APPENDIX F.7

Biological Evaluation

Appendix F.7

Pacific Connector Gas Pipeline Project

Biological Evaluation

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USDA Forest Service

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Acronyms and Abbreviations

APDBA	Applicant Prepared Draft Biological Assessment
BA	Biological Assessment
BBS	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
FERC	Federal Energy Regulatory Commission
Forest Service	U.S. Department of Agriculture, Forest 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
ROW	right-of-way
SBS	Siskiyou BioSurvey, LLC
TEWA	Temporary Extra Work Area
UCSA	Uncleared Storage Area
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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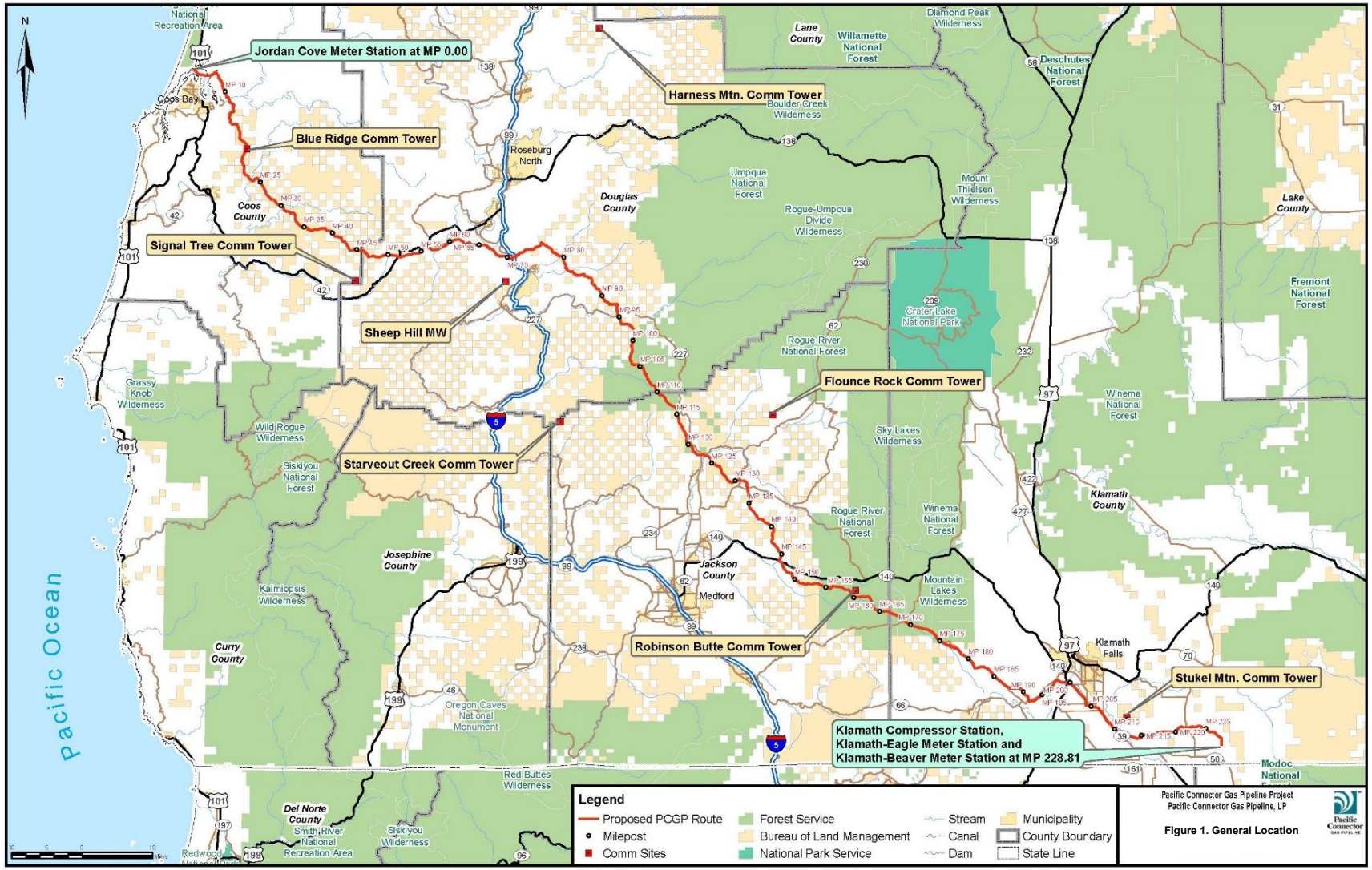
1.0 INTRODUCTION

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 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 List, that can be found on the Interagency Special Status/Sensitive Species Program (ISSSSP) website (ISSSSP 2015). Impacts to species that are listed or proposed for listing under the federal Endangered Species Act (ESA; 16 U.S.C. §§ 1531 et seq.) will be further discussed in FERC's pending Biological Assessment (BA), and are not discussed in this BE, even where these species are Forest Service sensitive species, 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 Draft Environmental Impact Statement (DEIS; FERC 2019).

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 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, 13.7 miles of the Rogue River National Forest, and 6.1 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 DEIS (FERC 2019).


Jordan Cove Meter Station at MP 0.00
Blue Ridge Comm Tower
Signal Tree Comm Tower
Sheep Hill MW
Starveout Creek Comm Tower
Harness Mtn. Comm Tower
Flounce Rock Comm Tower
Robinson Butte Comm Tower
Stukel Mtn. Comm Tower
Klamath Compressor Station,
Klamath-Eagle Meter Station and
Klamath-Beaver Meter Station at MP 228.81
Pacific Ocean
Coos Bay
Roseburg North
Medford
Klamath Falls
Coos County
Douglas County
Lane County
Jackson County
Josephine County
Curry County
Del Norte County
Klamath County
Lake County
Fremont National Forest
Winema National Forest
Deschutes National Forest
Willamette National Forest
Umpqua National Forest
Rogue River National Forest
Siskiyou National Forest
Crater Lake National Park
Oregon Caves National Monument
Smith River National Recreation Area
Redwood National Park
Modoc National Forest
Grassy Knob Wilderness
Wild Rogue Wilderness
Kalmiopsis Wilderness
Boulder Creek Wilderness
Rogue-Umpqua Divide Wilderness
Mount Thielsen Wilderness
Sky Lakes Wilderness
Mountain Lakes Wilderness
Diamond Peak Wilderness
Red Buttes Wilderness
Siskiyou Wilderness
Legend
Proposed PCGP Route
Milepost
Comm Sites
Forest Service
Bureau of Land Management
National Park Service
Stream
Canal
Dam
Municipality
County Boundary
State Line
Pacific Connector Gas Pipeline Project
Pacific Connector Gas Pipeline, LP
Figure 1. General Location

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 2019, 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 2019, 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 DEIS additionally recommends that Pacific Connector incorporate into the proposed route a variation that avoids impacts to *Sarcodon fuscoindicus* (a Survey and Manage fungi species; FERC 2019). If Pacific Connector files this variation as part of the proposed route, the BE will be 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 quary, 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 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 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 recommends that Pacific Connector incorporate these variations into the proposed route; if Pacific Connector files these variations as part of the proposed route, the BE will be 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 (PCGP 2017a), and in Chapter 3 of the DEIS (FERC 2019).

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 (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 publically-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, PCGP 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 pending BA, 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 269 Forest Service sensitive species that have been documented or are suspected to occur within the Umpqua, Rogue River, and Winema national forests, based on the July 13, 2015 Regional Forester Special Status Species List (ISSSSP 2015). 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 269 Forest Service sensitive species, 39 had impact determinations of MIIH. Of those, 36 are discussed in detail in Section 6.2, and the remaining 3 are discussed in more detail in the Survey and Manage Persistence Evaluation (Appendix F.5 to the DEIS). 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 also considered Forest Service sensitive species are included in Table 1 (four mammals, one bird, one amphibian, three fish, and four plants). These species will be addressed in FERC's pending BA. Preliminary impact determinations in Table 1 are from FERC's pending 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 Sensitive 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
Oregon red tree vole *Arborimus longicaudus* [b/]	D – UMP	Y	Y	Y	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
North American wolverine *Gulo gulo luscus* [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 *Pekania pennanti* [a/]	D – UMP D – RRS D – FWI	Y	N	U	MIIH/NJ/LAA
Pacific marten (Coastal population) *Martes caurina*	D-RRS	N	N	U	NJ/NLAA [f/]

Table 1. Forest Service Sensitive 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/]**
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
Northern spotted owl *Strix occidentalis caurina* [a/]	D – UMP D – RRS D – FWI	Y	Y	Y	LAA
Great gray owl *Strix nebulosa* [b/]	D – RRS	Y	Y	Y	MIIH
Black swift *Cypseloides niger*	D – UMP	N	N	U	NI

Table 1. Forest Service Sensitive 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/]**
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
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

Table 1. Forest Service Sensitive 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/]**
Anadromous Fish					
Pacific lamprey *Entosphenus tridentatus*	D – RRS D – UMP	Y	N	N	NI
Chinook salmon *Oncorhynchus tshawytscha* Southern Oregon /Northern California Coastal ESU, Fall-run, Spring-run	D – RRS	N	N	N	NI
Steelhead *Oncorynchus mykiss* Oregon Coast ESU	D – UMP D – RRS	N	N	N	NI
Coho salmon *Oncorhynchus kisutch* Southern Oregon/Northern California Coast ESU[a/]	D – RRS	Y	N	U	LAA
Coho salmon *Oncorhynchus kisutch* Oregon Coast ESU [a/]	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*	S – RRS D - UMP	Y	Y	N	NI
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 D – FWI	Y	Y	N	NI
Siskiyou hesperian *Vespericola sierranas*	D – UMP [d/] D – RRS D – FWI	Y	Y	Y	MIIH

