, Pacific Connector Gas Pipeline, October 2018

3.0 RISK REDUCTION AND MANAGEMENT DIRECTION

Table 2 provides a key for implementation of risk reduction practices.

TABLE 2

Port-Orford-Cedar Risk Key: Site-specific analysis to help determine where risk reduction management practices would be applied.

Risk Factor	Assessment	Action Required
1a. Are there uninfected POC within, near, or downstream of the activity area whose ecological, Tribal, or product use or function measurably contributes to meeting resource management plan objectives?	No uninfested POC stands are known to exist on the Coos Bay or Roseburg BLM Districts.	Identify uninfested stands during preconstruction cruise. Action items for uninfested areas are identified in Table 3.
1b. Are there uninfected POC within, near, or downstream of the activity area that, were they to become infected, would likely spread infections to trees whose ecological, Tribal, or product use or function measurably contributes to meeting resource management plan objectives?	No uninfested POC stands are known to exist on the Coos Bay or Roseburg BLM Districts.	Identify uninfested stands during preconstruction cruise. Action items for uninfested areas are identified in Table 3.
1c. Is the activity area within an uninfested 7th field watershed as defined in Attachment 1?	No. There are no uninfested subwatersheds on the Coos Bay or Roseburg District. Any subwatershed crossed is presumed to be infested on these units. On the Medford District, none of uninfested watersheds are crossed by the project.	If no, then risk is low and no POC management practices are required in the uninfested watersheds.

1 In questions 1a and 1b, "near" generally means within 25 to 50 feet downslope or 25 feet upslope from management activity areas, access roads, or haul routes; farther for drainage features; 100 to 200 feet in streams.
2 Uninfested 7th field watersheds are defined and listed in Attachment 1 and are those with at least 100 acres of POC stands, are at least 50% federal ownership, and are free of PL except within the lowermost 2 acres of the drainage.
3 Appreciable additional risk does not mean "any risk." It means that a reasonable person would recognize risk, additional to existing uncontrollable risk, to believe mitigation is warranted and would make a cost-effective or important difference (see Risk Key Definitions and Examples for further discussion.

If yes, apply management practices from the list below to reduce the risk to the point it is no longer appreciable, or meet the disease control objectives by other means, such as redesigning the project so that uninfected POC are no longer near or downstream of the activity area. If the risk cannot be reduced to the point it is no longer appreciable through practicable and cost-effective treatments or design changes, the project may proceed if the analysis supports a finding that the value or need for the proposed activity outweighs the additional risk to POC created by the project.

Table 3 describes how to comply with management direction for POC.

TABLE 3

Compliance with Management Direction

Management Direction	Project Level Compliance	Documentation
1) **Project Scheduling:** Schedule projects during the dry season or incorporate unit scheduling (Management Practice 3) and vehicle and equipment washing (Management Practice 11) as part of project design.	Applicable: Project is planned to operate during the dry season. Wet weather operations provisions are in the ECRP.	Integrated Pest Management; ECRP wet weather direction specific POC.
2) **Utilize Uninfested Water:** Use uninfested water sources for planned activities such as equipment washing, road watering, and other water-distribution needs, or treat water with Clorox bleach to prevent/reduce the spread of PL (see Reference 3 for Clorox bleach label and instructions for use). To reduce the likelihood of getting Clorox in streams, add Clorox to fire trucks and road watering equipment only after they have left the stream area where they were just filled.	Applicable: Uninfested water from municipal sources would be the source of water in areas where POC disease is known to occur. Other water sources would be treated with Clorox.	ECRP; See also Hydrostatic Test POD
3) **Unit Scheduling:** Conduct work in all timber sale and other activity units or areas where PL is not present before working in units or areas infested with PL.	Applicable: Objective is met by requiring vehicle washing and separating project by construction spreads.	ECRP, IPM, TMP
4) **Access:** Designate access and egress routes to minimize exposure to PL.	Applicable:	ECRP, TMP: Vehicle cleaning required where designated by agency reps on roads that transition from infested to non-infested areas.
5) **Public Information:** Increase public awareness of the root disease and the need to control it by using informational signs on or at trailheads, gates, and other closures, and holding coordination meetings with adjacent industrial and small woodland landowners.	Not required. This is a Plan-level responsibility of the BLM and Forest Service	
6) **Fuels Management:** Clean boots, vehicles, and incorporate other management practices to avoid moving infested soil out of treatment areas. Incorporate unit scheduling and vehicle and equipment washing as described in Management Practice 1 as part of project design. Select water sources as described in Management Practice 2. Specify travel routes as shown in Management Practice 4.	Applicable:	ECRP: Cleaning required in areas designated by agency reps during slash disposal operations.
7) **Incorporate POC Objectives into Prescribed Fire Plans:** Incorporate POC objectives (such as sanitation) into prescribed fire treatment plans. These include using uninfested or treated water sources and, potentially, aiding with eradication treatments.	Not Required. There is no prescribed burning outside of burn piles on the Right of Way.	
8) **Routing Recreation Use:** Route new trails (off-highway vehicle, motorcycle, mountain bike, horse, and foot) away from areas with POC or PL or provide other mitigation such as seasonal closures. Trailheads will be relocated and/or established trails will be rerouted in the same manner where trails present significant risk to POC or provide other mitigation such as site hardening.	Not required. This is a Plan level requirement for the BLM.	
9) **Road Management Measures:** Implement proactive disease-prevention measures including not building	Applicable: Road use must consider POC transmission.	ECRP and TMP

