Establishment of the 95-foot wide construction corridor and TEWAs would likely remove individuals of *H. caeruleus* and modify microclimate conditions around individuals that are not removed. The removal of forests and host trees and disturbance to soil could negatively affect *H. caeruleus* in adjacent areas by removing its habitat, disturbing the roots of host trees, and affecting its mycorrhizal association with the trees, potentially affecting site persistence. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project.

Hygrophorus caeruleus is not likely to persist at one of the sites in the project area because of the extent of impacts and the proximity of the recorded observation to the corridor.

Hygrophorus caeruleus is likely to persist at the remaining three sites in the project area (MP 168.8 and MP 172.4 (north), and MP 172.5-172.7) because the majority of observations within the sites are more than 90 feet from the corridor, where direct effects are not anticipated and indirect effects are unlikely. The site at MP 168.8 is in a forested area on an east-facing slope, and a paved road occurs through the southeast part of the site. Four out of five observations are more than 90 feet southwest of the corridor and are not likely to be directly or indirectly affected by the PCGP Project based on the distance from the corridor, extent of forests surrounding the observations, and proximity to an existing open corridor (the road), indicating the species is likely resilient to edge-related effects at the site. The site at MP 172.4 is also in a forested area on an east-facing slope. Four out of five observations are at least 400 feet north of the project area and are not likely to be directly or indirectly affected by the PCGP Project because of their distance from the proposed corridor. The site at MP 172.5-172.7 is intersected by a paved road and contains seven observations, all of which are at least 110 feet from the project corridor. These observations are not likely to be directly or indirectly affected by the PCGP Project.

Indirect effects on individuals within the two sites that occur in the analysis area but not the project area (MP 168.7 and MP 172.4 south) are unlikely because of the distance of the proposed corridor to the observations (more than 300 feet) and the species' likely resilience to edge-related effects. The species is expected to persist at these two sites.

Based on this analysis, *H. caeruleus* is not likely to persist at one of the six sites in the analysis area following project implementation. Several sites are located in the vicinity of the analysis area, and the five sites that are expected to persist are part of a small group of sites in the Cascade Range in southern Oregon. The species would continue to be found in the Cascade Range in southern Oregon, and other sites may exist in previously unsurveyed areas based on the recent trends of increased observations.

Across the project area, the PCGP Project would remove an estimated 634 acres of coniferous forests between 2,000–7,000 feet msl, including 171 acres of LSOG coniferous forests. These impacts would result in a reduction of habitat that may be suitable for *H. caeruleus*. Within this impact area, about 332 acres (52 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 145 acres of coniferous forests between 2,000–7,000 feet

msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests between 2,000–7,000 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at one of the six sites as a result of the PCGP Project, 13 sites of *H. caeruleus* would remain on NFS lands in the local area, including four in reserves, and 46 sites, including 13 in reserves, would remain on NFS lands in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but the NFS sites would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 13 sites in reserves are assumed to have additional protections provided by the NWFP Standards and Guidelines in place for those land allocations. Based on these site counts, approximately 28 percent of the remaining *H. caeruleus* sites on NFS lands in the NSO range would be protected in reserves.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Hygrophorus caeruleus* is a Category B (rare) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category B species are likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information received since the species was listed in the 2001 ROD, however, indicates that the species appears to be more common than previously documented, as described below:

    - *Hygrophorus caeruleus* has a somewhat limited distribution across four provinces and three states in the region and a low-moderate number of overall sites (47 on NFS lands, 56 on all lands). The species' distribution is limited to the Cascade Range, and sites are locally abundant in southern Oregon. The currently known number of sites on BLM and NFS lands has increased by 49 sites since 2007, with many sites documented during the PCGP Project surveys.

    - An estimated 25 percent of the sites (14 sites) on NFS and BLM lands are in reserves, which is an increase of about 10 sites in reserves since 2006 per Molina (2008).

- Coniferous forests between 2,000–7,000 feet msl (general habitat for the species) are widespread across the Cascade Range in the NSO range, where all sites are documented, and encompass approximately 14 million acres on BLM and NFS lands, with an estimated 59 percent in reserves.

- The PCGP Project would affect six of 47 sites of *H. caeruleus* on NFS lands, representing approximately 13 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at one of the six sites, a moderate-high number of sites (46) would remain on NFS lands in the region, with a somewhat limited distribution across California, Washington, and Oregon in the Cascade Range. Several sites (13 sites) would

remain on NFS lands in the local vicinity of the analysis area; these sites would continue to be distributed across two 5th-field watersheds. Several sites would remain on BLM lands in the region and local area; however, each site is at least partially on Harvest Land Base and would not likely be protected under BLM management. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would affect site persistence at one site in an LSR, but the percentage of sites in reserves would be about the same (28 percent). Of the remaining sites, 10 sites are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and three sites are in Congressionally Reserved areas where management activities that may adversely affect *H. caeruleus* are unlikely.

- The PCGP Project would result in a permanent loss of an estimated 145 acres of coniferous forests between 2,000–7,000 feet msl (less than 1 percent of the total acreage in the NSO range). An estimated 8.3 million acres (59 percent) of coniferous forests and 2.6 million acres (64 percent) of LSOG coniferous forests between 2,000–7,000 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *H. caeruleus*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Hygrophorus caeruleus* is a Category B species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO, particularly in the Cascade Range, that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

2.19.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *H. caeruleus* at six sites on NFS lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 46 sites would remain on NFS lands across the region, and 13 sites would remain on NFS lands in the local area. Although the PCGP Project would affect site persistence of *H. caeruleus* at one site, the site is part of a group sites in the Cascade Range where the species is locally abundant. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Hygrophorus caeruleus* would persist in the region without considering the site as part of the population.

- The PCGP Project would remove approximately 634 acres of coniferous forests and 171 acres of LSOG coniferous forests between 2,000–7,000 feet msl (a negligible amount of the forests). An estimated 52 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 8.3 million acres (59 percent) of coniferous forests and 2.6 million acres (64 percent) of LSOG coniferous forests between 2,000–7,000 feet msl would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where

suitable habitat exists based on the increased number of sites documented with increased surveys since 1998.

- The remaining NFS sites are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Although a single natural disturbance event or combination of events could affect a significant portion of sites in the Oregon Cascade Range, several sites are scattered across the rest of the Cascade Range and are less likely to be affected by a single event.

The PCGP Project would not be able to avoid impacts to all *H. caeruleus* sites in the analysis area, although some individuals or populations within the sites and some sites are expected to persist following project implementation. Based on the above conclusions, avoidance of the single *H. caeruleus* site is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plans that apply to the affected sites would waive implementation of Management Recommendations for the *H. caeruleus* site affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected site over the long term. The monitoring plan shall be approved by the Forest Service.

2.20 MYCENA OVERHOLTSII

Mycena overholtsii is a gilled mushroom species in the Mycenaceae family (formerly in the Tricholomataceae family) and is commonly known as fuzzy foot.

2.20.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *M. overholtsii* as a Category D (uncommon) species. ORBIC evaluated *M. overholtsii* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004), but it was not included in the most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2004, the species was considered to be between at high risk of extinction due to very restricted range, very few populations, steep declines, or other factors; and uncommon but not rare, with some cause for long term concern due to declines or other factors, within its global range and in Oregon (G2G4, S2S4, respectively). The species is not currently on any ORBIC lists. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.20.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Mycena overholtsii is a wood decomposer found fruiting in clusters on logs that do not have bark (decorticated) (Cripps 2009). As snow melts, the mushroom matures in the moist snow chamber. Fruiting is from March through July (Castellano et al. 1999). Like other members of genus *Mycena*, it is presumed to be dependent on wind (and possibly arthropods) for the dispersal of spores (Castellano and O'Dell 1997).

Range

Mycena overholtsii is found in western North America, from the Pacific Northwest to Wyoming and Colorado (ORBIC 2004, Trappe, pers. comm. 2013). *Mycena overholtsii* was originally described from an occurrence in the Medicine Bow Mountains of Wyoming. Its range in the Pacific Northwest extends from northern California to Mount Rainier in Washington (Castellano and O'Dell 1997). The species has also been recently reported from Japan (Cha et al. 2010), although its distribution in Japan is not confirmed. The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, it was likely similar to the current range, with populations distributed in western North America and possibly parts of Asia. Local and regional distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported *M. overholtsii* from more than 20 element occurrences in North America in 2004, but the number of occurrences in the NSO range was not known. In 2004, *M. overholtsii* populations were presumed to be relatively stable (ORBIC 2004). The species was found in two locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented 143 new sites of *M. overholtsii* in the NSO range between 1998 and 2006, and 151 total sites were documented by 2006, including 73 in reserves or protected areas. The 2007 Final SEIS reported 136 sites on NFS and BLM lands and 142 total sites on all lands in the NSO range (USDA and USDI 2007).

Equivalent-effort surveys were conducted during the spring and fall from 2010 to 2016 in old-growth stands in the PCGP Project area and within 100 feet of habitat removal to comply with the Standards and Guidelines for Category B species where strategic surveys are not complete (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). As a category D species, *M. overholtsii* was not specifically targeted during surveys, although incidental sightings of all S&M fungi were recorded and resulted in one new observation of *M. overholtsii*. Based on the relatively high number of sites and the increased number of sites since 1998 as a result of the increased number of surveys (a more than 18-fold increase between 1998 and 2006 per Molina 2008 records), additional surveys would be expected to locate additional populations within the NSO range. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Based on data available in 1999, *M. overholtsii* was found in coniferous forests above 3,000 feet msl, primarily near true fir trees (Castellano et al. 1999). It has been found in gregarious caespitose clusters on decayed wood (stumps, downed wood) near snow banks or where snow has recently melted (Castellano et al. 1999, The Fungi of California 2010), as well as on decorticated logs buried beneath the snow (Cripps 2009). Within the range of the NSO, *M. overholtsii* has been found primarily within LSOG forests, but is occasionally found in younger forests adjacent to LSOG stands (Hibler et al. 2001a). *Mycena overholtsii* may prefer specific microclimate conditions of LSOG forests, but it may not be restricted to these conditions.