Table 1. Forest Service Sensitive 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/]**
Franklin's bumblebee *Bombus franklini*	D – UMP [d/] D – RRS	Y	N	U	NI
Western bumblebee *Bombus occidentalis*	D – UMP S – RRS D – FWI	Y	N	U	MIIH
Siskiyou short-horned grasshopper *Chloealtis aspasma*	S – UMP S – RRS	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
Coronis fritillary *Speyeria coronis 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 newberryi*	D – FWI	Y	Y	N	NI
Highcap lanx *Lanx alta*	D – RRS D – FWI	N	N	N	NI

Table 1. Forest Service Sensitive 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/]**
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
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
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

Table 1. Forest Service Sensitive 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/]**
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
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

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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/]**
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
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
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 *Cryptantha milobakeri*	D – RRS	Y	Y	N	NI
Pine woods cryptantha *Cryptantha simulans*	D – RRS D – FWI	Y	Y	Y	MIIH

Table 1. Forest Service Sensitive 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/]**
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
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

Table 1. Forest Service Sensitive 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/]**
Gold poppy *Eschscholzia caespitosa*	S – RRS	N	N	N	NI
Wayside aster [b/] *Eucephalus vialis* (syn. *Aster vialis*)	S – UMP	Y	Y	N	NI
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
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

Table 1. Forest Service Sensitive 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/]**
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*	S – 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
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*)	S – 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

Table 1. Forest Service Sensitive 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/]**
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
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

Table 1. Forest Service Sensitive 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/]**
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 S – 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
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*	S – FWI	Y	Y	N	NI
Timber bluegrass *Poa rhizomata*	S – UMP S – 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

Table 1. Forest Service Sensitive 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/]**
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
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

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project					
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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*	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
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/]	S – 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

Table 1. Forest Service Sensitive 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/]**
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
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

Table 1. Forest Service Sensitive 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/]**
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
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

Table 1. Forest Service Sensitive 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/]**
Kurzia makinoana [b/ c/]	S – RRS	Y	Y	N	NI
Gillman's pawwort *Lophozia gillmanii*	S – UMP S – 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
Polytrichum strictum [c/]	S – UMP	Y	Y	N	NI
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*	S – RRS S – FWI	Y	Y	N	NI
Alpine masterwort *Schofieldia monticola*	S – UMP	Y	Y	N	NI

Table 1. Forest Service Sensitive 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/]
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 PCGP'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 lists documented and suspected occurance 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

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 targetted 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 will be available in FERC's pending 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, 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

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**			
	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
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[4/]	N/A	0	11	0	116	1,667	1,794
Eastside Grasslands[4/]	N/A	0	1	10	2	580	593

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			
Herbaceous Wetlands	N/A	1	0	20	1	447	468
Westside Riparian Wetlands[5/]	N/A	0	0	0	1	18	19
Eastside Riparian Wetlands[5/]	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[6/]	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**

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 assinged 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.

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**

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**			
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
	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

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			
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**

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 assinged 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.

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
Southwest Oregon Mixed Conifer-Hardwood Forest	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
	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

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**			
	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
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

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			

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 assinged 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.

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 five construction spreads along the proposed 229-mile pipeline. The five construction spreads 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**
1	0.00-51.60
2	51.60 to 94.67
3	94.67 to 132.47
4	132.47 to 169.50
5	169.50 to 228.81

General timing of activities is discussed in more detail in Section 2.0 of the DEIS (FERC 2019) 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 5 (MP 170 – 229) where winter construction is scheduled in part 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.

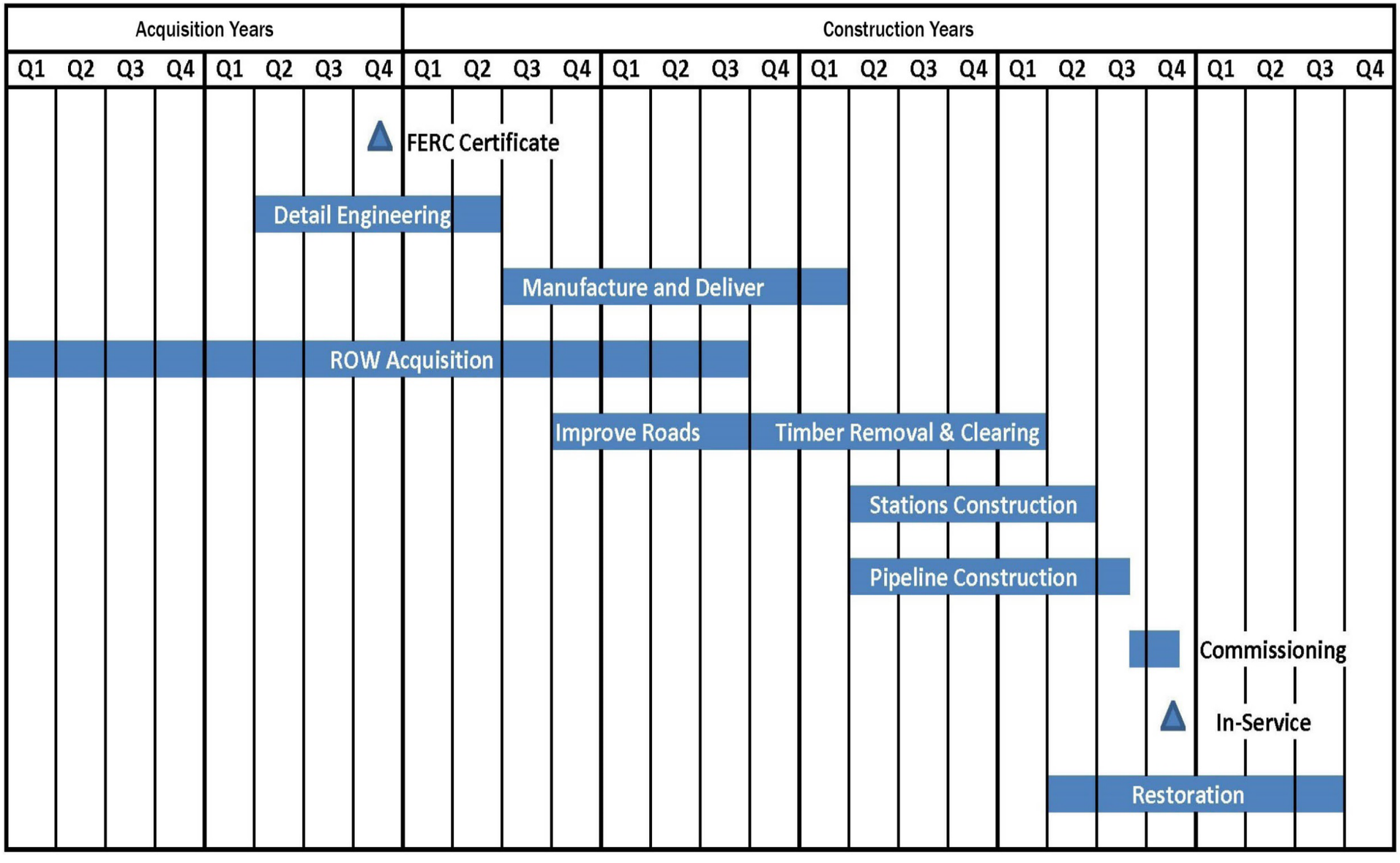

Figure 2. Pipeline Construction Schedule

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

Activity	Migratory Birds	Northern Spotted Owl	Marbled Murrelet	Great Grey Owl	Bald Eagle	Golden Eagle	Peregrine Falcon
Felling & Brushing*	NO WORK - April 1 - July 15	NO WORK - March 1 - Sept 30	NO WORK - April 1 - Sept 15, 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 - If trees and brush* previously removed	NO WORK - March 1 - July 15	DTR** - April 1 - Aug 5, 1/4-mi buffer from stand; April 1 - Sept 15 for helicopters	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 - If trees and brush* previously removed	NO WORK - March 1 - July 15	DTR** - April 1 - Aug 5, 1/4-mi 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
Driving Through Restricted Area on ROW	NO RESTRICTION - If trees and brush* are not impacted or have been previously removed	NO RESTRICTION - If trees previously removed	DTR** - April 1 - Aug 5, 1/4-mi buffer from stand if trees have been previously removed	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 - If trees and brush* previously removed	NO WORK - March 1 - July 15	DTR** - April 1 - Aug 5, 1/4-mi buffer from stand; April 1 - Sept 15 for helicopters	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 Exisiting Access Roads	NO RESTRICTION - If trees and brush* previously removed	NO WORK - March 1 - July 15	DTR** - April 1 - Aug 5, 1/4-mi 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
Access Road Improvement & New Road Construction	NO WORK - April 1 - July 15 If cutting trees or brush*	NO WORK - March 1 - Sept 30 If cutting trees NO WORK - March 1 - July 15 If no tree removal	NO WORK - April 1 - Sept 15, 300-ft buffer from stand if cutting trees; DTR** - April 1 - Aug 5, 1/4-mi buffer from stand if no tree removal	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31
AFFECTED SPREADS	ALL	ALL in defined locations	1 & 2 in defined locations	2 & 4 in defined locations	1 in defined location	5 in defined location	3 in defined location

*All forest regenerating areas (not including recent clear-cuts), deciduous tree groves, shrub/brush thickets, etc. are considered migratory bird habitat and will need to be removed outside the nesting window, just like merchantable timber. Crushed understory in felled timbered areas will not be considered migratory bird habitat and does not have to be cut to meet MBTA requirements.

** DTR - Daily Timing Restrictions stipulate no work until two hours after sunrise and work must stop two hours before sunset.