TABLE 3 **Compliance with Management Direction**		
Management Direction	**Project Level Compliance**	**Documentation**
roads, not using existing roads, seasonal or permanent road closures, road maintenance, and/or sanitation removal of roadside POC to help reduce the likelihood of spreading the disease—especially to high-risk areas and/or identify prevention measures at a site-specific or drainage-specific level. Road design features include pavement over other surfacing, surfacing over no surfacing, removal of low water crossings, drain- age structures to divert water to areas unfavorable to the pathogen, and waste disposal.		
10) **Resistant POC Planting:** Plant resistant POC 25 feet apart or in approximately 10 tree clusters at 100 to 150-foot spacing to lessen the potential for root grafting (a source of PL spread). Silvicultural prescriptions for sites having potential for growing POC will provide for the establishment of the species through natural or artificial regeneration and maintenance as a viable stand component through the current and future rotations. Highest priority for reforestation is replacing POC where its ecological function is most critical, such as along streams on ultramafic soils and replacing stands lost to wildfire.	Applicable: Disease resistant POC would be planted in suitable areas where POC is currently found on or adjacent to the corridor	ECRP
11) **Washing Project Equipment:** Wash project equipment prior to beginning work in uninfested project areas, when leaving infested areas to work in uninfested areas, and when leaving the project area to minimize the transportation of infested soil to uninfested areas. Equipment includes maintenance and harvest equipment coming in contact with soils, and project vehicles, including trucks and crew vehicles, leaving surfaced roads or traveling on other roads deemed at risk for spreading disease (generally project area secondary roads around diseased POC). Project areas should be compartmentalized by road system in areas with mixed ownership (Federal and private). A road system with infested areas and noninfested areas will be considered infested. Washing areas should be placed at optimum locations for minimizing spread, such as at entry/exit points of the road system with Federal control. Washing should take place as close as possible to infested sites. Wash water will be from uninfested water sources or treated with Clorox bleach. Wash water should not drain into watercourses or into areas with uninfected POC. Ideally, equipment should not travel for any substantial distance prior to being washed unless being transported on surfaced roads. Equipment moving into uninfested areas may be washed miles away as long as they do not travel through infested areas to reach their destination. Effectiveness testing indicates large reductions in inoculum by washing. Additional information about washing, and suggested parameters for field washing stations from the BLM "Port-Orford-Cedar Management Guidelines," but with an updated equipment cleaning checklist, is in Attachment 2. A Clorox bleach label and updated mixing instructions are in Reference 3.	Applicable: Cleaning sites will be incorporated into the ECRP based on pre-project surveys as designated by agency representatives.	ECRP, TMP.
12) **Logging Systems:** Use non-ground-based logging systems (cable or helicopter).	Applicable: Helicopter and cable systems will be used on steeper ground. Objective is met because PCGP activities will be confined to the project corridor and equipment washing is required as directed by BLM.	ECRP: Require helicopter or cable logging if preconstruction surveys show POC within corridor and uninfested stands nearby where aerial removal would provide protection.

TABLE 3 **Compliance with Management Direction**		
Management Direction	**Project Level Compliance**	**Documentation**
13) **Spacing Objectives for POC Thinning:** POC spacing objectives during thinning projects (commercial or precommercial) should be to create discontinuous POC populations across the management unit.	Not Applicable: PCGP is not a thinning project. This is a responsibility of the BLM.	
14) **Non-POC Special Forest Products:** No special forest products permits, including firewood permits, will be issued in the wet season where POC is present, unless administration previously mentioned for Bough Cutting under General Direction can be implemented. Educate the public on the risks associated with collecting in areas with POC.	Not Applicable: The PCGP does not issue permits. This is a requirement of the BLM.	
15) **Summer Rain Events:** Apply permit or contract clause or otherwise require cessation of operations when indicators such as puddles in the roadway, water running in roadside ditches, or increases in soil moisture (as measured by moisture meter or equivalent) indicate an unacceptable increase in the likelihood of spreading PL.	Applicable	ECRP
16) Roadside Sanitation: Remove or kill POC along both sides of the road. Recommended minimum width is 25 feet above the road or to the top of the cutbank, and 25 to 50 feet below the road. Roads that are open year-round generally pose the highest risk and will benefit most from sanitation treatment. Maintenance will be essential to retain benefits. POC should be re-treated as soon as possible after they reach a height of 6 inches above ground level. Sanitation treatments could be incorporated as part of routine road maintenance.	Applicable	TMP
17) Site-Specific POC Management: Where possible, emphasize management of POC on sites where conditions make it likely that they will escape infection by PL, even if the pathogen has already been established nearby or may be introduced in the future. POC above roads, uphill from creeks, on ridgetops, and on well-drained sites are less likely to become infected. Emphasis may include priority retention during thinning or other silvicultural treatments, and planting to increase the presence of POC in areas unfavorable to the pathogen.	Applicable	During pre-construction surveys BLM would determine any areas where this would apply and add to Environmental Alignment Sheets.

4.0 ATTACHMENT A: POC RECORD OF DECISION

4.1 RESOURCE MANAGEMENT PLAN AMENDMENT — EXISTING STANDARDS AND GUIDELINES ARE REPLACED

The Standard and Guidelines (management direction) relating to Port-Orford-cedar (POC) root disease control in the existing Resource Management Plans for the Coos Bay, Medford, and Roseburg Districts, and the “Port-Orford-cedar Management Guidelines” they reference, are removed and replaced entirely with the Standards and Guidelines below. The Standards and Guidelines replaced are described as Alternative 1, the No Action Alternative, in the January 2004 “Final Supplemental Environmental Impact Statement (FSEIS) for Management of Port-Orford-Cedar in Southwest Oregon” (USDA-FS and USDI-BLM 2004 [hereafter referred to as FSEIS], pp. 2-11–2-13).

A. Introduction

These Standards and Guidelines build upon previous research, monitoring, education, cooperation, resistance breeding, and experience with disease-controlling management practices used to reduce the spread of Phytophthora lateralis (PL) and maintain POC. They describe all currently known disease-control practices, dividing them between those that would be applied generally (such as community outreach and restoration) and those that may, depending upon site conditions, be applied to specific management activities (such as fuel management projects, special use permits, road maintenance, mining plans of operations, and timber sales). For the latter group, a risk key is included to clarify the environmental conditions that require implementation of one or more of the listed disease-controlling management practices. The risk key also highlights 162 currently uninfested 7th field watersheds (described and listed in Attachment 1), requiring management practices to reduce appreciable additional risk posed by proposed activities.

The objectives of these Standards and Guidelines are to:

- Maintain POC on sites where the risk for infection is low;
- reduce the spread and severity of root disease in high-risk areas to retain its ecological function to the extent practicable;
- reestablish POC in plant communities where its numbers or ecosystem function have been significantly reduced; and
- reduce the likelihood of root disease becoming established in disease-free 7th field watersheds.

B. General Direction

Integrated Management Approach. An integrated approach will be implemented to deal with PL which includes prevention, restoration, detection, evaluation, suppression, and monitoring. Management goals are directed toward maintaining POC and reducing root disease losses. Elements of the management strategy include management of POC bough cutting, community outreach, genetics, interagency coordination, planning, wildland fire operations, snag retention, project-specific direction, risk key, management practices, and monitoring.

In portions of the natural range, POC is widespread across the landscape. In these areas, POC conservation will emphasize management on sites naturally at low risk for infection. In many forest types, management of POC can focus on sites where conditions make it likely to escape infection by PL, even if the pathogen has already been established nearby. POC on such sites often has escaped infection because the sites have characteristics that are unfavorable for the spread of the pathogen. These sites are above and away from roads, uphill from creeks, on ridgetops, and on well-drained soils.