Threats

Threats to *M. overholtsii* are actions that disrupt stand conditions or remove woody debris, such as fire or road, trail, and campground construction (Castellano and O'Dell 1997). Logging has threatened the species through removal of overstory trees, which modify microclimates. Other specific threats to the species are not currently known.

Management Recommendations

As a Category D S&M species, the direction under the 2001 ROD is to manage high priority sites to provide a reasonable assurance of species persistence (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. Management recommendations were developed for *M. overholtsii* with several other species (Group 16 of Castellano and O'Dell 1997). The primary guidance is to maintain habitat conditions at all known sites by minimizing soil disturbance at or around known sites and preventing removal of host trees. The known locations of the species on federal land should be managed to include an area that is large enough to maintain the habitat and associated microclimate of the population. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *M. overholtsii*:

- As a wood saprobe, *M. overholtsii* probably does not extend beyond the available substrate (log, stump etc.). Retention of habitat patches across a landscape could provide possible areas of refugia and potential areas for colonization**.** To provide a reasonable assurance of the continued persistence of occupied sites consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.20.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *M. overholtsii* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices)

and converted into sites in accordance with the methodology described in Chapter 1. Table MYOV-1 shows the total number of known sites in the regional (NSO range), local (18 5th field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 215 observations from BLM and Forest Service geodatabases were converted into 205 sites in the NSO range (region). Table MYOV-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table MYOV-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure MYOV-1 displays the regional distribution of the species across NFS lands, Figure MYOV-2 displays the extent of known sites in protected areas (NFS lands, NS reserves, BLM reserves, and NPS lands), and Figure MYOV-3 displays the species' regional distribution with the extent of coniferous forests and LSOG coniferous forests above 2,000 feet msl on BLM and NFS lands within the currently known range of the species.

TABLE MYOV-1

Number of *Mycena overholtsii* Sites (2017)

Location*	Number of Sites
Regional Area	205
Local Area	10
Analysis Area (Project Area)	2 (2)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE MYOV-2

Distribution of *Mycena overholtsii* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	201	10	2
BLM	3	-	-
NPS	1	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	4	1	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE MYOV-3

Distribution of *Mycena overholtsii* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	1	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	26	-	-
Congressionally Reserved (CR)	**26**	**1**	**-**
Late Successional Reserve (LSR)	**70**	**1**	**1**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**-**	**-**	**-**
Managed Late Successional Area (MLSA)	2	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	90	9	2
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	**-**	**-**	**-**
District Designated Reserve	**2**	**-**	**-**
Harvest Land Base	2	-	-
Late Successional Reserve	**1**	**-**	**-**

TABLE MYOV-3

Distribution of *Mycena overholtsii* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**3**	**-**	**-**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Mycena overholtsii is somewhat widely distributed across seven physiographic provinces in Washington (Western and Eastern Cascades), Oregon (Cascades East and West and Klamath Mountain), and California (Klamath and Cascades) (see Figure MYOV-1). Most sites are found along the eastern Cascade Range, where the sites are found in three general groups in northern California, southern Oregon, and northern Washington. Scattered sites are located in the Klamath Mountains of Oregon and California, where the species is less abundant. *Mycena overholtsii* appears to be well distributed in the eastern Cascade Range where sites are more abundant and clustered in three large groups.

Four of 205 known sites are partially located on private land; one site is on NPS land (Mount Rainier National Park); three sites are on BLM lands; and 201 sites are at least partially on NFS lands. Sites located on the National Forests that encompass the project area include three sites on the Rogue River-Siskiyou National Forest, 10 sites on the Umpqua National Forest, and 69 sites on the Fremont-Winema National Forest. The remaining 120 sites on NFS lands are on the Deschutes, Gifford Pinchot, Klamath, Modoc, Mt. Baker-Snoqualmie, Mt. Hood, Okanogan-Wenatchee, Shasta-Trinity, Six Rivers, and Willamette National Forests.

Across the NSO range, 94 sites are at least partially located in reserve lands managed by the Forest Service, including 70 at least partially in LSRs and 26 at least partially in Congressionally Reserved areas (see Figure MYOV-2). This represents 47 percent of the Forest Service-managed sites in the region. The remaining Forest Service-managed sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. One additional site in the region is located entirely in BLM reserves. While the single site in BLM reserves and the single NPS site are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management and National Park management.

Mycena overholtsii is more commonly found in LSOG forests based on available data (118 of 205 total sites are in LSOG), but is also relatively common in non-LSOG forests and has been found in younger forests adjacent to LSOG stands. Based on current site locations, the species has been found in coniferous forests above about 2,500 feet msl and has only been documented in the eastern part of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous forests, including the LSOG component of these forests, within the NSO range could provide habitat for

M. overholtsii and support additional sites. These forests encompass an estimated 14.1 million acres on BLM and NFS lands in the eastern part of the NSO range, including an estimated 8.3 million acres in reserve land allocations (59 percent of the forests; Table MYOV-4). Of this acreage, an estimated 4 million acres are LSOG (see Figure MYOV-3), including 2.6 million acres in reserve land allocations (64 percent of the forests). Coniferous forests, including LSOG coniferous forests, above 2,000 feet msl are somewhat widespread across the NSO range and are primarily found along the Cascade Range and the Klamath Mountains.

TABLE MYOV-4

Extent of Forests That Could Provide Habitat for *Mycena overholtsii* on NFS and BLM Lands a/

Location	Coniferous Forests above 2,000 feet		LSOG Coniferous Forests above 2,000 feet	
	Total	**Reserves**	**Total**	**Reserves**
Regional Area	14,057,701	8,337,057	4,025,292	2,566,670
Local Area	329,776	180,454	104,606	64,923
Project Area	778	508	217	144