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	10.04	3.18	6.31	2.96	16.35	6.14
		MS	0.00	0.00	6.88	3.57	2.78	0.92	9.66	4.49
		CR	0.00	0.00	33.85	11.53	18.16	3.23	52.00	14.76
		Total	**0.00**	**0.00**	**50.77**	**18.29**	**27.25**	**7.11**	**78.02**	**25.39**
	Southwest Oregon Mixed Conifer-Hardwood Forest	LO	78.24	34.04	68.14	32.33	34.80	3.12	181.18	69.49
		MS	30.37	7.59	10.29	3.76	5.04	0.17	45.70	11.52
		CR	35.22	0.07	44.91	12.18	9.38	1.10	89.51	13.35
		Total	**143.83**	**41.70**	**123.34**	**48.27**	**49.22**	**4.39**	**316.39**	**94.36**
	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**
		LO	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/]
	Western Juniper and Mountain Mahogany Woodlands	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 (cont.)	Forest-Woodland Sub-Total	LO	78.24	34.04	78.18	35.51	41.11	6.08	197.53	75.63
		MS	30.37	7.59	17.17	7.33	7.82	1.09	55.36	16.01
		CR	35.22	0.07	78.75	23.71	27.54	4.33	141.51	28.11
		Total	**143.83**	**41.70**	**174.11**	**66.55**	**76.47**	**11.50**	**394.40**	**119.75**
Grasslands-Shrublands	Shrub-Steppe	N/A	0.00	0.00	5.50	0.13	0.00	0.00	5.50	0.13
	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	0.91	0.00	1.29	0.00
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
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	12.94	0.41	12.21	2.41	2.96	0.06	28.11	2.88
	Beaches	N/A	0.00	0.00	1.54	0.00	0.00	0.00	1.54	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/]
Open Water	Open Water-Lakes, Rivers, and Streams	N/A	0.30	0.00	0.13	0.09	0.07	0.00	0.51	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**	25.45	0.41	37.97	2.95	4.19	0.07	67.61	3.42
Total			**194.73**	**42.51**	**250.04**	**72.45**	**84.85**	**11.63**	**529.62**	**126.59**

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	2.70	2.90	3.92	0.00	**9.52**	0.00	0.16	0.00	0.00	0.76	**0.92**	**10.44**
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	1.34	0.12	1.76	0.00	**3.22**	0.00	0.00	0.19	0.00	0.00	**0.19**	**3.41**
Spencer Creek (HUC 1801020601)												
Winema National Forest	1.59	1.66	1.82	0.00	**5.07**	0.26	0.00	0.26		0.13	**0.65**	**5.72**
All Fifth Field Watersheds												
Umpqua National Forest	2.70	4.37	3.92	0.00	**10.99**	0.00	0.16	0.00	0.00	3.21	**3.37**	**14.36**
Rogue River National Forest	1.34	0.12	1.76	0.00	**3.22**	0.00	0.00	0.19	0.00	0.00	**0.19**	**3.41**
Winema National Forest	1.59	1.66	1.82	0.00	**5.07**	0.26	0.00	0.26	0.00	0.13	**0.65**	**5.72**
Fifth Field Watershed Total	**5.63**	**6.14**	**7.50**	**0.00**	**19.28**	**0.26**	**0.16**	**0.45**	**0.00**	**3.34**	**4.21**	**23.49**

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	0.90	0.69	1.08	**2.67**	0.00	0.03	0.00	0.10	**0.13**	**2.81**
Little Butte Creek (HUC 1710030708)										
Rogue River National Forest	0.3	0.04	0.47	**0.80**	0.00	0.00	0.06	0.00	**0.06**	**0.87**
Spencer Creek (HUC 1801020601)										
Winema National Forest	0.65	0.09	0.46	**1.2**	0.10	0.00	0.00	0.02	**0.12**	**1.32**
All Fifth Field Watersheds										
Fifth Field Watershed Total	**1.85**	**0.82**	**2.01**	**4.67**	**0.10**	**0.03**	**0.06**	**0.12**	**0.31**	**5.00**

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 was filed with FERC on January 23, 2018. 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 prevent 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 anthropgenic 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 13 stream crossings along 4 creeks 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[1] 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;

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

however, hauling speeds would be below 80 knots and optimal flight speeds could only be maintained during unloaded return flights.

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 102.9 and between MPs 109.4 and 111.0 on the Umpqua National Forest; low potential for blasting between MPs 111.0 and 113.2 on the Umpqua National Forest; and high potential for blasting between MPs 153.8 and 172.4 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

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/]
5	Ditching (Rock-Free)	Pickup Truck Backhoe Excavator Dozer Flatbed Truck Dump Truck Tracked Ditcher	86	71	66	51	46	3,510	2,211
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

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/]
9	Bending	Pickup Truck Excavator Dozer	87	72	67	52	47	3,850	2,425
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

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/]
18	Pad and Backfill	Pickup Truck Backhoe Excavator Dozer Dump Truck	87	72	67	52	47	3,850	2,425
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.

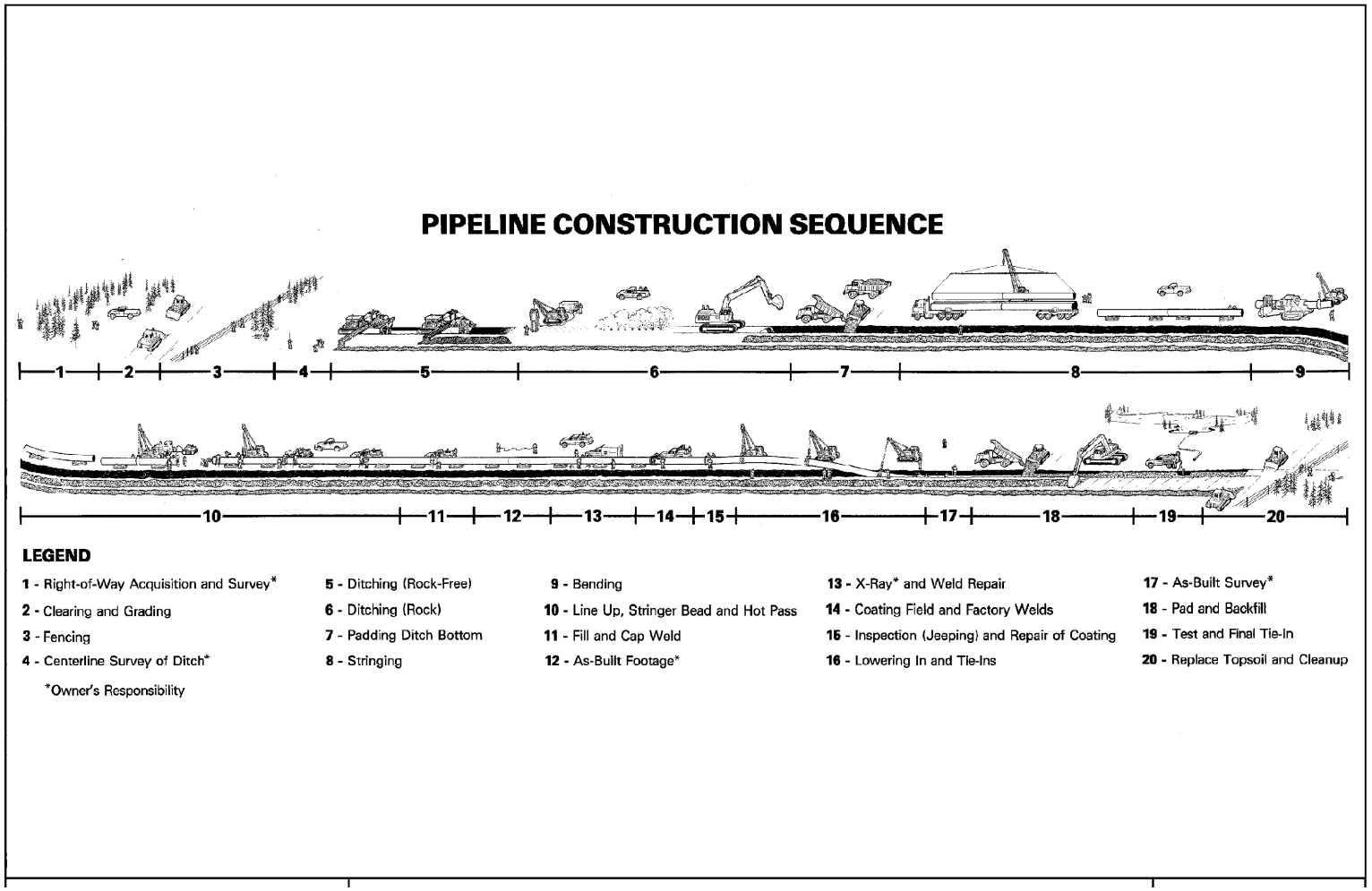

Figure 3. Generalized Pipeline Construction Sequence

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 snage 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.	Implmentation 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	Implmentation 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	Implmentation 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
	2016 SW OR RMP (BLM lands)	46,350 acres grazing on the following allotments: Buck Lake, Heppsie Mountain, Devon South, Howard Prairie, Grizzly, Lake Creek Spring, Lake Creek Summer, Deer Creek Reno Lease, Hunger Flat, Antelope Road, Brownsboro, Yankee Reservoir, Canal, Deadwood, Poole Hill, and Conde Creek allotments	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 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.
Winema National Forest			

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**
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 pstures 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	517	0.4
Cumulative Area Impacted	***4,381***	***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	2,807	5.9
Cumulative Area Impacted	***5,315***	***11.2***
Watershed: Trail Creek	35,338	
Other Identified Projects	9,597	27.2
Pacific Connector Pipeline and Associated Facilities	221	0.6
Project-related Mitigation on NFS lands	896	2.5
Cumulative Area Impacted	***10,714***	***30.3***
Total Umpqua National Forest	278,762	
Subtotal Other Identified Projects	27,561	9.9
Subtotal Pacific Connector Pipeline and Associated Facilities	917	0.3
Subtotal Project-related Mitigation on NFS lands	5,055	1.8
Umpqua Total Cumulative Area Impacted	***33,533***	***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