In the majority of the natural range, POC is localized on moist microsites (such as along streams) or sites favorable for establishment of the species. In these areas, opportunities for managing for POC on sites unfavorable to the pathogen are more limited. Treatments to prevent new infestations will be emphasized in this portion of the range, and there is a potential for eradication treatments in certain circumstances.

Restoration of Port-Orford-Cedar. Restore POC to sites within its natural range where the species measurably contributes to meeting Resource Management Plan objectives for both aquatic and terrestrial ecosystems, Tribal, or product uses or function. This will be accomplished using resistant and nonresistant (generally on low-risk sites or away from potential infection sources) stock for reforestation and other elements of the integrated management approach.

Adaptive Management. Adaptive management is a continuing process of action-based planning, monitoring, researching, evaluating, and adjusting with the objectives of improving the implementation and achieving the goals of the selected alternative. Under the concept of adaptive management, new information will be evaluated, and a decision made whether to make adjustments. The Agency will continue to develop and evaluate techniques to protect POC and prevent disease intensification and spread within and around areas where PL infestations already occur.

Bough Cutting. To reduce or eliminate the spread of PL by POC bough cutters, limit POC bough cutting to roadside sanitation, commercial thinning, and precommercial thinning units (or stewardship contracts with specific provisions to protect and enhance POC).

POC bough collection will be by permit only, and require:

- Dry season operations;
- designation of access and egress routes;
- designation of parking areas;
- unit scheduling (collect all uninfested areas prior to infested areas);
- washing of boots and equipment;
- daily inspections;
- stopping operations during and after rains; and
- easily identifiable areas where boughs are to be collected.

Community Outreach. Continue to improve public awareness of the root disease and the need to control it by using methods such as periodic press releases; distributing posters and pamphlets; coordinating with Tribal groups; creating and maintaining POC websites; conducting public symposiums; preparing and installing informational signs on or at trailheads, gates, and other closures; and/or other measures. Consider focusing these efforts on user groups most likely to engage in activities at more risk for spreading PL. Coordinate with state, local, industrial, and small woodland owners to help meet overall POC management objectives.

Eradication. In watersheds or other geographic areas where PL infestations are localized or infrequent in comparison to the amount of POC, POC eradication may be tried as a management technique to prevent/reduce spread of the disease and reduce the need for other management practices in the long term. If experience demonstrates techniques and conditions where this treatment can be effective, its use can be increased. Additional tools for eradicating PL in the soil will be sought, developed, and implemented as evidence warrants.

Genetics. Develop resistant stock and make it available for all POC reforestation and restoration projects.

The existing interagency resistance breeding program will be continued as needed, contingent on available funding. The objectives are to (1) select and evaluate families for resistance and develop durable resistance to PL while maintaining broad genetic diversity within the species, and (2) produce seed genetically resistant to PL for deployment throughout the range of where PL is present. The POC resistance breeding program will continue as follows:

- Develop operational resistant seed for breeding zones (breeding blocks plus elevation zones) based upon management needs within the range of POC;
- continue efforts to inform the public about the availability and use of resistant seed;
- find ways to provide resistant seed to non-Federal landowners; and
- monitor the operational performance of resistant plantings.

In addition, collect and maintain about 0.5 pound of resistant seeds for each POC breeding zone in organized conservation seedbanks. This seed will be reserved exclusively for reforesting areas after the occurrence of stand-replacement events such as large-scale wildfires. Where possible, resistant POC seedlings will be planted in such locales, with the goal to reintroduce POC to all pre-event locations.

Finally, as described in the Record of Decision, the Agency will prepare a benefit analysis by seed zone and elevation of an accelerated resistance breeding program, and then, if still warranted by a substantial long-term cost savings and environmental benefits, to pursue potential sources for the necessary increased funding.

Interagency Coordination. The agencies will continue to coordinate management practices including research, genetic resistance breeding, and public education.

Planning. Consideration of how to achieve the POC management objectives will be ad- dressed, as applicable, in new NEPA documents, watershed analyses, Late-Successional Reserve assessments, wild and scenic river management plans, transportation planning (roads analysis process or transportation management objectives), fire management plans, recreation planning, and other activities or strategies in all watersheds with POC.

Wildland Fire Operations. Management strategies to prevent/reduce spread of PL will be a part of wildland fire preparedness planning. When practicable, these measures will be incorporated into firefighting activities. Such practices may include treating firefighting water with Clorox bleach or other registered material to kill waterborne PL spores, washing vehicles, and washing tools and clothing. However, POC issues may become a secondary priority during wildland fire operations. While management objectives for POC are a concern, safety of firefighters and the public, and protection of property is always a higher priority. Existing or “in-place” disease-controlling management practices such as road closures may be compromised.

Road closures and other compromised POC disease-controlling measures will be reinstalled following suppression and emergency rehabilitation unless changed circumstances indicate otherwise. Fire rehabilitation efforts would include POC and PL considerations.

Snag Retention. Emphasize the retention of POC snags in Riparian Reserves because they are resistant to decay and the resultant down logs can provide durable structural components for both aquatic and terrestrial ecosystems. Retention numbers should consider that few additional large

POC snags are likely to become available in the near future in infested areas because of the current mortality and presence of PL. This direction is particularly applicable to plant associations on ultramafic soils and other locations where POC can be some of the largest and most abundant trees.

Disease Export. Where the agencies have reason to believe heavy equipment working in infested stands will next travel through or to substantially uninfested private or public POC areas, such as in uninfested watersheds or different administrative units, heavy equipment, including road maintenance equipment that has left surfaced (rocked or paved) roads in infested POC areas, will be washed upon leaving infested project areas to minimize transport of infested soil to uninfested areas. Washing areas will be located as described under Management Practice 11 (Washing Project Equipment) in the following Management Practices section.

C. Project-Specific Direction and Port-Orford-Cedar Risk Key

One or more of the management practices listed under the following Management Practices subheading will be applied to site-specific management activities when a need is indicated by the POC Risk Key. This approach precludes the need for additional project-specific analysis of mid- and large-geographic and temporal-scale effects because the risk key describes conditions where risk reduction management practices are assumed (expected) to be applied. When a project-specific application of the risk key shows the risk is low, no additional management practices are needed. Project-specific NEPA analysis will appropriately document the application of the risk key and the consideration of the available management practices. Application of the risk key and application of resultant management practices (if any) will make the project consistent with the mid- and large-geographic and temporal-scale effects described by the SEIS analysis and will permit the project analysis to tier to the discussion of those effects.