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

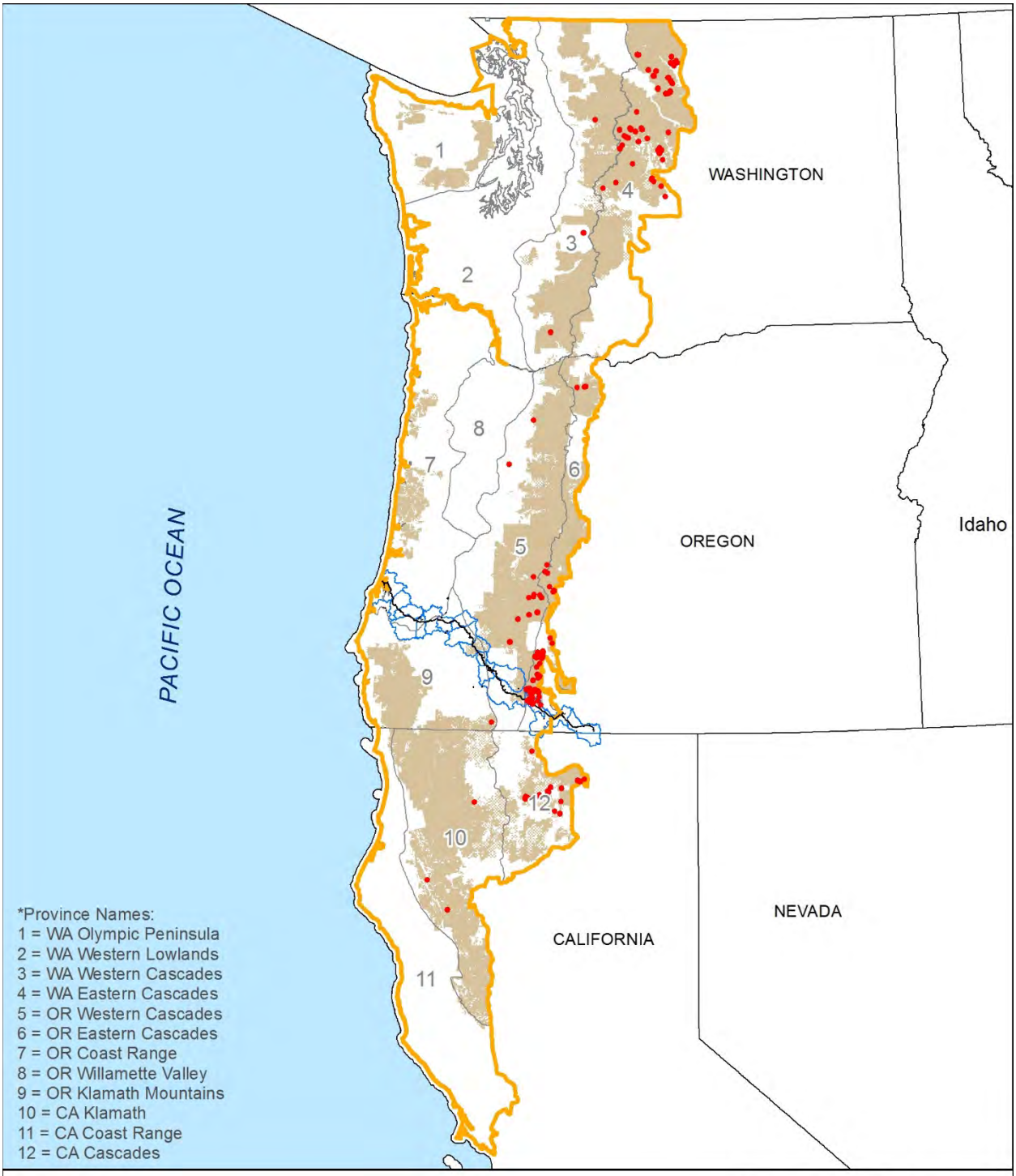


Figure MYOV-1
Regional Distribution of *Mycena overholtsii*

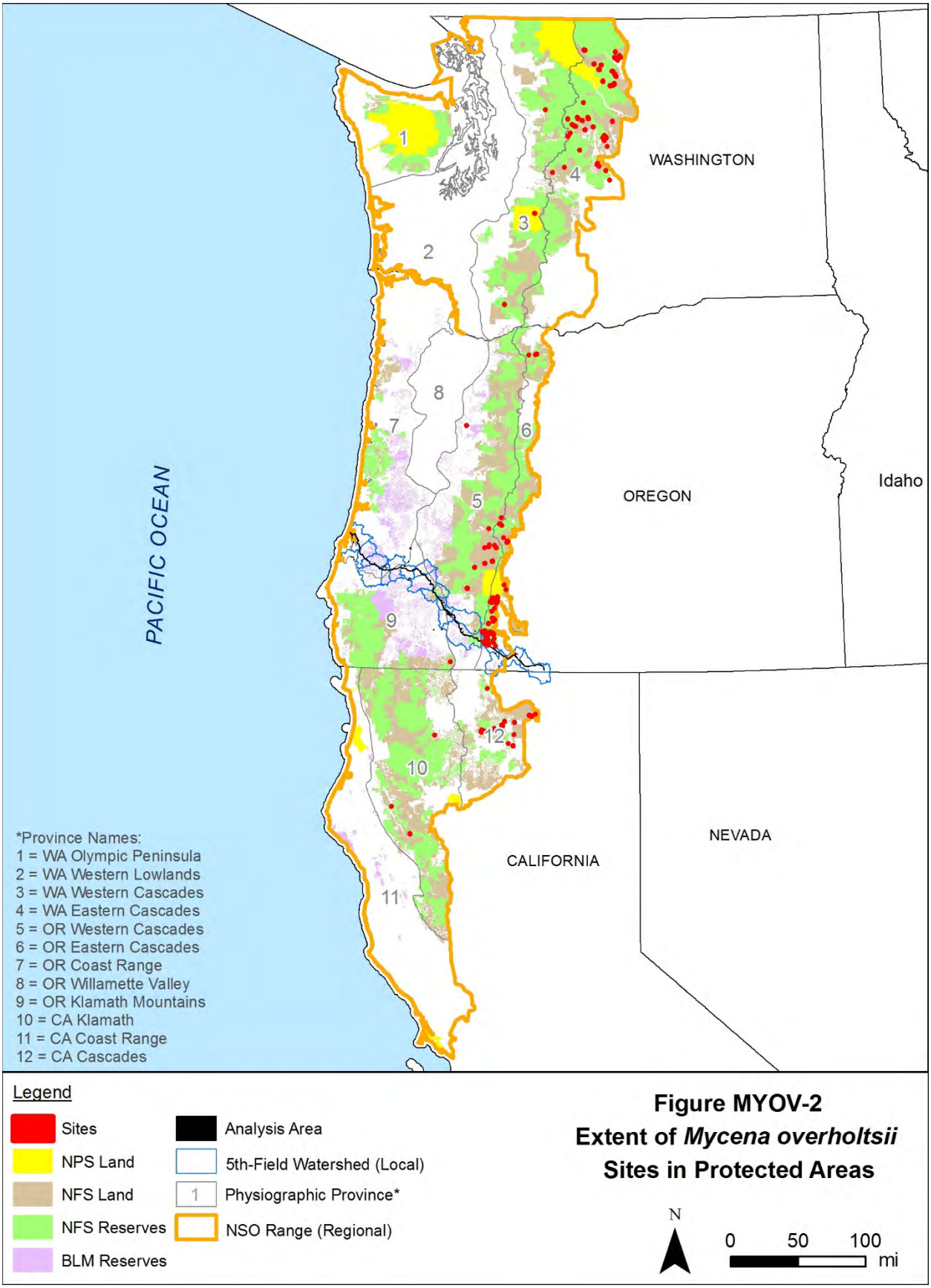


Figure MYOV-2
Extent of *Mycena overholtsii* Sites in Protected Areas

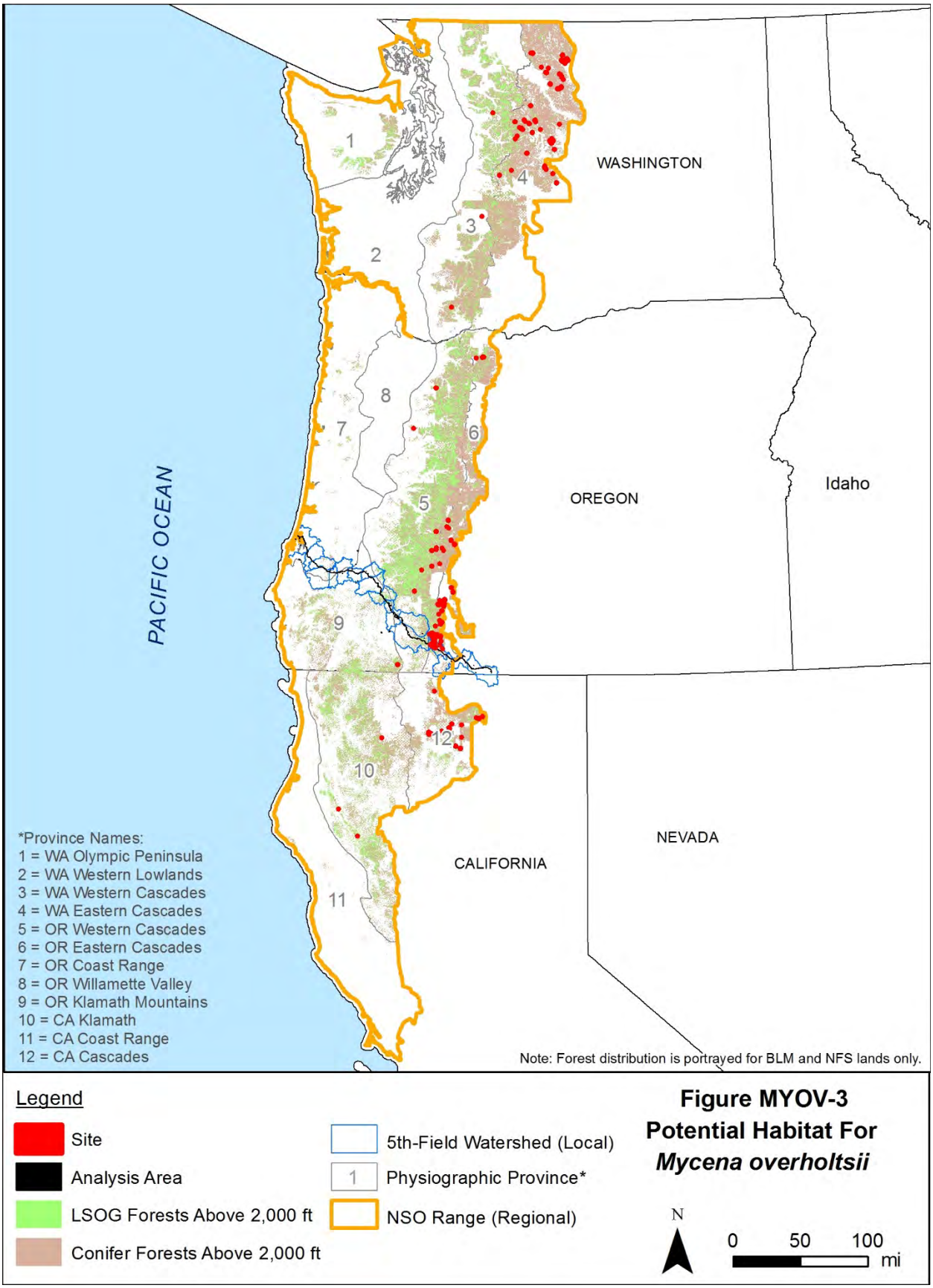


Figure MYOV-3
Potential Habitat For
Mycena overholtsii

Local Distribution

Within the local area, *M. overholtsii* is found in two 5th field watersheds (Little Butte Creek and Spencer Creek) that overlap the project area (see Table MYOV-5 and Figure MYOV-4). The sites are near one another in the Cascade Range in the eastern portion of the local area. Within the Cascade Range, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous forests, and opportunities for dispersal exist within the local area and to nearby regional areas. Many regional sites on NFS lands are located within 10 miles to the north in the Cascade Range.

All of the 10 sites in the local area are on NFS lands (Rogue River-Siskiyou and Fremont-Winema National Forests), and one site is partially on private land. Most of the local sites are on land designated as Other (Matrix). Two sites are in reserves (Congressionally Reserved and LSR), representing 20 percent of the total sites in the local area.

Coniferous forests above 2,000 feet msl encompass approximately 329,776 acres on BLM and NFS lands in the local area, with 180,454 acres in reserve land allocations (55 percent of the forests). Of this acreage, an estimated 104,606 acres are LSOG, including 64,923 acres in reserves (62 percent of the forests). Other sites may also exist in the local area, particularly in the Cascade Range, where surveys have not been completed, based on the number of sites in the local area, distribution of those sites, and the extent of forests that may provide suitable habitat (see Figures MYOV-3 and MYOV-4).

TABLE MYOV-5

Distribution of *Mycena overholtsii* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	-	-	-
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	1 a/	1	-
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	-	-	-
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	-	-	-
Spencer Creek (865)	10 a/	2	-
Trail Creek (804)	-	-	-
Upper Cow Creek (801)	-	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.
a/ Site counts are not additive because one site occurs in both watersheds and the counts overlap.