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
Project-related Mitigation on NFS lands	497	0.3
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	637	0.3
Project-related Mitigation on NFS lands	1,796	0.8
Cumulative Area Impacted	***6,203***	***2.7***
Total Rogue River National Forest	397,122	
Subtotal Other Identified Projects	8,711	2.2
Subtotal Pacific Connector Pipeline and Associated Facilities	726	0.2
Subtotal Project-related Mitigation on NFS lands	2,293	0.6
Rogue River Total Cumulative Area Impacted	***11,730***	***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	1,874	0.3
Grand Total Project-related Mitigation on NFS lands	7,462	1.0
Grand Total Cumulative Area Impacted	**50,078**	***6.9***

1/ Watershed acres and acres associated with "Other Identified Projects" and "Pacific Connector Pipeline and Associated Facilities" adapted from Table 4.14.2-1 of the DEIS (FERC 2019). 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 proejcts" 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 1700's (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 the Applicant Prepared Draft BA (APDBA)[2], 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 H.3 of Resource Report 3[3]), 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),

[2] The APDBA was filed with FERC on September 14, 2018.
[3] Resource Report 3 is included in the Application for Certification filed with FERC on September 21, 2017.

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 the APDBA.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 except for the red tree vole (*Arborimus longicaudus*). The red tree vole is designated as a Survey and Manage species and discussed in a separate report. 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	316.39	94.36	14,704	2.79%
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	5.50	0.13	52	10.91%
Eastside Grasslands[3]	Generally Associated	Feeds and Breeds	1.29	0.00	18	7.34%
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%

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**
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%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.51	0.09	181	0.33%
Total			**324.09**	**94.57**	**16,003**	**2.62%**

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 1,874 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 4 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 474 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 decommissiong, 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 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the pallid bat cumulative effects analysis area includes 50,078 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	78.02	25.39	1,766	5.86%
Southwest Oregon Mixed Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	316.39	94.36	14,704	2.79%
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	5.50	0.13	52	10.91%
Westside Grasslands[3]	Generally Associated	Feeds	2.53	0.33	11	25.99%

Table 16. Townsend's Big-eared Bat Habitat Associations						
Eastside Grasslands[3]	Generally Associated	Feeds and Breeds	1.29	0.00	18	7.34%
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	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	0.51	0.09	181	0.33%
Total			**404.64**	**120.29**	**17,780**	**2.95%**

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 1,874 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Approximately 474 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.

rThe proposed Project, including mitigation actions, would affect approximately 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,078 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	316.39	94.36	14,704	2.79%
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	5.50	0.13	52	10.91%
Eastside Grasslands[3]	Generally Associated	Feeds	1.29	0.00	18	7.34%
Herbaceous Wetlands	Generally Associated	Feeds	0.01	0.00	21	0.03%

Table 17. Fringed Myotis Habitat Associations						
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%
Open Water-Lakes, Rivers, and Streams	Generally Associated	Feeds	0.51	0.09	181	0.33%
Total			**324.09**	**94.57**	**16,003**	**2.62%**

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 1,874 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 474 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 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,078 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 forestssnag 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 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	78.02	25.39	31,531	0.33%
Southwest Oregon Mixed Conifer-Hardwood Forest	Generally Associated	Feeds and Breeds	316.39	94.36	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	261	0.00%
Total			**394.81**	**119.75**	**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 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.

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. 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 1,874 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Approximately 474 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 2,553 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 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 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 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	21	0.03%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds and Breeds	0.37	0.00	131	0.28%
Total			**0.38**	**0.00**	**153**	**0.25%**

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 1,148 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 6,317 acres. Combined with 32,031 acres of overlapping reasonably foreseeable activities, approximately 38,348 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 0.25 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	0.30	0.00	18	1.67%
Total			**0.31**	**0.00**	**19**	**1.65%**

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 917 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 5,972 acres. Combined with 27,561 acres of overlapping reasonably foreseeable activities, approximately 33,533 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	0.20	0.09	163	0.18%
Total			**0.20**	**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.

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 957 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 3,364 acres. Combined with 13,181 acres of overlapping reasonably foreseeable activities, approximately 16,545 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 jurisdictional boundaries discussed above. 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	0.44	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 0.3 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 1,643 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 8,991 acres. Combined with 36,272 acres of overlapping reasonably foreseeable activities, approximately 45,263 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 the APDBA).

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	0.51	0.09	181	0.33%

Table 23. Bufflehead Habitat Associations						
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 forfor 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 1,874 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 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,078 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 the APDBA).

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 Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Eastside Grasslands[3]	Closely Associated	Feeds and Breeds	0.91	0.00	17	5.47%
Herbaceous Wetlands	Generally Associated	Feeds and Breeds	0.00	0.00	21	0.00%
Total			**0.91**	**0.00**	**38**	**2.42%**

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 H.3 of Resource Report 3).

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	1.54	0.00	16	9.61%
Agriculture, Pastures, and Mixed Environs	Closely Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Total			**4.07**	**0.33**	**27**	16.28%

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 726 acres within the cumulative effects analysis area, or 0.2 percent of the total watershed area (Table 14). Approximately 474 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 proejcts (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 3,019 acres. Combined with 8,711 acres of overlapping reasonably foreseeable activities, approximately 11,730 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 Removed[1/]**	**Total Acres Modified[1/]**	**Total Acres in Analysis Area[2/]**	**Percentage Impacted**
Westside-Lowlands Conifer-Hardwood Forest	Generally Associated	Reproduces	0.00	0.00	0	0.00%
Montane Mixed Conifer Forest	Generally Associated	Reproduces	78.02	25.39	1,766	5.86%
Southwest Oregon Mixed Conifer-Hardwood Forest	Generally Associated	Reproduces	316.39	94.36	14,704	2.79%
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	0.51	0.09	207	0.29%
Bays and Estuaries	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Total			**423.04**	**119.84**	**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 1,874 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Approximately 474 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 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,078 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 H.3 of Resource Report 3).

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, ripariang 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 Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	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	78.02	25.39	1,766	5.86%

Table 27. American Peregrine Falcon 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	Generally Associated	Feeds and Breeds	316.39	94.36	14,704	2.79%
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	5.50	0.13	52	10.91%
Westside Grasslands[3]	Generally Associated	Feeds	2.53	0.33	11	25.99%
Eastside Grasslands[3]	Generally Associated	Feeds and Breeds	1.29	0.00	18	7.34%
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	1.54	0.00	45	3.41%
Open Water-Lakes, Rivers, and Streams	Generally Associated	Feeds	0.51	0.09	707	0.08%
Bays and Estuaries	Generally Associated	Feeds	0.00	0.00	0	0.00%
Total			**433.90**	**120.29**	**17,829**	**3.11%**

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 1,874 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Approximately 474 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 Wimena 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 1,874 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 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,078 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	316.39	94.36	14,704	2.79%
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			**318.92**	**94.68**	**15,741**	**2.63%**

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, 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. However, pesticide application will be limited, 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 1,874 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). Approximately 474 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, 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 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,078 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	316.39	94.36	14,704	2.79%
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	1.54	0.00	17	9.05%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.51	0.09	181	0.33%
Bays and Estuaries	Closely Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Total			**346.56**	**94.44**	**14,956**	**2.95%**

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 1,874 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 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities, approximately 50,078 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.

Conservation Measures and Mitigation

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 957 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 the APDBA).

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	267.17	89.96	13,805	2.59%
Westside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.15	0.00	1	12.38%
Total			**267.32**	**89.96**	**13,806**	**2.59%**

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, 14.21 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, 3.47 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 947 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 5,499 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 6,446 acres. Combined with 15,786 acres of overlapping reasonably foreseeable activities, approximately 22,232 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 the APDBA).

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 the APDBA, and Appendix H.3 of Resource Report 3). 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 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 Modified 1/	Total Acres in Analysis Area 2/	Percentage Impacted
Southwest Oregon Mixed Conifer and Hardwood Forests	Generally Associated	Feeds and Breeds	316.39	94.36	14,704	2.79%
Ponderosa Pine Forest and Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	821	0.00%
Westside Grassland[3]	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	0.51	0.09	181	0.33%
Total			**319.84**	**94.77**	**15,740**	**2.63%**

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 19 acres within Riparian Reserves would be removed by the Project within the analysis area (Table 8), and 5 of these acres would be maintained in an early seral stage within the 30-foot Project corridor (Table 9). These habitats include LO, MS, CR forested habitats, as well as wetlands and unaltered non-forested habitats (Tables 7 and 8). 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 1,874 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 9,336 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 50,078 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 the APDBA, and Appendix H.3 of Resource Report 3). 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 4 of the 7 stream crossings within the analysis area that would be impacted by the Project (Table 34; further detail in Appendix C). One of those streams would be within a TEWA and not directly affected; it currently flows through a culvert under a road that would be part of the TEWA. 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
Trib. to East Fork Cow Creek (GDX-15)	17100302034497 Forest Service – Umpqua NF	109.13	Intermittent Intermediate	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/FS-HF-G)	17100302013839 Forest Service – Umpqua NF	109.47	Perennial Intermediate	Dry Open-Cut (Streambed-bedrock)	Assumed
East Fork Cow Creek (GSP-22/FS-HF-G ASP297)	17100302013839 Forest Service – Umpqua NF	109.69	Perennial Intermediate	Adjacent to centerline within TEWA-flows through culvert	Assumed
Trib. to East Fork Cow Creek (FS-HF-J/AW298)	17100302013839 Forest Service – Umpqua NF	109.69	Perennial Minor	Dry Open-Cut	Assumed
Trib. to East Fork Cow Creek (FS-HF-K/AW-299)	17100302012765 Forest Service – Umpqua NF	109.78	Perennial Minor	Dry Open-Cut	Assumed
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 the APDBA).