For the application of this risk key, the definition of project would not be limited to any one type of management activity. For example, projects such as road maintenance projects, livestock grazing permits, recreation management projects and permits, fuel wood permits, non- POC special forest products permits, and other uses subject to permitting or other specific Agency authorization action, likely to introduce significant risk to essential POC require implementation of applicable management practices at the time of planning or reissuance of permits when indicated by application of the key.

Port-Orford-Cedar Risk Key:

Site-specific analysis to help determine where risk reduction management practices would be applied:

- 1a. Are there uninfected POC within, near1, or downstream of the activity area whose ecological, Tribal, or product use or function measurably contributes to meeting resource management plan objectives?

- 1b. Are there uninfected POC within, near1, or downstream of the activity area that, were they to become infected, would likely spread infections to trees whose ecological, Tribal, or product use or function measurably contributes to meeting resource management plan objectives?

- 1c. Is the activity area within an uninfested 7th field watershed2 as defined in Attachment 1?

If the answer to all three questions, 1a,1b, and 1c, is **no**, then risk is low and no POC management practices are required.

If the answer to any of the three questions is **yes**, continue.

- 2. Will the proposed project introduce appreciable additional risk3 of infection to these uninfected POC?

If **no**, then risk is low and no POC Management practices are required.

If **yes**, apply management practices from the list below to reduce the risk to the point it is no longer appreciable, or meet the disease control objectives by other means, such as redesigning the project so that uninfected POC are no longer near or downstream of the activity area. If the risk cannot be reduced to the point it is no longer appreciable through practicable and cost-effective treatments or design changes, the project may proceed if the analysis supports a finding that the value or need for the proposed activity outweighs the additional risk to POC created by the project.

In questions 1a and 1b, "near" generally means within 25 to 50 feet downslope or 25 feet upslope from management activity areas, access roads, or haul routes; farther for drainage features; 100 to 200 feet in streams.

Uninfested 7th field watersheds are defined and listed in Attachment 1 and are those with at least 100 acres of POC stands, are at least 50% federal ownership, and are free of PL except within the lowermost 2 acres of the drainage.

Appreciable additional risk does not mean "any risk." It means that a reasonable person would recognize risk, additional to existing uncontrollable risk, to believe mitigation is warranted and would make a cost-effective or important difference (see Risk Key Definitions and Examples for further discussion.

The objective of the risk key is to identify project areas/situations where new infections should be avoided and guide the application of one or more of the management practices until the risk is acceptably mitigated. The risk key describes circumstances under which the various risk reducing management practices will be applied where needed.

Port-Orford-Cedar Risk Key Definitions and Examples

Additional risk. The intent is to mitigate or avoid the potential risk for infection that is appreciably above background or existing risk levels, commensurate with the value of the potentially affected resource and the cost of the mitigation or avoidance. Where background or existing potential risk of infection levels are low, an apparently minor activity such as a permitted one-time event or trail maintenance, might create appreciable additional risk. In checkerboard ownerships near private timberlands, near roads that have reciprocal rights-of- way agreements not addressing POC, or near major public use areas, such activities would likely not create appreciable “additional” risk since the risk already exists. In other words, mitigation (application of management practices or other options identified in the risk key) is only required by the key when, in the context of the risk coming from already existing activities essentially beyond the practical control of the Agencies, it can make a cost-effective and important difference.

Measurably contributes to meeting resource management plan objectives. The uninfected POC in question is so located, or covers such a geographic area such, that it measurably contributes to meeting Resource Management Plan objectives and/or all applicable laws and regulations. The effects discussions in the FSEIS provide much of the basis for this determination; if no adverse effect is identified for POC mortality, then the likelihood of various mortality having an adverse effect on Resource Management Plan objectives is low.

Resource Management Plan objectives. Includes, but is not limited to, maintaining forested landscapes, species diversity, soil stability, stream temperatures (including State 303(d) requirements), buffering seasonal stream flow fluctuations, supplying large wood from streams and wildlife, visual quality, habitat for rare or unique plants, habitat for threatened, endangered, sensitive/special status, or other Agency-emphasis species, product collection and harvest, designated wilderness values, research opportunities, and genetic diversity.

Measurably contributes to. Means the POC at risk from the proposed activity makes a meaningful and unique contribution to the plan objective in question. Where POC is a small percentage of the stand or does not provide unique stand attributes (not providing the largest trees in the stand, for instance), its loss is probably not meaningful when measured against management objectives. Similarly, where stream shading, bank stability, and other riparian functions are readily performed by other species onsite, POC mortality is probably not meaningful. Where POC mortality could affect rare or unique plants, but mortality has been demonstrated to benefit such plants, POC mortality is probably not meaningful.

On the other hand, where POC is a significant portion of the riparian vegetation and its loss would likely lead to creating or exacerbating stream temperature, bank stability, turbidity, or other problems, POC is making a meaningful contribution to Resource Management Plan objectives. Significant geographic areas in designated wilderness are making a meaningful contribution. POC as a large percentage of the stand in recreation or visually sensitive areas are probably making a meaningful contribution. Where POC is part of the reason for the designation of a research natural area or area of critical environmental concern, it is making a meaningful contribution. POC protecting rare plants, or serving as nest structures for listed species, are probably making a meaningful contribution if substitutes are not readily available. It is more likely that POC is making a meaningful contribution to Resource Management Plan objectives if the site is within the 90,900 acres in Oregon where POC is prominent in the overstory (see Reference 1).

Management Practices

Management practices are designed to:

- Prevent/reduce the import of disease into uninfested areas (offsite spores picked-up and carried into an uninfested project area);
- prevent/reduce the export of disease to uninfested areas (onsite spores moved to offsite, uninfested area); and

- minimize increases in the level of inoculum or minimize the rate of spread in areas where the disease is localized, or infection is intermittent.

One or more of the management practices from the list below will be selected and implemented when there is a management need indicated by the POC Risk Key. No priority is assumed by the order listed below; the one or combination of specific practices best fitting the nature of the risk and the site-specific conditions will be applied when indicated by the risk key. Practices can be modified or partially implemented if such changes still meet risk reduction objectives and/or better fit site conditions. As noted in the Pathology section of the FSEIS (see Reference 2), combinations of practices can be more effective than single practices, depending on site-specific circumstances.

1. **Project Scheduling:** Schedule projects during the dry season or incorporate unit scheduling (Management Practice 3) and vehicle and equipment washing (Management Practice 11) as part of project design.