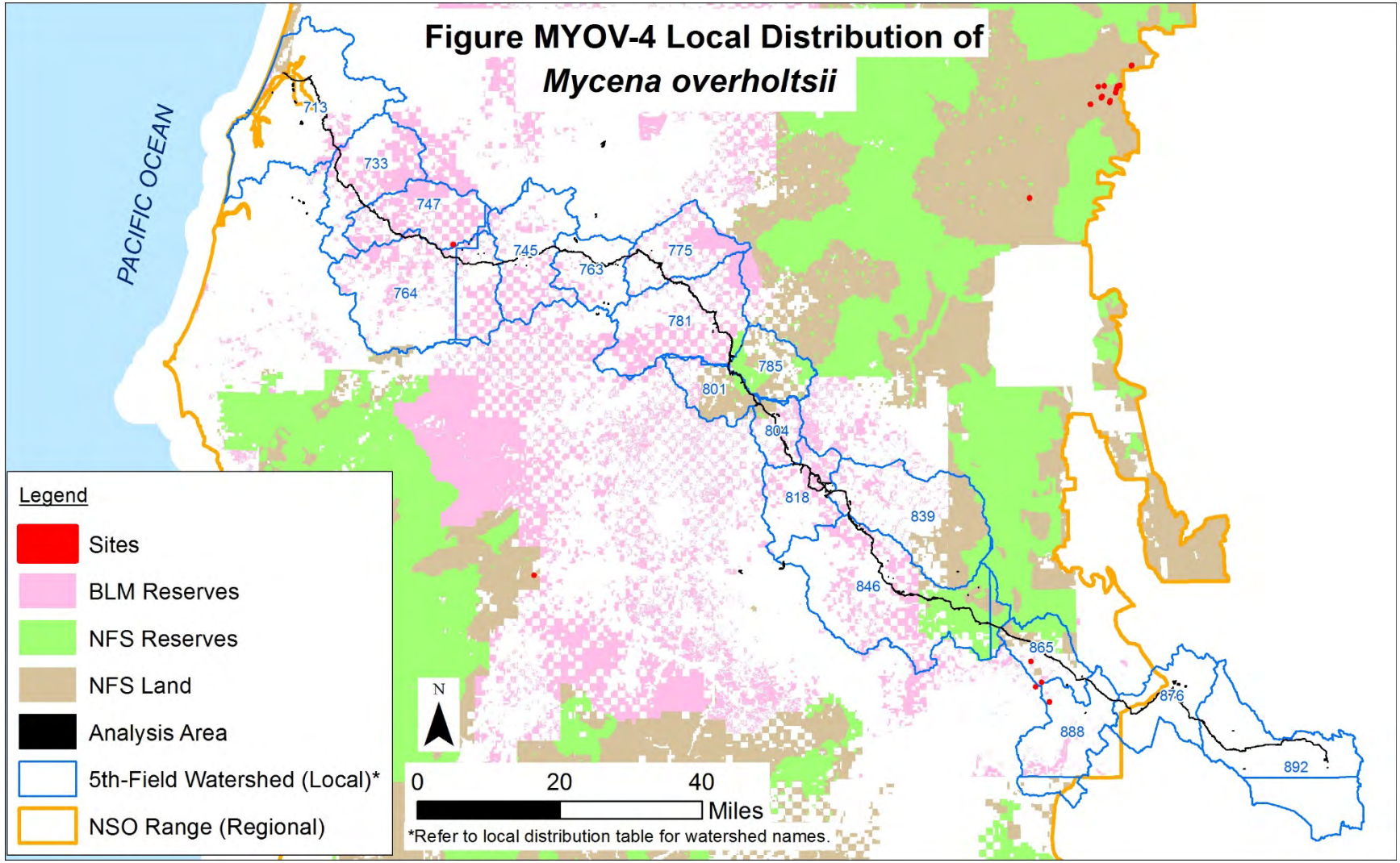


Figure MYOV-4 Local Distribution of
Mycena overholtsii
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis and project areas contain two sites of *M. overholtsii*. These sites are on Forest Service-managed lands (Rogue River-Siskiyou and Fremont-Winema National Forests) on lands designated as Other (Matrix), with one site also partially in an LSR on both National Forests. The sites are located on the eastern side of the analysis area and are near each other. Several sites are located within the immediate vicinity (see Local Distribution discussion above).

Surveys for the PCGP Project resulted in one observation of the species near the project area during 2011 (Siskiyou BioSurvey LLC 2012a). This recorded observation in combination with agency records comprises the two sites in the analysis area. Within the project area, the sites are at MPs 167.9 and MP 171.9.

Project Impacts

Analysis

The PCGP Project would affect two sites out of the 201 sites on NFS lands in the region, representing approximately 1 percent of the sites (or two out of 205 total sites on all lands in the NSO range). Table MYOV-6 presents an overview of the features of the PCGP Project that would affect the *M. overholtsii* sites. The construction corridor and associated storage areas would affect approximately 1.5 acres within the sites (about 27 percent of the sites). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *M. overholtsii* in and near the project area.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 1.0 acre of vegetation and soils within two sites and could result in the removal of *M. overholtsii* populations or individuals. Disturbance in a TEWA would result in similar impacts on less than 0.1 acre within one site. The establishment of the corridor and TEWAs could modify microclimate conditions around populations or individuals adjacent to the corridor. The removal of forests and woody debris could negatively affect *M. overholtsii* in adjacent areas by removing its habitat, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat conditions as a result of the corridor could make habitat within the sites no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Material storage within UCSAs would disturb about 0.4 acre of understory habitat in two sites, potentially making the habitat unsuitable for the species or removing individuals.

TABLE MYOV-6

Impacts to *Mycena overholtsii* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	2	1.0 ac
Temporary Extra Work Area (TEWA)	1	0.1
Uncleared Storage Area (UCSA)	2	0.4
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

Across the project area, the PCGP Project would remove an estimated 628 acres of coniferous forests above 2,000 feet msl, including 166 acres of LSOG coniferous forests. These impacts would result in a reduction of habitat that may be suitable for *M. overholtsii*. Within this impact area, about 328 acres (about 52 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A permanent unforested corridor would remain across the project area, resulting in a permanent loss of about 143 acres of coniferous forests above 2,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests above 2,000 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the two sites as a result of the PCGP Project, eight sites of *M. overholtsii* would remain on NFS lands in the local area, including one entirely in a reserve (Congressionally Reserved area), and 199 sites, including 93 at least partially in reserves, would remain on NFS lands in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but the NFS sites would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 93 sites in reserves are assumed to have additional protections provided by the NWFP Standards and Guidelines in place for those land allocations. Based on these site counts, approximately 47 percent of the remaining *M. overholtsii* sites on NFS lands in the NSO range would be protected in reserves. One additional site located entirely in BLM reserves would remain in the NSO range; this site would likely receive some level of protection under BLM management.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Mycena overholtsii* is a Category D (uncommon) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category D species are not likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information received since the species was listed in the 2001 ROD indicates that the species appears to be more common than previously documented, as described below:

  - *Mycena overholtsii* has a somewhat wide distribution across seven physiographic provinces and three states in the region and a moderate-high number of overall sites (201 on NFS lands, 205 on all lands). The species appears to be well distributed in the eastern Cascade Range in the NSO range, but has a scattered distribution outside the mountain range. The currently known number of sites on NFS and BLM lands has increased by 69 sites since 2007, with one site documented during the PCGP Project surveys.

  - An estimated 46 percent of the sites (95 sites) are in reserves, which is an increase of about 22 sites in reserves since 2006 per Molina (2008).

- Coniferous forests above 2,000 feet msl (general habitat for the species) are somewhat widespread across the eastern part of the NSO range and encompass approximately 14.1 million acres on BLM and NFS lands with an estimated 59 percent in reserves. Most of the forests are found in the Cascade Range and Klamath Mountains, where most sites are documented.

- The PCGP Project would affect two of 201 sites of *M. overholtsii* on NFS lands, representing approximately 1 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the two sites, a moderate-high number of sites (199) would remain on NFS lands in the region with a somewhat wide distribution across Washington, Oregon, and California. Some sites (eight sites) would remain in the local vicinity of the analysis area; these sites would be found in the Cascade Range in one 5th-field watershed. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would affect site persistence at one site in an LSR, but would not change the percentage of sites in reserves (47 percent). Of the remaining sites, 69 are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, and 26 are at least partially in Congressionally Reserved areas where management activities that may adversely affect *M. overholtsii* are unlikely.

- The PCGP Project would result in the permanent loss of an estimated 143 acres of coniferous forests above 2,000 feet msl (less than 1 percent of the total acreage in the NSO range). An estimated 8.3 million acres (59 percent) of coniferous forests and 2.6 million acres (64 percent) of LSOG coniferous forests above 2,000 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *M. overholtsii*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Mycena overholtsii* is a Category D species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

2.20.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *M. overholtsii* at two sites; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 199 sites would remain on NFS lands across the region, and eight sites would remain on NFS lands in the local area. Additionally, one site would remain BLM reserves and one site would remain on NPS lands in the regional area. Although the PCGP Project would affect site persistence of *M. overholtsii* at two sites, these sites are part of a large group of sites in the Cascade Range in southern Oregon where the species is well distributed. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Mycena overholtsii* would persist in the region without considering those sites as part of the population.

- The PCGP Project would remove approximately 628 acres of coniferous forests and 166 acres of LSOG coniferous forests above 2,000 feet msl (a negligible amount of the forests). An estimated 52 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 8.3 million acres (59 percent) of coniferous forests and 2.6 million acres (64 percent) of LSOG coniferous forests above 2,000 feet msl would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 1998.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Although a single natural disturbance event or combination of events could affect a significant portion of sites in one of the two groups of sites in the Cascade Range, several sites are scattered across the region and are less likely to be collectively affected by a single event.