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 the APDBA 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 (PCGP 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)	181.18	69.49	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	**181.59**	**69.49**	**2,487**	**10.09%**

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, 5.63 acres of late successional/old growth forested habitat that would be removed within the three national forests is within Riparian Reserves (Table 8), and 1.85 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 1,874 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 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,078 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 the APDBA).

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, 17.95 acres of forested habitat (of all seral stages) that would be removed within the analysis area is within Riparian Reserves (Table 8), and 4.67 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 1,874 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 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,078 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 the APDBA).

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 Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Montane Mixed Conifer Forest	General		78.02	25.39	1,766	5.86%
Southwest Oregon Mixed Conifer-Hardwood Forest	General		316.39	94.36	14,704	2.79%

Table 37. Western Bumblebee Habitat Associations						
Habitat Type	**Association**	**Activities**	**Total Acres Removed[1/]**	**Total Acres Modified[1/]**	**Total Acres in Analysis Area[2/]**	**Percentage Impacted**
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		5.50	0.13	52	10.91%
Westside Grasslands[3]	Close	Feeds and Breeds	2.53	0.33	11	25.99%
Eastside Grasslands[3]	Close	Feeds and Breeds	1.29	0.00	18	7.34%
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		28.11	2.88	231	13.43%
Total			**432.25**	**123.08**	**17,830**	**3.11%**

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 15 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[4]. 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 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 1,874 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 14). The

[4] 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.

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 6 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, 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 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50, 078 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 the APDBA). 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 susptected 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 1,643 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 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 (30 percent) of the construction ROW is currently forested but would be maintained in an early seral stage within the 30-foot permanent corridor.

Project-related mitigation actions proposed by the Forest Service in the cumulative effects analysis area that would affect the 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 8,991 acres. Combined with 36,272 acres of overlapping reasonably foreseeable activities, acreage impacted

within the cumulative effects analysis area includes 45,263 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-herned 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 Days Creek South Umpqua River watershed 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, as 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 39 lists the acreages of those 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 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	1.29	0.00	18	7.34%
Herbaceous Wetland	Close	Feeds and Breeds	0.00	0.00	21	0.00%
Total			**3.82**	**0.33**	**50**	**8.38%**

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 8 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 957 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, 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 3,364 acres. Combined with 13,181 acres of overlapping reasonably foreseeable activities described above,

acreage impacted within the cumulative effects analysis area includes 16,545 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.

6.2.6.1 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	78.02	25.39	1,766	5.86%
Southwest Oregon Mixed Conifer-Hardwood Forest	General	Feeds and breeds	316.39	94.36	14,704	2.79%
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%

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
Total			394.40	119.75	17,291	2.97%
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[5]. 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,

[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.

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 1,874 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. 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 9,336 acres. Combined with 140,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,078 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 3 percent of available potentially suitable habitat for this species within the analysis area.

6.2.6.2 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; 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 *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 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	1.29	0.00	18	7.34%
Total			**3.82**	**0.33**	**29**	**14.50%**

1/ Totals taken from Table 7 for the Rogue River, Winema, and Umpqua national forests in which the species has been documented or is susptected 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 15 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 prevent 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 1,874 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 prevent noxious weeds from establishing. Approximately 105 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.

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 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,078 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 the APDBA).

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 weedsand approximately 124 acres of meadow would be restored on the Umpqua National Forest within the Elk Creek and Days Creek South Umpqua River watershed 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.

6.2.6.3 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* adults often congregate on hillsides and meadows overgrown with rabbitbrush (*Chrysothamnus* spp.) and sagebrush (*Artemisia* spp.; Dornfeld 1980). The common food plant is 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 forbes 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		267.17	89.96	13,805	2.59%

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**
Shrub-Steppe	Close	Feeds and breeds	5.50	0.13	52	10.91%
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	1.0	38.45%
Total			**275.58**	**90.41**	**13,869**	**2.64%**

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 prevent 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 prevent noxious weeds from establishing. Within the Rogue River and Umpqua national forests, 83 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.

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, 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 8,991 acres. Combined with 36,272 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 45,263 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 the APDBA).

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 Days Creek South Umpqua River watershed 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 were documented or suspected to occur in the national forests received Project-specific surveys (Table 1). These 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 8 on the Umpqua National Forest, 2 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 1,874 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 9,336 acres. Combined with 140,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,078 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 Appenix I fo 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 the APDBA).

Several proposed Forest Serivce 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 Coastal 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 5.0 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 8 on the Umpqua National Forest, 2 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 1,874 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 allotment 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 9,336 acres. Combined with 40,742 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 50,078 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 the APDBA). 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 5.0 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 8 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 917 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 projectst 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 5,972 acres. Combined with 27,561 acres of overlapping reasonably foreseeable activities described above,

acreage impacted within the cumulative effects analysis area includes 33,533 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 the APDBA). 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 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 springnail, 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 the APDBA).

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 vascular, non-vascular and fungi Sensitive 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 and strategic 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. Five additional Forest Service sensitive species, *Bryoria subcana* (lichen with no common name), Rogue Canyon rockcress (*Arabis modesta*), bensonia (*Bensoniella oregana*), bristly sedge (*Carex comosa*), and coastal lip-fern (*Cheilanthes intertexta*) were documented on State Forest, BLM, or private lands. These five 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, PCGP 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 (PCGP 2017b). 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 (PCGP 2017b). These populations were identified in 1992 and 2008 in a variety of habitats (ORBIC 2017). Although plants were not documented during surveys, potential Umpqua mariposa lily suitable habitat 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 idahoensis* ssp. *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	143.83	41.70	2146.85	8.64%
Westside Grasslands[3]	Closely Associated	0.00	0.00	0.00	0.00%
Total		**143.83**	**41.70**	**2146.85**	**8.64%**

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.

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.

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 l impacts 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 potential 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 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: Days Creek, Elk Creek, Upper Cow Creek and Trail Creek (Table 14). Construction of the pipeline and associated facilities would affect 917 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 invaders 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 and 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 5,972 acres. Combined with 27,561 acres of overlapping reasonably foreseeable activities, approximately 33,533 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 and Integrated Pest Management plans (Appendix B and 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 Days Creek South Umpqua River 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 (PCGP 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 (PCGP 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	172.56	52.66	2394.15	9.41%
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		**172.56**	**52.66**	**2440.43**	**9.23%**

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 theRogue River and Winema national foreststst 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 95 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.

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 fwas 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 957 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 invaders 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 3,364 acres. Combined with 13,181 acres of overlapping reasonably foreseeable activities, approximately 16,545 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 and Integrated Pest Management plans (Appendix B and 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.

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. California globe mallow has been observed within the impact area in the Umpqua 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 (PCGP 2017b). This species was also observed in the Project ROW near MP 99.9 on lands managed by the Roseburg BLM District (PCGP 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	267.17	89.96	3944.32	9.05%
Westside Riparian Wetlands	Closely Associated	0.15	0.00	0.45	34.51%
Total		**267.32**	**89.96**	**3944.77**	**9.06%**

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 theRogue River and Umpqua national foreststs 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 individuals and permanent loss or alteration of habitat including changes in microclimate of the area. The sites are located within the proposed Project ROW and they therefore, would 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.

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. On the Rogue River National Forest these watersheds include Big Butte Creek and Little Butte Creek and on the Umpqua National Forest these watersheds include Days Creek South Umpqua, Elk Creek South Umpqua, Upper Cow Creek and Trail Creek. 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). 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 invaders 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 8,991 acres. Combined with 36,272 acres of overlapping reasonably foreseeable activities, approximately 45,263 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 at MP 154.1 (SBS 2008). In 2010, surveys documented approximately 30,000 plants within 0.8 acres between MPs 154.7 and 154.8, in the vicinity of Heppsie Mountain (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 blooms from April to June (Meinke 1982). This species is able to grow on disturbed sites and withstand grazing, although it is unable to complete with weedy species (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 of all kinds 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 Removed[1/]**	**Total Acres Modified[1/]**	**Total Acres in Analysis Area[2/]**	**Percentage Impacted**
Westside Grasslands[3]	Generally Associated	2.53	0.33	11.00	25.99%
Eastside Grasslands[3]	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**	**11.50**	**28.19%**

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 Umpua or Winema 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.

Direct impacts to the site observed in 2008 at MPs 154.1 would not be expected as the TEWA proposed for that location was eliminated from consideration, and the site is now approximately 95 to 255 feet south of a TEWA at its closest distance to the Project.

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 2011b; Rolle 2014). Approximately 10 percent of the population was in the proposed ROW and an immediately-adjacent TEWA. Another 80 percent was in a large TEWA that included nearly all of the meadow to the 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 at the head of the meadow, 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 likely 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: Big Butte Creek and Little Butte Creek. Construction of the pipeline and associated facilities would affect 726 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 invaders 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 shrink 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). The NWFP protects wetlands (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. Wetlands are often associated with meadows, another habitat component for Bellinger's meadowfoam. 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 3,019 acres. Combined with 8,711 acres of overlapping reasonably foreseeable activities, approximately 11,730 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 a TEWA at its closest distance to the Project; the Project is not expected to affect this site. Measures to avoid the site discovered in 2010 in the Rogue River National Forest, 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 at MP 154.7:

- 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 grass and 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 Limnanthes 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 and Integrated Pest Management plans (Appendix B and 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.