2. **Utilize Uninfested Water:** Use uninfested water sources for planned activities such as equipment washing, road watering, and other water-distribution needs, or treat water with Clorox bleach to prevent/reduce the spread of PL (see Reference 3 for Clorox bleach label and instructions for use). To reduce the likelihood of getting Clorox in streams, add Clorox to fire trucks and road watering equipment only after they have left the stream area where they were just filled.

3. **Unit Scheduling:** Conduct work in all timber sale and other activity units or areas where PL is not present before working in units or areas infested with PL.

4. **Access:** Designate access and egress routes to minimize exposure to PL.

5. **Public Information:** Increase public awareness of the root disease and the need to control it by using informational signs on or at trailheads, gates, and other closures, and holding coordination meetings with adjacent industrial and small woodland landowners.

6. **Fuels Management:** Clean boots, vehicles, and incorporate other management practices to avoid moving infested soil out of treatment areas. Incorporate unit scheduling and vehicle and equipment washing as described in Management Practice 1 as part of project design. Select water sources as described in Management Practice 2. Specify travel routes as shown in Management Practice 4.

7. **Incorporate POC Objectives into Prescribed Fire Plans:** Incorporate POC objectives (such as sanitation) into prescribed fire treatment plans. These include using uninfested or treated water sources and, potentially, aiding with eradication treatments.

8. **Routing Recreation Use:** Route new trails (off-highway vehicle, motorcycle, mountain bike, horse, and foot) away from areas with POC or PL or provide other mitigation such as seasonal closures. Trailheads will be relocated and/or established trails will be rerouted in the same manner where trails present significant risk to POC or provide other mitigation such as site hardening.

9. **Road Management Measures:** Implement proactive disease-prevention measures including not building roads, not using existing roads, seasonal or permanent road closures,

road maintenance, and/or sanitation removal of roadside POC to help reduce the likelihood of spreading the disease—especially to high-risk areas and/or identify prevention measures at a site-specific or drainage-specific level. Road design features include pavement over other surfacing, surfacing over no surfacing, removal of low water crossings, drain- age structures to divert water to areas unfavorable to the pathogen, and waste disposal.

10. **Resistant POC Planting:** Plant resistant POC 25 feet apart or in approximately 10 tree clusters at 100 to 150-foot spacing to lessen the potential for root grafting (a source of PL spread). Silvicultural prescriptions for sites having potential for growing POC will provide for the establishment of the species through natural or artificial regeneration and maintenance as a viable stand component through the current and future rotations. Highest priority for reforestation is replacing POC where its ecological function is most critical, such as along streams on ultramafic soils and replacing stands lost to wildfire.

11. **Washing Project Equipment:** Wash project equipment prior to beginning work in uninfested project areas, when leaving infested areas to work in uninfested areas, and when leaving the project area to minimize the transportation of infested soil to uninfested areas. Equipment includes maintenance and harvest equipment coming in contact with soils, and project vehicles, including trucks and crew vehicles, leaving surfaced roads or traveling on other roads deemed at risk for spreading disease (generally project area secondary roads around diseased POC). Project areas should be compartmentalized by road system in areas with mixed ownership (Federal and private). A road system with infested areas and noninfested areas will be considered infested. Washing areas should be placed at optimum locations for minimizing spread, such as at entry/exit points of the road system with Federal control. Washing should take place as close as possible to infested sites. Wash water will be from uninfested water sources or treated with Clorox bleach. Wash water should not drain into watercourses or into areas with uninfected POC. Ideally, equipment should not travel for any substantial distance prior to being washed unless being transported on surfaced roads. Equipment moving into uninfested areas may be washed miles away as long as they do not travel through infested areas to reach their destination. Effectiveness testing indicates large reductions in inoculum by washing. Additional information about washing, and suggested parameters for field washing stations from the BLM "Port-Orford-Cedar Management Guidelines," but with an updated equipment cleaning checklist, is in Attachment 2. A Clorox bleach label and updated mixing instructions are in Reference 3.

12. **Logging Systems:** Use non-ground-based logging systems (cable or helicopter).

13. **Spacing Objectives for POC Thinning:** POC spacing objectives during thinning projects (commercial or precommercial) should be to create discontinuous POC populations across the management unit.

14. **Non-POC Special Forest Products:** No special forest products permits, including firewood permits, will be issued in the wet season where POC is present, unless administration previously mentioned for Bough Cutting under General Direction can be implemented. Educate the public on the risks associated with collecting in areas with POC.

15. **Summer Rain Events:** Apply permit or contract clause or otherwise require cessation of operations when indicators such as puddles in the roadway, water running in roadside

ditches, or increases in soil moisture (as measured by moisture meter or equivalent) indicate an unacceptable increase in the likelihood of spreading PL.

16. **Roadside Sanitation:** Remove or kill POC along both sides of the road. Recommended minimum width is 25 feet above the road or to the top of the cutbank, and 25 to 50 feet below the road. Roads that are open year-round generally pose the highest risk and will benefit most from sanitation treatment. Maintenance will be essential to retain benefits. POC should be re-treated as soon as possible after they reach a height of 6 inches above ground level. Sanitation treatments could be incorporated as part of routine road maintenance.

17. **Site-Specific POC Management:** Where possible, emphasize management of POC on sites where conditions make it likely that they will escape infection by PL, even if the pathogen has already been established nearby or may be introduced in the future. POC above roads, uphill from creeks, on ridgetops, and on well-drained sites are less likely to become infected. Emphasis may include priority retention during thinning or other silvicultural treatments, and planting to increase the presence of POC in areas unfavorable to the pathogen.

D. Monitoring

Introduction

To maintain POC as an ecologically and economically significant species on BLM-administered lands, management strategies (both actions and inactions) will be evaluated.

Implementation Monitoring

Questions

1) Have resistance breeding and genetic conservation requirements been met?

2) Are General Direction requirements for maintaining and reducing the risk of PL infections being implemented?

3) Are project-specific management actions applied as required?

Requirements

1) The Agency will address current accomplishments including levels of established conservation seedbanks in annual updates for the resistance breeding program.

2) District annual program summaries will include the general activities accomplished for maintaining and reducing the risk of PL infections.

3) Administrative units will incorporate POC management actions into their existing project-specific implementation monitoring programs.

Effectiveness and Validation Monitoring

Questions

1) Is the genetic resistance program producing POC seedlings that survive long term under field conditions?

2) Are disease-controlling mitigation measures, such as road use restrictions and closures, sanitation, and washing, effective as predicted, and is the risk associated with projects such as fire suppression at presumed or predicted levels?

3) Has the spread or non-spread of the disease significantly departed from the predictions made in the FSEIS that were used to select this management strategy (see Reference 4)?