The PCGP Project would not be able to avoid impacts to all *M. overholtsii* sites in the analysis area, although some individuals or populations within the sites may persist following project implementation. Based on the above conclusions, avoidance of the two *M. overholtsii* sites is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plans that apply to the affected sites would waive implementation of Management Recommendations for *M. overholtsii* sites affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

2.21 POLYOZELLUS MULTIPLEX

Polyozellus multiplex is a chanterelle-like mushroom species in the Thelephoraceae family and is commonly known as blue/black chanterelle.

2.21.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *P. multiplex* as a Category B (rare) species. ORBIC evaluated *P. multiplex* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and again in its most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2016, the species was considered to be between not rare and apparently secure, but with cause for long-term concern; and widespread, abundant, and secure within its global range (G4G5) and was considered to be at moderate risk of extinction due to a restricted range, relatively few populations, or recent and widespread declines in Oregon (S3). The species is an ORBIC List 4. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.21.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Little is known about the autecology or reproductive biology of *P. multiplex*. The mushroom is presumed to be ectomycorrhizal, forming symbiotic associations with the roots of conifer trees to obtain minerals, water, and nutrients (Castellano and O'Dell 1997). It is likely long-lived and slow-growing, with a low reproductive rate (ORBIC 2004). It typically grows in clusters (The Fungi of California 2017) and has been documented fruiting from June through September (Castellano et al. 1999). Spores of *P. multiplex* are assumed to disperse by wind and possibly by animal (arthropod) vectors (Castellano and O'Dell 1997).

Range

Polyozellus multiplex is known from North America and Asia (ORBIC 2004; Trappe, pers. comm. 2013). In North America, it has been documented in Canada, Alaska, the Pacific Northwest, New Mexico, Colorado, and from Michigan east to Maine (ORBIC 2004, Castellano et al. 1999). In the Pacific Northwest, the mushroom has been found along the Coast and Cascade ranges in Washington, Oregon, and California. In Oregon, *P. multiplex* has been found in the Cascade Range from Mount Hood to the Rogue River (ORBIC 2004). The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, it was likely similar to the current range, with populations widely distributed in Asia and North America. Local and regional distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported *P. multiplex* from an estimated 57 element occurrences in the Pacific Northwest in 2004. An estimated 33 of these occurrences were in Oregon, with fewer in Washington (22) and California (1) (ORBIC 2004). ORBIC estimated that more than half of the element occurrences were in protected areas in the NSO range in 2004. In 2004, the species was considered uncommon to rare and was presumed to be relatively stable with potential for population declines based on its habitat requirements (ORBIC 2004). The species was not found during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented 45 new sites of *P. multiplex* in the NSO range between 1998 and 2006, and 67 total sites were documented by 2006, including 36 in reserves or protected areas. The 2007 Final SEIS reported 63 sites on NFS and BLM lands and 65 total sites on all lands in the NSO range (USDA and USDI 2007).

Pre-disturbance surveys are not practical for Category B species. Instead, equivalent-effort surveys were conducted during the fall and spring from 2010 to 2016 in old-growth stands in the PCGP Project area and within 100 feet of habitat removal to comply with the Standards and Guidelines for Category B species where strategic surveys are not complete (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). The equivalent-effort surveys targeted all Category B species, including *P. multiplex*, and resulted in one new observation of the species. Additional surveys for other species in LSRs in nearby areas resulted in one incidental observation. Based on the increased number of sites since 1998 with increased surveys (a three-fold increase between 1998 and 2006 per Molina 2008 records), additional survey effort would be expected to locate additional populations within the NSO range. The current estimated number of sites and distribution of the species based on 2017 data are provided below under the Species Distribution.

Habitat

Polyozellus multiplex has primarily been found in LSOG coniferous forests at mid-elevations and demonstrates a preference for older true firs (ORBIC 2004, Castellano et al. 1999). In the Pacific Northwest, it is presumed to be restricted to old-growth coniferous forests based on data available in 2004 (ORBIC 2004). It is primarily found in montane areas and typically near intermittent streams or along the edge of seeps (e.g., in riparian reserves) (Holthausen et al. 1994). This species seems to prefer the specific microclimate conditions of LSOG coniferous forests.

Threats

Threats to *P. multiplex* are actions that affect its host tree and disturb the associated soil and duff, such as road and trail construction, logging, fire management activities, and recreational activities (Castellano and O'Dell 1997). Hot fires, development, pollution, and logging activities could threaten unprotected populations (ORBIC 2004). The species is also collected for commercial uses, which may threaten populations (Holthausen et al. 1994). Other specific threats to the species are not currently known.

Management Recommendations

As a Category B S&M species, the direction under the 2001 ROD is to manage all known sites and reduce the inadvertent loss of undiscovered sites (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. Management recommendations were developed for *P.*

multiplex (Group 6 of Castellano and O'Dell 1997). The primary guidance is to maintain current habitat and microclimate conditions by retaining LSOG forest structure and soil conditions. In order to maintain habitat conditions around known locations, impacts from soil disturbing activities should be minimized and damage to or removal of host trees should be prevented. Known sites on federal land should be managed to include an area that is large enough to maintain the habitat and associated microclimate of the population. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *P. multiplex*:

- As a mycorrhizal species, *P. multiplex* forms symbiotic associations with the fine root systems of plants, growing out into the soil matrix. Consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.21.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *P. multiplex* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites according to the methodology described in Chapter 1. Table POMU-1 shows the total number of known sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 100 observations from BLM and Forest Service geodatabases were converted into 87 sites in the NSO range (region). Table POMU-2 presents the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table POMU-3 presents the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure POMU-1 displays the regional distribution of the species across NFS lands, Figure POMU-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure POMU-3 displays the species' regional distribution with the extent of coniferous forests and LSOG coniferous forests below 6,500 feet msl on BLM and NFS lands within the currently known range of the species.

TABLE POMU-1

Number of *Polyozellus multiplex* Sites (2017)

Location*	Number of Sites
Regional Area	87
Local Area	1
Analysis Area (Project Area)	1 (1)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE POMU-2

Distribution of *Polyozellus multiplex* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	83	1	1
BLM	2	-	-
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	3	-	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE POMU-3

Distribution of *Polyozellus multiplex* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	2	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	20	-	-
Congressionally Reserved (CR)	**24**	**-**	**-**
Late Successional Reserve (LSR)	**17**	**1**	**1**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**1**	**-**	**-**
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	28	-	-
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	**-**	**-**	**-**
District Designated Reserve	**2**	**-**	**-**
Harvest Land Base	-	-	-
Late Successional Reserve	**-**	**-**	**-**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	8
Riparian Reserve	**-**	**-**	**-**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Polyozellus multiplex is somewhat widely distributed across six physiographic provinces in Washington (Western and Eastern Cascades), Oregon (Cascades East and West, and Klamath Mountain), and California (Klamath) (see Figure POMU-1). Most sites are found along the Cascade Range, where the sites tend to be clustered or relatively close to one another in groups. Scattered sites are located in the Klamath Mountains where the species is less abundant. *Polyozellus multiplex* appears to be well distributed in the Cascade Range in Oregon and Washington based on the relative abundance of sites in the mountain range, proximity of sites to one another, and distribution of the sites across forests that may provide suitable habitat.

Three of 87 known sites are at least partially located on other lands; two sites are on BLM lands; and 83 sites are at least partially on NFS lands across the region. Sites included on the National Forests that encompass the project area include 14 sites on the Fremont-Winema National Forest, four sites on the Rogue River-Siskiyou National Forest, and five sites on the Umpqua National

Forest. The remaining 60 sites on NFS lands are on the Deschutes, Gifford Pinchot, Mt. Hood, Okanogan-Wenatchee, and Willamette National Forests.

Across the NSO range, 40 sites are at least partially located in reserve lands managed by the Forest Service, including 17 at least partially in LSRs, one in a Known Owl Activity Center, and 24 at least partially in Congressionally Reserved areas (see Figure POMU-2). This represents 38 percent of the total Forest Service-managed sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. The two sites located on BLM lands in the region are entirely within District Designated Reserves, and would likely receive some protection under BLM reserve management.

Polyozellus multiplex is more common in LSOG forests based on available data (66 of 87 total sites are in LSOG), but is also found in non-LSOG forests. Based on current site locations, the species is primarily found in coniferous forests below about 6,300 feet msl in Oregon and Washington, but it is found at lower elevations (to about 300 feet msl) in California. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous forests, including the LSOG component of these forests, in the NSO range could provide habitat for *P. multiplex* and support additional sites. These forests encompass an estimated 15.8 million acres on BLM and NFS lands in the eastern part of the NSO range, including an estimated 9.6 million acres in reserve land allocations (60 percent of the forests; Table POMU-4). Of this acreage, an estimated 5 million acres are LSOG (see Figure POMU-3), including 3.3 million acres in reserve land allocations (66 percent of the forests). Coniferous forests, including LSOG coniferous forests, below 6,500 feet msl are widespread across the NSO range.