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**
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.
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

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**
Franklin's bumblebee *Bombus franklini*	Grasslands associated with lakes, rivers, streams and seeps; 1400-4000 feet. Requires adequate supply of floral resources for continuous blooming throughout the flight season. Generalist forager. Eusocial bumblebee with a flight season from mid-May to the end of September.	D – RRS	Does not occur in Project vicinity
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				
Chinook Salmon (Oncorhynchus tshawytscha), Southern Oregon /Northern California Coastal ESU, Fall-run and 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 Oregon Coast ESU *(Oncorhynchus mykiss)*	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		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 – FWI D – RRS	Unknown	No suitable habitat in analysis 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**
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
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 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.

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**

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: PCGP 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 S – 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
Polytrichum strictum[3/]	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 S – 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	Presumed mycorrhizal with pine trees, known from Shore Acres in Coos County, in T26S, R14W, Sec. 17 SWNE along Cape Arago area.	S – RSS	Not documented in Project survey
Chamonixia caespitosa	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 *(*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	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	Associated with *Abies magnifica* and *Tsuga mertensiana.*	S – FWI D – RSS S – UMP	Not documented in Project survey
Gastrolactarius camphoratus	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	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	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 (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	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*	Fruits on wood in conifer forests.	D – RSS	Not documented in Project survey
Rhizopogon chamaleontinus	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	Associated with roots of Douglas-fir and sugar pine in October.	D – RSS	Not documented in Project survey
Rhizopogon exiguus	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	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	Colonizes plant debris in wet coniferous forest floor depressions and shallow pools.	D – RSS S – UMP	Not documented in Project survey
Lichen			
Bryoria subcana	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	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	On trees, shrubs, mossy rocks or alpine sod. Montane to alpine.	S – RSS D – UMP	Not documented in Project survey
Ramalina pollinaria	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

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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 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

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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
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
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

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**
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
Short seeded waterwort *Elatine brachysperma*	Occurs almost always under natural conditions in wetlands.	S – FWI 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**
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
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

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Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
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 in 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
Baker's cypress *Hesperocyparis bakeri* (syn. *Cupressus bakeri*)	Scattered on dry wooded slopes, usually in serpentine soil.	D – RRS	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**
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.	S – 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.	S – 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

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Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Englemann's desert-parsley *Lomatium engelmannii*	Chaparral, red fir forest, yellow pine forest.	D – RRS	No suitable habitat in survey area
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

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Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
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
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

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Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
American pillwort *Pilularia americana*	Vernal pools, mud flats, lake margins.	S – 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*	Wet meadows, marshlands, and streambanks. Standing or flowing water, at least early in the growing season, is important where populations are present.	S – FWI	Not documented in Project survey
Timber bluegrass *Poa rhizomata*	Dry Douglas-fir/ponderosa pine forests.	S – RRS S – UMP	Not documented in Project survey
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

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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
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

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Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
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*	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
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

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Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
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

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]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
	Montane Mixed Conifer Forest	L-O [1]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
	Southwest Oregon Mixed Conifer-Hardwood Forest	L-O [1]	67.99		10.08	34.04		0.17			112.28	37.96	35.29	185.52	*100.0%*	*87.8%*
		M-S [2]	19.20		11.09	7.59	0.03	0.04								
		C-R [3]	30.02		5.19	0.07		0.02								
	Ponderosa Pine Forest and Woodland	L-O [1]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
	Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O [1]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
	Western Juniper and Mountain Mahogany	L-O [1]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
Subtotal Forest-Woodland by Age Class		L-O 1	**67.99**	**0.00**	**10.08**	**34.04**	**0.00**	**0.17**	**0.00**	**0.00**	112.28	37.96	35.29	185.52	***60.5%***	*87.8%*
		M-S 2	**19.20**	**0.00**	**11.09**	**7.59**	**0.03**	**0.04**	**0.00**	**0.00**					***0.3%***	
		C-R 3	**30.02**	**0.00**	**5.19**	**0.07**	**0.00**	**0.02**	**0.00**	**0.00**					***0.0%***	
Subtotal Forest-Woodland			**117.20**	**0.00**	**26.36**	**41.70**	**0.03**	**0.24**	**0.00**	**0.00**	**112.28**	**37.96**	**35.29**	**185.52**		***87.8%***
Percent of All Forest-Woodland			***63.2%***	***0.0%***	***14.2%***	***22.5%***	***0.0%***	***0.1%***	***0.0%***	***0.0%***	***60.5%***	***20.5%***	***19.0%***			
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]									0.00	0.00	0.15	0.15	*0.1%*	*0.1%*
		M-S [2]													*0.0%*	
		C-R [3]	0.11		0.05										*0.0%*	

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							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	
	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**	**0.15**	**0.16**	***0.1%***	***0.1%***
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		6.57		6.34	0.41	0.02	0.00						13.34	*6.3%*	*6.3%*
Subtotal Developed / Barren			**6.57**	**0.00**	**14.09**	**0.41**	**4.32**	**0.00**	**0.00**	**0.00**				**25.39**	***12.0%***	***12.0%***
Open Water	Open Water - Lakes, Rivers, and Streams		0.18		0.12									0.30	*0.1%*	*0.1%*
	Bays and Estuaries													0.00	*0.0%*	*0.0%*
Subtotal Open Water			**0.18**	**0.00**	**0.12**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**				**0.30**	***0.1%***	***0.1%***
Subtotal Non-Forest			**6.87**	**0.00**	**14.25**	**0.41**	**4.32**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.15**	**25.85**	***12.2%***	***12.2%***
Percent of All Non-Forest			***26.6%***	***0.0%***	***55.1%***	***1.6%***	***16.7%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.6%***			
Project Total			**124.07**	**0.00**	**40.62**	**42.10**	**4.35**	**0.24**	**0.00**	**0.00**	**112.28**	**37.96**	**35.44**	**211.38**		
Percent of Pipeline Facilities			***58.7%***	***0.0%***	***19.2%***	***19.9%***	***2.1%***	***0.1%***	***0.0%***	***0.0%***	***53.1%***	***18.0%***	***16.8%***			

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-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			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
	Montane Mixed Conifer Forest	L-O 1			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
	Southwest Oregon Mixed Conifer-Hardwood Forest	L-O 1	20.43		20.43	6.04	10.19	36.66	34.33																	0.00	**36.66**
		M-S 2	6.04						10.03																		
		C-R 3	10.19						16.89																		
	Ponderosa Pine Forest and Woodlands	L-O 1			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
	Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O 1			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
	Western Juniper and Mountain Mahogany Woodlands	L-O 1			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
Subtotal Forest-Woodland by Age Class		L-O 1	***20.43***	***0.00***	20.43	6.04	10.19	36.66	*34.33*	**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***	***20.43***
		M-S 2	***6.04***	***0.00***					*10.03*	**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***	***6.04***
		C-R 3	***10.19***	***0.00***					*16.89*	**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***	***10.19***
Subtotal Forest-Woodland			**36.66**	**0.00**	**20.43**	**6.04**	**10.19**	**36.66**	***61.25***	**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**	**36.66**
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**

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																				
			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	Total Operation Impacts by Vegetation Type6
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**
Wetland/ Riparian	Westside Riparian-Westlands / 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	0.03					0.03	0.06																		0.00	**0.03**
	Herbaceous Wetlands		0.00					0.00	0.00																		0.00	**0.00**
Subtotal Wetland/Riparian			**0.03**	**0.00**				**0.03**	**0.07**	**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**	**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		2.52					2.52	4.08																	0.01	**0.01**	**2.53**
Subtotal Developed / Barren			**2.52**	**0.00**				**2.52**	**4.08**	**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**	**0.01**	**0.01**	**2.53**
Open Water	Open Water - Lakes, Rivers, and Streams		0.08					0.08	0.12																		**0.00**	**0.08**
	Bays and Estuaries							0.00																			**0.00**	**0.00**
Subtotal Open Water			**0.08**	**0.00**				**0.08**	**0.12**	**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**	**0.08**
Subtotal Non-Forest			**2.64**	**0.00**	**0.00**	**0.00**	**0.00**	**2.64**	**4.26**	**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**	**0.01**	**0.01**	**2.64**
Project Total			**39.30**	**0.00**	**20.43**	**6.04**	**10.19**	**39.30**	**65.51**	**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**	**0.01**	**0.01**	**39.31**

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	

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 within this Resource Report.