4) Is the disease being kept out of the uninfested watersheds and if not, have appropriate eradication treatments been tried and are they successful?

Requirements

1) The Agencies will annually report survival results of validation studies that determine effectiveness of the genetic resistance program.

2) The USDA-FS Southwest Oregon Forest Insect and Disease Service Center will continue working with BLM field units to evaluate and coordinate existing management techniques to reduce the occurrence of PL and retain healthy POC. Emphasis will be directed towards ongoing projects and monitoring their results. Actual monitoring will be split between the Service Center and the administrative units where management occurs. Additional (new) monitoring efforts will be a function of available budget and workforce. (An example is whether prescribed fire heats the soil enough to be effective as an eradication treatment.) In some cases, university research will be the appropriate vehicle to accomplish evaluations of management techniques.

3) As new inventory data (continuous vegetation survey and forest inventory and analysis) and local mapping becomes available, it will be evaluated for current levels (acres and/or number of trees) of infected and uninfected POC and corresponding trends. Inventory plots are typically reinventoried on a 3- to 10-year cycle, depending upon location.

4) Road, aerial, or photo surveys of the uninfested watersheds will be done to identify new infestations at least once every 5 years.

Consultation-Related Monitoring

The Conservation Recommendations from NOAA-Fisheries listed below and applicable to POC eradication, sanitation, and similar PL control projects, will be met as follows: Items 1, 3, and 4 will be reported by administrative units as part of regular POC work accomplishment reporting, and compiled and reported to NOAA-Fisheries and U.S. Fish and Wildlife Service each year as it becomes available. Normal activity reporting years (fiscal) will be used.

NOAA-Fisheries Conservation Recommendations (NOAA-Fisheries 2004):

1) The FS and BLM should monitor the implementation of future site level projects and their authorized incidental take statements to determine if modification to these Standards and Guidelines are warranted for the protection and conservation of listed species.

2) The FS and BLM should monitor the number of acres of POC eradication projects implemented each year to determine if the assumptions in the EIS and this Opinion have been exceeded. Furthermore, report the amounts annually to NOAA-Fisheries by January 31 of the following year. The report should include a description [of] the acreage occurring within one site potential tree height of a stream.

3) The FS and BLM should monitor the number of miles of POC sanitation projects implemented each year to determine if the assumptions in the EIS and this Opinion have been exceeded. Furthermore, report the amounts annually to NOAA-Fisheries by January 31 of the following year. The report should include a description [of] the miles of roadside treated within one site potential tree height of a stream."

ATTACHMENT 1

DESCRIPTION OF UNINFESTED 7TH FIELD WATERSHEDS AND TABLE OF WATERSHEDS, AND MAP

Description of Uninfested 7th Field Watersheds

"Uninfested 7th field watersheds" are watersheds with greater than 50 percent Federal ownership and with greater than 100 Federal acres in stands that include POC (not including plantations where POC did not previously occur), where at least the Federal lands are uninfested or essentially uninfested (see the following table) with PL. These stands occur in Matrix as well as various Reserve land allocations. Uninfested POC stands within these watersheds (about 49,000 acres) are referred to as POC cores. POC cores are not necessarily contiguous acres. Analysis done for the FSEIS using existing GIS stand mapping indicates there are 162 currently uninfested 7th field watersheds in Oregon (BLM and FS). Actual watersheds included, and POC core boundaries, depend on the absence of PL at the time the Record of Decision is signed, and where POC occurs on the ground. Stands with any level of POC are included. Uninfested watersheds expected to have over 100 acres of POC within

10 years of this Record of Decision as a result of natural or artificial regeneration of POC stands burned in the Biscuit Fire will be considered uninfested 7th field watersheds. Water- sheds no longer qualify for POC cores if 5 percent or more of the POC core area becomes infested with PL. Because these watersheds sometimes empty into a larger stream that is infested, infestations within the lowest 2 acres of the watershed (and lowest 200 feet of stream) do not count against the current uninfested status or the 5 percent.

The existing mapping protocols used for determining the 7th field watersheds shown on the Map are not necessarily consistent between administrative units or with standard 6th field mapping. If 7th field watershed maps are revised to a regional standard in the future, it does not change the designation of POC cores. POC core areas identified with the existing protocol would be considered permanent unless 5 percent or more become infested, or they are changed through a future NEPA decision.

Table of Uninfested 7th Field Watersheds

The following 7th field watersheds are those that Agency GIS databases indicate meet the description of uninfested watersheds above. Text above also explains that actual field conditions are the final determinant as to whether a watershed is ultimately considered uninfested for the purpose of these Standards and Guidelines. These watersheds are referenced in question 1c in the risk key.

Summary of 7th Field Cores and Buffers (Federal Acres) a/						
BLM District	**Number of Watersheds**	**Core Matrix / Riparian Reserve / Adaptive Management Areas**	**Core Reserve Acres**	**Buffer Acres**	**Federal and private acres in watershed**	**% Federal Ownership**
Coos Bay	0	0	0	0	0	0
Medford	18	8	7,137	22,201	33,414	88
Roseburg	0	0	0	0	0	0
Siskiyou	144	6,343	35,881	193,799	244,867	96
Total	162	6,351	43,018	216,000	278,281	95
Includes watersheds with up to 2 acres PL; excludes watersheds with less than 50% Federal administration						

See POC ROD for list of uninfested 7th field Watersheds.

ATTACHMENT 2

GENERAL SPECIFICATIONS FOR A WASHING STATION AND EQUIPMENT CLEANING CHECKLIST

The following specifications are from the 1994 BLM “Port-Orford-cedar Management Guidelines,” (FSEIS, Appendix 1). The Equipment Cleaning Checklist is from the POC FSEIS (FSEIS, Appendix 13).

General Specifications for a Field Washing Station

Purpose: The purpose of the washing station is to remove as much soil and organic matter from vehicles as possible to prevent/reduce the spread of PL. The intent is to reduce the spread of PL into uninfested areas. Washing can be accomplished with a mixture of chlorine bleach and water or by steam cleaning. The ration of chlorine bleach to water is 12 ounces of bleach per 1,000 gallons of wash water.

When locating and constructing a washing station to clean vehicles and equipment, we need to minimize the chance that a “clean” truck will be re-exposed to infested material near the washing site. There are two ways this can happen. One is if the truck travels through an area where “unclean” trucks are also traveling. This can be minimized by proper location of the washing station. If some common travel ways are used, efforts need to be made that will reduce the chance of picking up soil. This can be accomplished by rocking the common road surface or hardening it in some other fashion. Reducing the amount of water used for dust abatement will lessen the amount of mud which may also prove useful.