TABLE POMU-4

Extent of Forests That Could Provide Habitat for *Polyozellus multiplex* on NFS and BLM Lands a/

Location	Coniferous Forests below 6,500 feet		LSOG Coniferous Forests below 6,500 feet	
	Total	Reserves	Total	Reserves
Regional Area	15,808,614	9,550,028	4,966,735	3,302,047
Local Area	449,412	281,132	160,690	116,103
Project Area	1,024	691	299	211

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011

Note: Areas are presented in acres.

a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

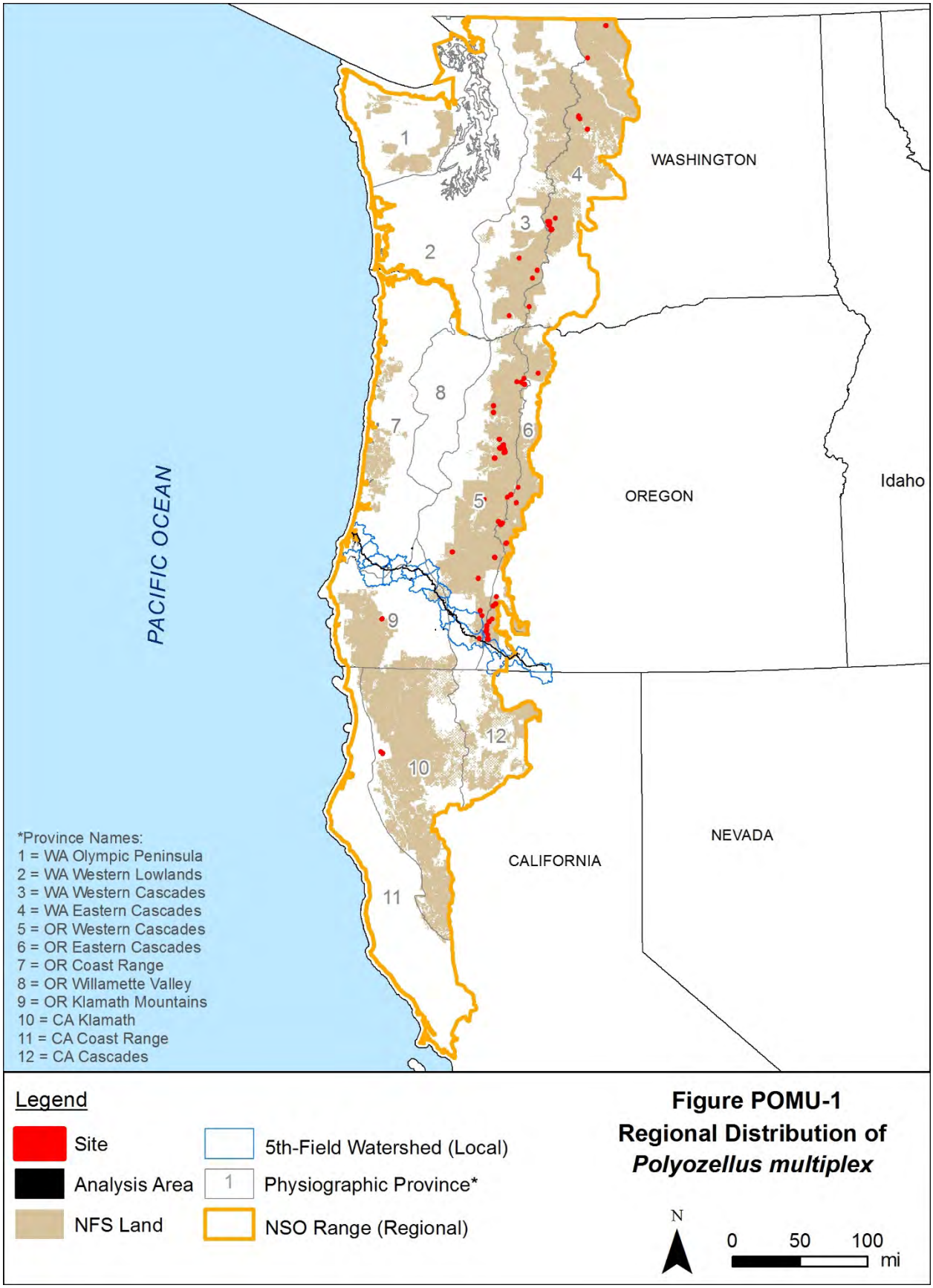


Figure POMU-1
Regional Distribution of *Polyozellus multiplex*

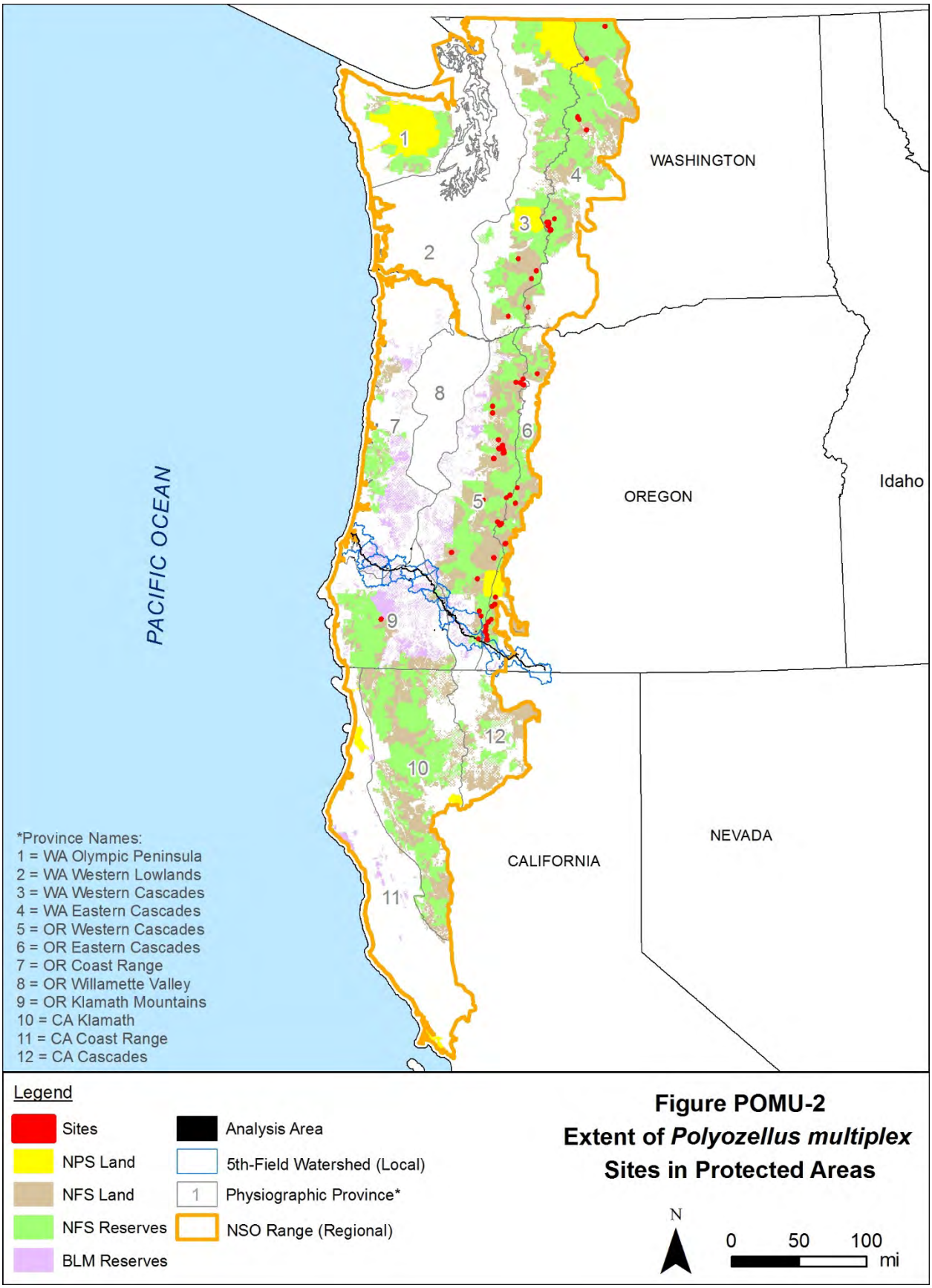


Figure POMU-2
Extent of *Polyozellus multiplex* Sites in Protected Areas

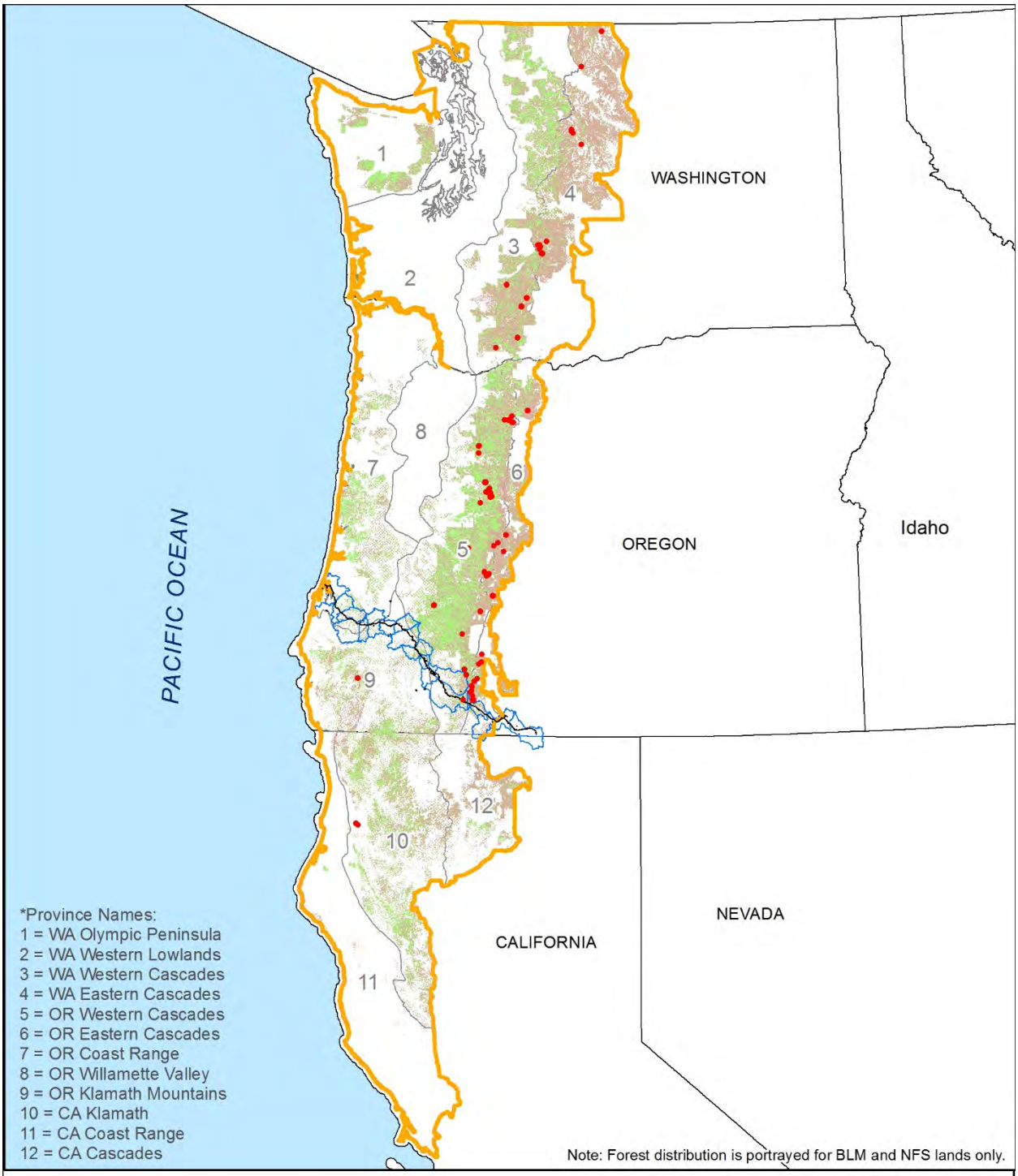


Figure POMU-3
Potential Habitat For
Polyozellus multiplex

Local Distribution

Within the local area, *P. multiplex* is found in one 5th-field watershed (Little Butte Creek) that overlaps the project area (see Table POMU-5 and Figure POMU-4). The site is on NFS land in the Rogue River National Forest and is in an LSR. The site is at the southern extent of the species' currently known range in the Cascade Range, and several other sites are located to the north within about 20 miles of the site. Connectivity may be available between the local site and the other sites in the Cascade Range based on the extent of coniferous forests, and animals and wind could transport spores across suitable habitat within the local area.

Coniferous forests below 6,500 feet msl encompass approximately 449,412 acres on BLM and NFS lands in the local area, with 281,132 acres in reserve land allocations (63 percent of the forests). Of this acreage, an estimated 160,690 acres are LSOG, including 116,103 acres in reserve land allocations (72 percent of the forests). Other sites may also exist in the Cascade Range in the local area where surveys have not been completed, based on the number of sites in nearby areas, distribution of those sites, and the extent of forests that may provide suitable habitat (see Figures POMU-3 and POMU-4).

TABLE POMU-5

Distribution of *Polyozellus multiplex* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	-	-	-
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	1	1	-
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	-	-	-
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	-	-	-
Spencer Creek (865)	-	-	-
Trail Creek (804)	-	-	-