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*	
	Westside Lowland Conifer-Hardwood	L-O [1]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
	Montane Mixed Conifer Forest	L-O [1]	9.89		0.15	3.18					13.22	10.45	45.38	69.06	*28.7%*	*24.5%*
		M-S [2]	6.71		0.17	3.57										
		C-R [3]	22.67		11.18	11.53										
	Southwest Oregon Mixed Conifer-Hardwood Forest	L-O [1]	62.27		5.87	32.33					100.47	14.05	57.08	171.60	*71.3%*	*60.9%*
		M-S [2]	9.98		0.31	3.76										
		C-R [3]	33.25		11.65	12.18										
	Ponderosa Pine Forest and Woodland	L-O [1]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
	Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O [1]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
	Western Juniper and Mountain Mahogany	L-O [1]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
Subtotal Forest-Woodland by Age Class		L-O 1	**72.16**	**0.00**	**6.02**	**35.51**	**0.00**	**0.00**	**0.00**	**0.00**	113.69	24.50	102.46	240.66	***47.2%***	*85.5%*
		M-S 2	**16.69**	**0.00**	**0.48**	**7.33**	**0.00**	**0.00**	**0.00**	**0.00**					***0.2%***	
		C-R 3	**55.92**	**0.00**	**22.83**	**23.71**	**0.00**	**0.00**	**0.00**	**0.00**					***0.0%***	
Subtotal Forest-Woodland			**144.77**	**0.00**	**29.34**	**66.55**	**0.00**	**0.00**	**0.00**	**0.00**	**113.69**	**24.50**	**102.46**	**240.66**		***85.5%***
Percent of All Forest-Woodland			***60.2%***	***0.0%***	***12.2%***	***27.7%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***47.2%***	***10.2%***	***42.6%***			
Grasslands-Shrubland	Shrub-steppe		1.29		4.20	0.13								5.62	*2.0%*	*2.0%*
	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			**3.03**	**0.00**	**5.38**	**0.45**	**0.00**	**0.00**	**0.00**	**0.00**				**8.87**	*3.1%*	***3.1%***
Wetland / Riparian	Westside Riparian-Wetlands/Eastside Riparian-Wetlands	L-O [1]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]													*0.0%*	
		C-R [3]													*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*	
	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%***
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	*5.6%*	*5.6%*
	Beaches				1.54									1.54	*0.5%*	*0.5%*
	Roads		9.12		3.09	2.41								14.62	*5.2%*	*5.2%*
Subtotal Developed / Barren			**9.12**	**0.00**	**15.39**	**2.41**	**4.91**	**0.00**	**0.00**	**0.00**				**31.83**	*11.3%*	***11.3%***
Open Water	Open Water - Lakes, Rivers, and Streams		0.13			0.09								0.22	*0.1%*	*0.1%*
	Bays and Estuaries													0.00	*0.0%*	*0.0%*
Subtotal Open Water			**0.13**	**0.00**	**0.00**	**0.09**	**0.00**	**0.00**	**0.00**	**0.00**				**0.22**	*0.1%*	***0.1%***
Subtotal Non-Forest			**12.29**	**0.00**	**20.77**	**2.95**	**4.91**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**40.91**	*14.5%*	***14.5%***
Percent of All Non-Forest			***30.0%***	***0.0%***	***50.8%***	***7.2%***	***12.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***			
Project Total			**157.06**	**0.00**	**50.10**	**69.50**	**4.91**	**0.00**	**0.00**	**0.00**	**113.69**	**24.50**	**102.46**	**281.57**		
Percent of Pipeline Facilities			***55.8%***	***0.0%***	***17.8%***	***24.7%***	***1.7%***	***0.0%***	***0.0%***	***0.0%***	***40.4%***	***8.7%***	***36.4%***			

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			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
	Montane Mixed Conifer Forest	L-O 1	3.30		3.30	2.39	7.22	12.92	5.43																	0.00	**12.92**
		M-S 2	2.39						3.90																		
		C-R 3	7.22						12.04																		
	Southwest Oregon Mixed Conifer-Hardwood Forest	L-O 1	19.87		19.87	3.07	10.85	33.79	32.93																	0.00	**33.79**
		M-S 2	3.07						5.13																		
		C-R 3	10.85						17.97																		
	Ponderosa Pine Forest and Woodlands	L-O 1			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
	Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O 1			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
	Western Juniper and Mountain Mahogany Woodlands	L-O 1			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
Subtotal Forest-Woodland by Age Class		L-O 1	***23.17***	***0.00***	23.17	5.46	18.08	46.71	*38.36*	**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***	***23.17***
		M-S 2	***5.46***	***0.00***					*9.03*	**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***	***5.46***
		C-R 3	***18.08***	***0.00***					*30.00*	**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***	***18.08***
Subtotal Forest-Woodland			**46.71**	**0.00**	**23.17**	**5.46**	**18.08**	**46.71**	***77.39***	**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**	**46.71**
Grasslands-Shrubland	Sagebrush Steppe							0.00																		0.00	**0.00**
	Shrublands		0.42					0.42	0.67																	0.00	**0.42**
	Westside Grasslands		0.50					0.50	0.83																	0.00	**0.50**
	Eastside Grasslands		0.09					0.09	0.15																	0.00	**0.09**

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						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	
Subtotal Grasslands-Shrubland			**1.01**	**0.00**				**1.01**	***1.65***	**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**	**1.01**
Wetland/ Riparian	Westside Riparian-Westlands / 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		2.14					2.14	4.05																	0.01	**0.01**	**2.15**
Subtotal Developed / Barren			**2.14**	**0.00**				**2.14**	**4.05**	**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**	**0.01**	**0.01**	**2.15**
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			**3.18**	**0.00**	**0.00**	**0.00**	**0.00**	**3.18**	**5.76**	**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**	**0.01**	**0.01**	**3.19**
Project Total			**49.89**	**0.00**	**23.17**	**5.46**	**18.08**	**49.89**	**83.15**	**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**	**0.01**	**0.01**	**49.89**

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						*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	

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 within this Resource Report.

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]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
	Montane Mixed Conifer Forest	L-O [1]	5.77		0.53	2.96					9.27	3.70	21.39	34.35	*39.1%*	*37.3%*
		M-S [2]	2.49		0.29	0.92										
		C-R [3]	14.62		3.54	3.23										
	Southwest Oregon Mixed Conifer-Hardwood Forest	L-O [1]	30.67		4.13	3.12					37.92	5.21	10.48	53.61	*60.9%*	*58.1%*
		M-S [2]	3.94		1.10	0.17										
		C-R [3]	8.74		0.64	1.10										
	Ponderosa Pine Forest and Woodland	L-O [1]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
	Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O [1]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
	Western Juniper and Mountain Mahogany	L-O [1]									0.00	0.00	0.00	0.00	*0.0%*	*0.0%*
		M-S [2]														
		C-R [3]														
Subtotal Forest-Woodland by Age Class		L-O 1	**36.45**	**0.00**	**4.66**	**6.08**	**0.00**	**0.00**	**0.00**	**0.00**	47.19	8.91	31.87	87.97	***53.6%***	*95.4%*
		M-S 2	**6.42**	**0.00**	**1.40**	**1.09**	**0.00**	**0.00**	**0.00**	**0.00**					***0.6%***	
		C-R 3	**23.35**	**0.00**	**4.19**	**4.33**	**0.00**	**0.00**	**0.00**	**0.00**					***0.0%***	
Subtotal Forest-Woodland			**66.22**	**0.00**	**10.25**	**11.50**	**0.00**	**0.00**	**0.00**	**0.00**	**47.19**	**8.91**	**31.87**	**87.97**		***95.4%***
Percent of All Forest-Woodland			***75.3%***	***0.0%***	***11.6%***	***13.1%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***53.6%***	***10.1%***	***36.2%***			
Grasslands-Shrubland	Shrub-steppe													0.00	*0.0%*	*0.0%*
	Westside Grasslands													0.00	*0.0%*	*0.0%*
	Eastside Grasslands		0.69		0.22	0.00								0.91	*1.0%*	*1.0%*
Subtotal Grasslands-Shrubland			**0.69**	**0.00**	**0.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**				**0.91**	***1.0%***	***1.0%***
Wetland / Riparian	Westside Riparian-Wetlands/Eastside Riparian-Wetlands	L-O [1]									0.00	0.00	0.26	0.26	*0.3%*	*0.3%*
		M-S [2]													*0.0%*	
		C-R [3]	0.26												*0.0%*	

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*	
	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**	**0.26**	**0.26**	***0.3%***	***0.3%***
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		1.58	0.06								3.02	*3.3%*	*3.3%*
Subtotal Developed / Barren			**1.38**	**0.00**	**1.58**	**0.06**	**0.00**	**0.00**	**0.00**	**0.00**				**3.02**	***3.3%***	***3.3%***
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			**2.40**	**0.00**	**1.80**	**0.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.26**	**4.26**	***4.6%***	***4.6%***
Percent of All Non-Forest			***56.2%***	***0.0%***	***42.2%***	***1.5%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***6.0%***			
Project Total			**68.62**	**0.00**	**12.04**	**11.57**	**0.00**	**0.00**	**0.00**	**0.00**	**47.19**	**8.91**	**32.12**	**92.23**		
Percent of Pipeline Facilities			***74.4%***	***0.0%***	***13.1%***	***12.5%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***51.2%***	***9.7%***	***34.8%***			

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						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	
Forest-Woodland	Westside Lowland Conifer - Hardwood Forest	L-O 1			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
	Montane Mixed Conifer Forest	L-O 1	1.84		1.84	0.84	4.73	7.40	3.07																	0.00	**7.40**
		M-S 2	0.84						1.40																		
		C-R 3	4.73						7.87																		
	Southwest Oregon Mixed Conifer-Hardwood Forest	L-O 1	9.91		9.91	1.24	2.81	13.96	16.53																	0.00	**13.96**
		M-S 2	1.24						2.06																		
		C-R 3	2.81						4.70																		
	Ponderosa Pine Forest and Woodlands	L-O 1			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
	Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O 1			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
	Western Juniper and Mountain Mahogany Woodlands	L-O 1			0.00	0.00	0.00	0.00																		0.00	**0.00**
		M-S 2																									
		C-R 3																									
Subtotal Forest-Woodland by Age Class		L-O 1	***11.74***	***0.00***	11.74	2.08	7.54	21.36	*19.59*	**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***	***11.74***
		M-S 2	***2.08***	***0.00***					*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***	***2.08***
		C-R 3	***7.54***	***0.00***					*12.56*	**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***	***7.54***
Subtotal Forest-Woodland			**21.36**	**0.00**	**11.74**	**2.08**	**7.54**	**21.36**	***35.62***	**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**	**21.36**
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**

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	
	Eastside Grasslands		0.26					0.26	0.42																	0.00	**0.26**
Subtotal Grasslands-Shrubland			**0.26**	**0.00**				**0.26**	***0.42***	**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**	**0.26**
Wetland/ Riparian	Westside Riparian-Westlands / 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	0.10					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**	**0.10**
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**
Developed / Barren	Urban and Mixed Environs							0.00																		**0.00**	**0.00**
	Beaches							0.00																		**0.00**	**0.00**
	Roads		0.27					0.27	0.45																	0.01	**0.01**	**0.28**
Subtotal Developed / Barren			**0.27**	**0.00**				**0.27**	**0.45**	**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**	**0.01**	**0.01**	**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**	**0.02**
Subtotal Non-Forest			**0.65**	**0.00**	**0.00**	**0.00**	**0.00**	**0.65**	**1.07**	**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**	**0.01**	**0.01**	**0.66**
Project Total			**22.01**	**0.00**	**11.74**	**2.08**	**7.54**	**22.01**	**36.69**	**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**	**0.01**	**0.01**	**22.02**

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	

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 within this Resource Report.