The second way a “clean” truck could become a carrier again is by traveling through wash water and mud at the washing station. Proper construction of the site will eliminate this risk. Runoff of the wash water needs to drain away from the wash site and away from the travel route to and from the site. Wash water must not be allowed to drain into stream channels. The actual washing site needs to be elevated so that the trucks are not sitting in mud and wash water. This could be accomplished by ramps or by building a sufficiently high rocked surface on which the trucks can travel. The length of the rocked surface wash area should be at least 1.5 times the length of the trucks that will be using it. This will allow the trucks to travel on a non-contaminated surface for a short distance after being washed and reduce the chances of picking up infested soil from the washing. The gravel used for rocking should be of sufficient size to allow good percolation of water and soil into the subsurface. Accumulations of water and soil on the surface should be avoided. This last point also affects the depth of the rocked road surface. The amount of washing and the number of trucks using the site will also influence the depth.

The type of equipment used for washing needs to be sufficient to remove all soil and organic matter that is clinging to the trucks. The actual water pressure required can best be deter- mined on the site.

Equipment Cleaning Checklist

This checklist (for optional use) is referenced in the Washing Project Equipment management practice.

The purpose of this checklist is to provide guidance in the cleaning of equipment, as stipulated in contracts, to control or prevent the spread of noxious weeds and PL. The checklist directs attention to specific areas on equipment that are likely to accumulate soil and organic material. Questions to ask about overall equipment cleanliness are:

1) Does the equipment appear to have been cleaned?

2) Is the equipment clean of clumps of soil and organic matter?

Rubber-Tired Vehicles

- Tires
- Wheel rims (underside and outside)
- Axles
- Fenders/wheel wells/trim
- Bumpers

Track-Laying Vehicles

- Tracks
- Road wheels
- Drive gears
- Sprockets
- Roller frame
- Track rollers/idlers

All Vehicles

- Frame
- Belly pan (inside)
- Stabilizers (jack pads)
- Grapple and arms
- Dozer blade or bucket and arms
- Ripper
- Brush rake
- Winch
- Shear head
- Log loader
- Water tenders (empty or with treated water)
- Trailers (low-boys)
- Radiator/grill
- Air filter/pre-cleaner
- Struts/springs/shocks
- 0 Body seams

ATTACHMENT 3

DEFINITIONS

The following terms have been reproduced from the FSEIS Glossary because they are used in the Record of Decision or Plan Amendment or are readily applicable to implementation. No departure from the FSEIS Glossary definitions is intended; they are listed here for convenience, and the FSEIS Glossary may continue to be used for any terms that were not included below.

Activity area. Used in the risk key, the portion of the project area where potentially PL- disturbing activities will take place, including related transportation routes and parking areas. Usually not synonymous with the NEPA “analysis area”, or fish consultation “action area”.

Adaptive management. A continuing process of action-based planning, monitoring, re-searching, evaluating, and adjusting with the objective of improving implementation and achieving the goals of the standards and guidelines.

Breeding. The science or art of changing the genetic constitution of a population of plants or animals.

Breeding block. A breeding block designates the geographic area which envelops a number of breeding zones.

Breeding zone. A breeding zone designates a unit of land in which an improved population of a species is being developed. Progeny testing and/or breeding activity is conducted to obtain an “improved” population (for one or more traits of interest) over time. The boundaries of a breeding zone may or may not coincide with seed zones. In many instances, a breeding zone covers multiple seed zones.

Buffer. In Alternatives 3 and 6, all lands within the currently uninfested 6th or 7th field watersheds (respectively) except stands containing POC (see Chapter 2).

Core. In Alternative 3 and 6 (and 2), stands with POC within the currently uninfested 6th or7th field watersheds (respectively) (see Chapter 2).

Disease. An abnormal, injurious physiological condition brought about by a continuous irritation. Plant disease usually involves a complex relationship between a susceptible host, a conducive environment, and a causal agent called a pathogen.

Dry season. From the Pathology section of the FSEIS, generally between June 1 and September 30, when conditions are dry, and temperatures typically exceed 68 degrees F.

Eradication. Removal of live POC around a PL infestation to keep PL from spreading.

Fire management plan. A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land or resource management plan.

Ground-based logging system. Tractor or cable partial suspension (as opposed to cable full suspension or helicopter).

Heavy equipment. Wheeled or tracked equipment other than highway vehicles, used for construction, road maintenance, logging, pipe-laying, and similar work; some examples are backhoes, Bobcats®, skidders, yarders, and graders.

High-risk site. Low-lying wet areas (infected or not) that are located downslope from already infected areas or below likely sites for future introductions, especially roads; they include streams, drainage ditches, gullies, swamps, seeps, ponds, lakes, and concave low-lying areas where water collects during rainy weather.

Infected. Refers to the attack of a living organism by a pathogen (the pathogen enters and establishes a pathogenic relationship with its host).

Infested. Refers to soil or other substratum that is occupied by a pathogen (used in the sense of "contaminated").

Inoculum. (1) The substance, generally a pathogen, used for inoculating; (2) to put a micro-organism or virus, or a substance containing one of the aforementioned, into an organism or substratum. Also, pathologists use these terms to apply both to inoculations conducted by humans and to inoculations that occur in nature.

Land Use Allocations (LUAs) or Land Allocations. Use in this SEIS is limited to the seven designations of management emphasis identified in land and resource management plans for each administrative unit as a result of the 1994 "Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl." The seven land allocations are Congressionally Reserve, Late-Successional Reserve, Adaptive Management Area, Managed Late-Successional Areas, Administratively Withdrawn, Riparian Reserve, and Matrix.

Late-successional forests. Forest stands consisting of trees, structural attributes, supporting biological communities, and processes associated with old-growth and/or mature forests. Forest seral stages that include mature and old-growth age classes. Age is not necessarily a defining characteristic but has been used as a proxy or indicator in some usages. Minimum ages are typically 80 to 130 years, depending on the site quality, species, rate of stand development, and other factors.

Late-Successional Reserve. Land allocation under the Northwest Forest Plan with the objective to protect and enhance conditions of late-successional and old-growth forest ecosystems that serve as habitat for late-successional and old-growth forest-related species, including the northern spotted owl. Limited stand management is permitted, subject to review by the Regional Ecosystem Office.

Low-risk site. A site with characteristics unfavorable for spread and infection by a particular pathogen.

Maintenance. The retention of POC.

Matrix . Federal lands outside of reserves, withdrawn areas, managed Late-Successional Areas, and Adaptive Management Areas.