Upper Cow Creek (801)	-	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011

Analysis/Project Area Distribution

The analysis and project areas contain one site of *P. multiplex*. This site is the same one as described in the Local Distribution discussion above.

Surveys for the PCGP Project resulted in two observations of the species in and near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). One of these recorded observations comprises the site in the analysis area. Within the project area, the site is located between MPs 162.4 and 162.5.

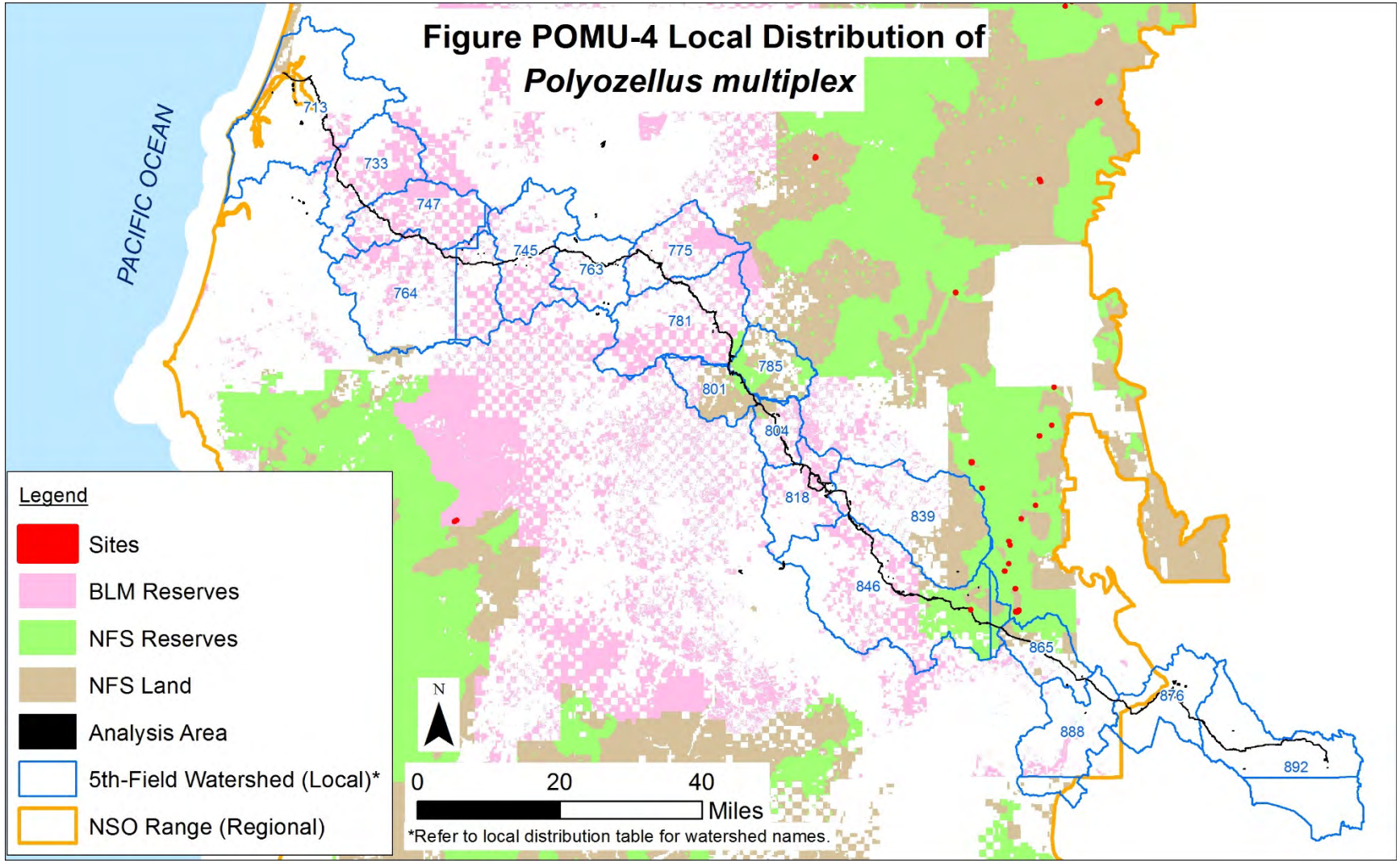


Figure POMU-4 Local Distribution of
Polyozellus multiplex
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Project Impacts

Analysis

The PCGP Project would affect one site out of the 83 sites on NFS lands in the region, representing approximately 1 percent of the sites (or one out of 87 total sites on all lands in the NSO range). Table POMU-6 provides an overview of the features of the PCGP Project that would affect the *P. multiplex* site. The construction corridor and associated storage areas would affect approximately 1.1 acres within the site (about 29 percent of the site). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *P. multiplex* in and near the project area.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 0.9 acre of vegetation and soils within the site and would likely remove individuals of *P. multiplex*. Disturbance in TEWAs would result in similar impacts on approximately 0.2 acre of the site. The establishment of the corridor could modify microclimate conditions in the site after the corridor is established. The removal of forests and host trees and disturbance to soil could negatively affect *P. multiplex* in adjacent areas by removing its habitat, disturbing soil or duff around trees or roots of trees, and affecting its mycorrhizal association with the trees, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat conditions as a result of the corridor and TEWAs could make habitat within the site no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project.

TABLE POMU-6

Impacts to *Polyozellus multiplex* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	1	0.9 ac
Temporary Extra Work Area (TEWA)	1	0.2 ac
Uncleared Storage Area (UCSA)	-	-
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because the site would be subject to impacts from multiple project activities.