Appendix C: Waterbodies Crossed by the Project on National Forest 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 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, Douglas County, Oregon													
Trib. to East Fork Cow Creek (GDX-15)	17100302034497Forest Service – Umpqua NF	109.13	Intermittent Intermediate	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*
East Fork Cow Creek (GSP-19/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	Assumed	None	None	Jul 1 to Sep 15	3	Y
East Fork Cow Creek (GSP-22/FS-HF-G ASP297)	17100302013839 Forest Service – Umpqua NF	109.69	Perennial Intermediate	Adjacent to centerline within TEWA	Not crossed by centerline. Waterbody flows through culvert on road which is encompassed by TEWA 109.68-N. This TEWA was selected for parking/staging as well as for potential mitigation to remove the culvert if the road is not required.	None	Unknown	Assumed	None	None	Jul 1 to Sep 15	3	N
Trib. to East Fork Cow Creek (FS-HF-J/AW298)	17100302013839 Forest Service – Umpqua NF	109.69	Perennial Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small 4' headwater tributary. ROW necked down to 75' and TEWAs only utilized on north side of creek to minimize riparian impacts. Steep topographic conditions prevent a conventional bore because of extensive grading/excavation requirements.	None	Unknown	Assumed	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 Species Present	EFH Species Present [6/]	EFH Component Present [6/]	Fishery Construction Window [5/, 7/]	Water Quality Status [8/]	Equipment Bridges [9/]
Trib. to East Fork Cow Creek (FS-HF-K/AW-299)	17100302012765 Forest Service – Umpqua NF	109.78	Perennial Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small 2-4' headwater tributary. ROW necked down to 75' and no TEWAs utilized to minimize riparian impacts.	None	Unknown	Assumed	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, 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	June 15 to Sep 15	Unknown	Y*
Cascades Ecoregion, Upper Rogue (HUC 17100307) Sub-basin, Trail Creek (HUC 1710030706) Fifth field Watershed, Jackson County, Oregon													
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	Unknown	Unknown	None	None	N/A	Unknown	N –to be avoided
Eastern Cascades Slopes and Foothills Ecoregion, Upper Rogue (HUC 17100307) Sub-basin, Little Butte Creek (HUC 1710030708) Fifth field Watershed [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	2 and 4A	Y-1i with mid-stream support
Daley Creek (ESI-76)	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*
Eastern Cascades Slopes and Foothills Ecoregion, Upper Klamath River (HUC 18010206) Sub-basin, Spencer Creek (HUC 1801020601) Fifth field Watershed [11/], Klamath County, Oregon													

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 Species Present	EFH Species Present [6/]	EFH Component Present [6/]	Fishery Construction Window [5/, 7/]	Water Quality Status [8/]	Equipment Bridges [9/]
Spencer Creek (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	Redband Trout Possible Brook Trout	None	None	Aug 1 to Sep 30	5: 303(d)	Y
Trib. to Spencer Creek (GSP-7)	18010206005900 Forest Service-Winema NF	171.57	Perennial 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*
Trib. to Spencer Creek (ESI-106)	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	Assumed	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)
2 = Available data and information indicate that some designated uses are supported and the water quality standard is attained.
3 = Insufficient data to determine whether a designated use is supported.
4A = Total maximum daily loads that will result in attainment of water quality standards have been approved
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							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	78	446	55	78	0	LO	Hard	78	266	16	8	0
	Soft		8	78	78	39		Soft		0	47	16	8
MS	Hard	30	173	21	30	0	MS	Hard	17	58	3	2	0
	Soft		3	30	30	15		Soft		0	10	3	2
CR	Hard	35	201	25	35	0	CR	Hard	79	268	16	8	0
	Soft		4	35	35	18		Soft		0	47	16	8
Total	Hard	144	820	101	144	0	Total	Hard	174	592	35	17	0
	Soft		14	144	144	72		Soft		0	104	35	17
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	41	136	8	4	0	LO	Hard	198	847	79	90	0
	Soft		0	16	4	0		Soft		8	142	98	47
MS	Hard	8	26	2	1	0	MS	Hard	55	257	26	33	0
	Soft		0	3	1	0		Soft		3	44	35	17
CR	Hard	28	91	6	3	0	CR	Hard	142	559	46	46	0
	Soft		0	11	3	0		Soft		4	93	54	25
Total	Hard	76	252	15	8	0	Total	Hard	394	1,664	151	169	0
	Soft		0	31	8	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	1,122	6,396	786	1,122	0	LO	Hard	1,307	4,442	261	131	0
	Soft		112	1,122	1,122	561		Soft		0	784	261	131
MS	Hard	663	3,778	464	663	0	MS	Hard	306	1,042	61	31	0
	Soft		66	663	663	331		Soft		0	184	61	31
CR	Hard	373	2,125	261	373	0	CR	Hard	1,093	3,717	219	109	0
	Soft		37	373	373	186		Soft		0	656	219	109
Total	Hard	2,158	12,299	1,510	2,158	0	Total	Hard	2,706	9,201	541	271	0
	Soft		216	2,158	2,158	1,079		Soft		0	1,624	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	1,306	79	40	0	LO	Hard	2,825	12,145	1126	1,292	0
	Soft		0	158	40	0		Soft		112	2064	1,423	692
MS	Hard	195	643	39	19	0	MS	Hard	1,164	5,463	564	713	0
	Soft		0	78	19	0		Soft		66	925	744	362
CR	Hard	477	1,573	95	48	0	CR	Hard	1,943	7,415	575	530	0
	Soft		0	191	48	0		Soft		37	1219	639	296
Total	Hard	1,067	3,522	213	107	0	Total	Hard	5,931	25,022	2265	2,535	0
	Soft		0	427	107	0		Soft		216	4208	2,806	1349

Table D-3. Estimate of Snags on National Forest Lands within 3,200 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	4,916	28,022	3,441	4,916	0	LO	Hard	5331	18,124	1,066	533	0
	Soft		492	4,916	4,916	2,458		Soft		0	3,198	1,066	533
MS	Hard	1,965	11,201	1,376	1,965	0	MS	Hard	715	2,429	143	71	0
	Soft		197	1,965	1,965	983		Soft		0	429	143	71
CR	Hard	3,008	17,144	2,105	3,008	0	CR	Hard	7116	24,194	1,423	712	0
	Soft		301	3,008	3,008	1,504		Soft		0	4,269	1,423	712
Total	Hard	9,889	56,366	6,922	9,889	0	Total	Hard	13161	44,747	2,632	1,316	0
	Soft		989	9,889	9,889	4,944		Soft		0	7,897	2,632	1,316
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	1,286	4,244	257	129	0	LO	Hard	11,533	50,390	4,765	5,578	0
	Soft		0	514	129	0		Soft		492	8,629	6,111	2,991
MS	Hard	297	980	59	30	0	MS	Hard	2,977	14,610	1,578	2,066	0
	Soft		0	119	30	0		Soft		197	2,513	2,138	1,054
CR	Hard	2,487	8,206	497	249	0	CR	Hard	12,610	49,543	4,026	3,968	0
	Soft		0	995	249	0		Soft		301	8,272	4,680	2,215
Total	Hard	4,070	13,431	814	407	0	Total	Hard	27,120	114,544	10,368	11,612	0
	Soft		0	1628	407	0		Soft		989	19,413	12,928	6,260

Table D-4. Estimate of Snags on National Forest Lands within 5 miles 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	24,896	141,908	17,427	24,896	0	LO	Hard	32,627	110,933	6,525	3,263	0
	Soft		2,490	24,896	24,896	12,448		Soft		0	19,576	6,525	3,263
MS	Hard	9,503	54,169	6,652	9,503	0	MS	Hard	8,154	27,725	1,631	815	0
	Soft		950	9,503	9,503	4,752		Soft		0	4,893	1,631	815
CR	Hard	19,501	111,153	13,650	19,501	0	CR	Hard	42,126	143,229	8,425	4,213	0
	Soft		1,950	19,501	19,501	9,750		Soft		0	25,276	8,425	4,213
Total	Hard	53,900	307,230	37,730	53,900	0	Total	Hard	82,908	281,887	16,582	8,291	0
	Soft		5,390	53,900	53,900	26,950		Soft		0	49,745	16,582	8,291
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	33,122	109,304	6,624	3,312	0	LO	Hard	90,646	362,144	30,577	31,471	0
	Soft		0	13,249	3,312	0		Soft		2,490	57,721	34,734	15,711
MS	Hard	3,042	10,040	608	304	0	MS	Hard	20,700	91,934	8,892	10,623	0
	Soft		0	1,217	304	0		Soft		950	15,613	11,438	5,567
CR	Hard	25,654	84,657	5,131	2,565	0	CR	Hard	87,280	339,040	27,206	26,279	0
	Soft		0	10,262	2,565	0		Soft		1,950	55,038	30,491	13,963
Total	Hard	61,818	204,001	12,364	6,182	0	Total	Hard	198,626	793,117	66,675	68,373	0
	Soft		0	24,727	6,182	0		Soft		5,390	128,372	76,663	35,241