Mitigation measures . Modifications of actions taken to: (1) avoid impacts by not taking a certain action or parts of an action; (2) minimize impacts by limiting the degree or magnitude of the action and its implementation; (3) rectify impacts by repairing, rehabilitating, or restoring the affected environment; (4) reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action; or, (5) compensate for impacts by replacing or providing substitute resources or environments.

Monitoring. A process of collecting information to evaluate if objectives and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned.

"National Environmental Policy Act" (NEPA). An Act passed in 1969 to declare a national policy that encourages productive and enjoyable harmony between humankind and the environment, promotes efforts that prevent or eliminate damage to the environment and biosphere, stimulates the health and welfare of humanity, enriches the understanding of the ecological systems and natural resources important to the nation, and establishes a Council on Environmental Quality.

"National Forest Management Act" (NFMA). A law passed in 1976 as an amendment to the "Forest and Rangeland Renewable Resources Planning Act," requiring preparation of forest plans and the preparation of regulations to guide that development.

Northwest Forest Plan. Coordinated ecosystem management direction incorporated into land and resource management plans for lands administered by the BLM and the FS within the range of the northern spotted owl. In April 1993, President Clinton directed his cabinet to craft a balanced, comprehensive, and long-term policy for management of over 24 million acres of public land within the range of the northern spotted owl. A Forest Ecosystem Management Assessment Team (FEMAT) was chartered to develop a series of options. These options were modified in response to public comment and additional analysis and then analyzed in a final SEIS. A record of decision was signed on April 13, 1994, by the Secretaries of the Department of Agriculture and the Department of Interior to adopt "Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl." The record of decision, including the "Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl" is referred to as the Northwest Forest Plan. The Northwest Forest Plan is not a plan in the agency planning regulations sense; the term instead refers collectively to the 1994 amendment to existing agency land and resource management plans or to the specific standards and guidelines for late-successional species incorporated into subsequent land and resource management plans.

Noxious weed. A plant species that is highly injurious or destructive and has a great potential for economic impact; a plant species that is listed as noxious by the State of Oregon.

Off-highway vehicle. Any motorized vehicle capable of, or designed for, travel on land, water, or natural terrain. The term will be used in place of off-road vehicle to comply with the purposes of Executive Orders 11644 and 11989 (although the definition for both terms is the same).

Old-growth forest. An ecosystem distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species, composition, and ecosystem function. More specific parameters applicable to various species are available in the 1993 "Interim Old Growth Definitions" (USDA-FS Region 6). The Northwest Forest Plan SEIS and FEMAT describe old-growth forest as a forest stand usually at least 180- to 220-years old with moderate-to-high canopy closure; a multi-layered, multi-species canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground.

Pathogen . A parasite able to cause disease in a particular host or range of hosts.

Plant association. A plant community type based on land management potential, successional patterns, and species composition.

Prescribed fire. Any fire ignited by management actions to meet specific objectives.

Prevent . As in prevent new infections: An objective, not a requirement.

Record of decision. A document separate from, but associated with, an environmental impact statement that: (1) states the management decision; (2) states the reason for that decision, (3) identifies all alternatives including the environmentally preferable and selected alternatives; and (4) states whether all practicable measures to avoid environmental harm from the selected alternative have been adopted, and if not, why not.

Reforestation. The natural or artificial restocking of an area with forest trees. Resistant. Possessing qualities that hinder the development of a given pathogen. Riparian. Pertaining to areas of land directly influence by water. Riparian areas usually have visible vegetative or physical characteristics reflecting this water influence. Streamsides, lake borders, or marshes are typical riparian areas. Vegetation bordering watercourses, lakes, or swamps; it requires a high water table. In the FSEIS, sometimes used as substitute for "high-risk sites," although the two are not synonymous (see text of respective FSEIS sections).

Riparian area. The shoreline zone including floodplains, along a stream or lake, affected by varying levels of subsurface water storage conditions; favoring water tolerant plants and forest vegetation. This linear geographic area is oftentimes extended upslope to include the direct influence of forest trees or to a transitional area between aquatic and terrestrial com- munities.

Riparian Reserves. Areas along live and intermittent streams, wetlands, ponds, lakes, and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis. Riparian Reserves are important to the terrestrial ecosystem as well, serving as dispersal habitat for certain terrestrial species.

Sanitation. Removal of POC from infested areas along roads, trails, or around uninfested POC to prevent spores from being generated and reaching nearby uninfested stands, or roads where they could be picked-up by passing traffic. Also, removal of POC from uninfested areas along roads, trails, or around infested areas to prevent spores falling off vehicles or originating from the nearby infested areas from reaching a host and thereby spreading the disease.

Seed zone. A seed zone is an area where seed can be moved from a source or seed collection location to a planting location. General adaptation over the long term is inferred within the movement or seed transfer within the respective zone. Most seed zones have a set geographic area where movement is restricted to specific elevation bands (300 meters).

7th field watershed. A delineated hydrologic unit depicting the location of a drainage area that is typically 1,000 to 10,000 acres in size; the 7th division level of the Nation's drainages; represented by extending the hydrologic unit code to 14 digits (Source: http://www.reo.gov/gis/projects/watersheds/Data_Standards2.htm).

6th field watershed. A delineated hydrologic unit depicting the location of a drainage area that is typically 10,000 to 40,000 acres in size (it can be as small as 3,000 acres); the 6th division level of the Nation's drainages; represented by extending the 10-digit hydrologic unit code to 12 digits (Source: http://wwwga.usgs.gov/gis/iag.html and http://www.reo.gov/gis/projects/watersheds/Data_Standards2.htm).

Snag. A standing dead tree.

Species. A class of individuals having some common characteristics or qualities. In these Standards and Guidelines, synonymous with taxon, which may include subspecies, groups, or guilds.

Spore. A general term for a reproductive structure in fungi, bacteria, oomycetes, and cryptogams (analogous to the seed of a green plant).

Stand (tree stand). An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition to be distinguishable from the forest in adjoining areas.

Standards and guidelines. The rules and limits governing actions, as well as the principles specifying the environmental conditions or levels to be achieved and maintained; synonymous with measures and management direction.

Supplemental environmental impact statement (SEIS). As defined by NEPA, a supplement to an existing EIS is prepared when: (1) the agency makes substantial changes to the proposed action that are relevant to environmental concerns; (2) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts; or, (3) the agency determines that the purposes of NEPA would be furthered by doing so.

Surfaced roads . Rocked or paved roads.

Ultramafic. Igneous rocks composed chiefly of mafic minerals such as augite or olivine.