Across the project area, the PCGP Project would remove an estimated 819 acres of coniferous forests, including 229 acres of LSOG coniferous forests, below 6,500 feet msl. These impacts would result in a reduction of habitat that may be suitable for *P. multiplex*. Within this impact area, about 428 acres (52 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 190 acres of coniferous forests below 6,500 feet msl. This

loss of forests represents less than 1 percent of the total estimated area of coniferous forests below 6,500 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the site as a result of the PCGP Project, no sites of *P. multiplex* would remain in the local area, and 82 sites, including 39 in reserves, would remain on NFS lands in the NSO range. An additional two sites would remain entirely in BLM reserves in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but the NFS sites would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 39 sites in NFS reserves are assumed to have additional protections provided by the NWFP Standards and Guidelines in place for those land allocations. While the two sites in BLM reserves are not subject to S&M Standards and Guidelines protections, they would likely receive some level of protection under BLM management. Based on these site counts, approximately 48 percent of the remaining *P. multiplex* sites on federal lands in the NSO range would be protected in either NFS or BLM reserves.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Polyozellus multiplex* is a Category B (rare) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category B species are likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information received since the species was listed in the 2001 ROD, however, indicates that the species appears to be more common than previously documented, as described below:

    - *Polyozellus multiplex* has a somewhat wide distribution across six physiographic provinces and three states in the region and a moderate-high number of overall sites (83 on NFS lands, 87 on all lands). The species appears to be well distributed in the Cascade Range in Oregon and Washington and is less common in the Klamath Mountains. The currently known number of sites on NFS and BLM lands has increased by 22 sites since 2007, with some sites documented during the PCGP Project surveys.

    - An estimated 49 percent of the sites (42 sites) on federal lands are at least partially in reserves, which is an increase of about six sites in reserves since 2006 per Molina (2008).

- Coniferous forests below 6,500 feet msl (general habitat for the species) are widespread across the eastern part of the NSO range and encompass approximately 15.8 million acres on BLM and NFS lands with an estimated 60 percent in reserves. Most of the forests, including most LSOG coniferous forests, are found in the Cascade Range and Klamath Mountains, where most sites are documented.

- The PCGP Project would affect one of 83 sites of *P. multiplex* on NFS lands, representing approximately 1 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the site, a moderate-high number of sites (82) would remain on NFS lands in the region with a somewhat wide distribution across Washington, Oregon, and California. No sites would remain in the local vicinity of the analysis area; however, many sites are located on NFS lands within 10 miles east and northeast of the affected site. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would affect site persistence at one site in an LSR, but the percentage of sites in NFS reserves would be about the same (48 percent). Of the remaining sites, 16 are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, and 24 are at least partially in Congressionally Reserved areas where management activities that may adversely affect *P. multiplex* are unlikely. The two sites on BLM lands in the region would remain entirely within District Designated reserves, where management activities that may adversely affect *P. multiplex* are unlikely.

- The PCGP Project would result in a permanent loss of an estimated 190 acres of coniferous forests below 6,500 feet msl (less than 1 percent of the total acreage in the NSO range). An estimated 9.6 million acres (60 percent) of coniferous forests and 3.3 million acres (66 percent) of LSOG coniferous forests below 6,500 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *P. multiplex*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Polyozellus multiplex* is a Category B species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

2.21.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *P. multiplex* at one site on NFS lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 82 sites would remain on NFS lands across the region, although no sites would remain in the local area. An additional two sites would remain entirely in BLM reserves in the region. Although the PCGP Project would affect site persistence of *P. multiplex* at one site, this site is part of a large group of sites in the Cascade Range in Oregon where the species is locally abundant and well distributed. Many sites are located within 10 miles east and northeast of the affected site. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Polyozellus multiplex* would persist in the region without considering the site as part of the population.

- The PCGP Project would remove approximately 819 acres of coniferous forests and 229 acres of LSOG coniferous forests below 6,500 feet msl (a negligible amount of the forests). An estimated 52 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 9.6 million acres (60 percent) of coniferous forests and 3.3 million acres (66 percent) of LSOG coniferous forests below 6,500 feet msl would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 1998.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely in BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is widely distributed.

The PCGP Project would not be able to avoid impacts to the *P. multiplex* site in the analysis area, although some individuals within the site may persist following project implementation. Based on the above conclusions, avoidance of the *P. multiplex* site is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plan that applies to the affected site would waive implementation of Management Recommendations for the *P. multiplex* site affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near the affected site over the long term. The monitoring plan shall be approved by the Forest Service.

2.22 RAMARIA ARAIOSPORA

Ramaria araiospora is a coral mushroom species in the Gomphaceae family (formerly in the Ramariaceae family) and is commonly known as red coral mushroom. Two varieties are known: *Ramaria araiospora* var. *rubella* and *Ramaria araiospora* var. *araiospora*.

2.22.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *R. araiospora* as a Category B (rare) species. ORBIC evaluated *R. araiospora* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004), but it was not included in the most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2004, the species was considered to be uncommon but not rare with some cause for long-term concern due to declines or other factors within its global range and in Oregon (G4, S4, respectively). The species is not currently on any ORBIC lists. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.22.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The

background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Relatively little is known about the autecology or reproductive biology of *R. araiospora*. It is presumed to be ectomycorrhizal, forming symbiotic associations with conifer trees for translocation of minerals, water, and nutrients (Castellano and O'Dell 1997). *Ramaria araiospora* fruits in humus or soil and matures above the ground, and has been documented fruiting primarily in fall between October and November (Castellano et al. 1999, Exeter et al. 2006). Spore dispersal is assumed to be via wind and possibly animals (arthropods) (Castellano and O'Dell 1997).

Range

Ramaria araiospora is endemic to the Pacific Northwest (ORBIC 2004). It is known from Pierce County, Washington to Mendocino County, California (Castellano and O'Dell 1997). Based on data available in 1997, the majority of populations in Oregon were in five areas within the Cascade and Coast Ranges: 1) Mt. Hood National Forest, 2) scattered clusters from the northern Willamette National Forest to the southeastern Salem District, 3) the southwest Salem District, 4) Coos Bay District, and 5) two small clusters in the Umpqua National Forest. The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, it may have been similar to the current range, with populations limited to the Pacific Northwest. It may have had more abundant local distributions across its range, but habitat modifications and other environmental factors, as discussed below under Threats, have likely reduced available habitat and may have further restricted the species' distribution.

Population Status

ORBIC (2004) reported *R. araiospora* from an estimated 93 element occurrences in the Pacific Northwest in 2004. An estimated 44 of these occurrences were in Oregon, with fewer in California (6) and Washington (6) (ORBIC 2004). The species was found in 11 locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented 111 new sites of *R. araiospora* in the NSO range between 1998 and 2006, and 131 total sites were documented by 2006, including 43 in reserves or protected areas. The 2007 Final SEIS reported 109 sites on NFS and BLM lands and 122 total sites on all lands in the NSO range (USDA and USDI 2007).

Pre-disturbance surveys are not practical for Category B species. Instead, equivalent-effort surveys were conducted during the fall and spring from 2010 to 2016 in old-growth stands in the PCGP Project area and within 100 feet of habitat removal to comply with the Standards and Guidelines for Category B species where strategic surveys are not complete (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). The equivalent-effort surveys targeted all Category B species, including *R. araiospora*, and resulted in six new observations of individuals or populations of *R. araiospora*. Additional surveys for *R. araiospora* in LSRs in nearby areas resulted in one additional observation of the species. Based on the relatively high number of sites and the increased number of sites since 1998 with increased surveys (a six-fold increase between 1998 and

2006 per Molina 2008 records), it is likely that this species is more abundant than previously known, and more survey effort would be expected to locate additional populations within the NSO range. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Ramaria araiospora has been mostly found in LSOG forests, but populations have also been found in younger forests adjacent to LSOG stands (Hibler et al. 2001b). It is primarily found in coniferous forests (Exeter et al. 2006) and appears to require conifer trees to form mycorrhizal relationships (Hibler et al. 2001b). The mushroom grows in humus or soil where it is associated with true firs, Douglas-fir, western hemlock, and Sitka spruce (*Picea sitchensis*) (Castellano et al. 1999, Trappe, pers. comm. 2013). Based on data available in 2007, it has been found below about 5,300 feet msl (Cushman and Huff 2007). *Ramaria araiospora* may prefer specific microclimate conditions of LSOG forests, but it may not be restricted to these conditions.

Threats

Threats to *R. araiospora* are presumably actions that affect its host tree and disturb the soil, such as road and trail construction, logging, and campground establishment (Castellano and O'Dell 1997). Other specific threats to the species are not currently known.

Management Recommendations

As a Category B S&M species, the direction under the 2001 ROD is to manage all known sites and reduce the inadvertent loss of undiscovered sites (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. Management recommendations were developed for *R. araiospora* with other *Ramaria* spp. (Group 7 of Castellano and O'Dell 1997). The primary guidance is to maintain current habitat and microclimate conditions by retaining forest structure and soil conditions. In order to maintain habitat conditions around known locations, impacts from soil disturbing activities should be minimized and damage to or removal of host trees should be prevented. Known sites on federal land should be managed to include an area that is large enough to maintain the habitat and associated microclimate of the population. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *R. araiospora*:

- As a mycorrhizal species, *R. araiospora* forms symbiotic associations with the fine root systems of plants, growing out into the soil matrix. Consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.22.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *R. araiospora* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table RAAR-1 shows the total number of known sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 196 observations from BLM and Forest Service geodatabases were converted into 152 sites in the NSO range (region). Table RAAR-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table RAAR-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure RAAR-1 displays the regional distribution of the species across NFS lands, Figure RAAR-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure RAAR-3 displays the species' regional distribution as well as the extent of coniferous and mixed hardwood-coniferous forests and LSOG forests below 6,000 feet msl on BLM and NFS lands within the currently known range of the species.

TABLE RAAR-1

Number of *Ramaria araiospora* Sites (2017)

Location*	Number of Sites
Regional Area	152
Local Area	14
Analysis Area (Project Area)	3 (3)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE RAAR-2

Distribution of *Ramaria araiospora* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	69	1	1
BLM	76	13	2
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	17	5	1

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE RAAR-3

Distribution of *Ramaria araiospora* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	26	-	-
Adaptive Management Reserves (AMR)	3	-	-
Administratively Withdrawn (AW)	-	-	-
Congressionally Reserved (CR)	**4**	**-**	**-**
Late Successional Reserve (LSR)	**18**	**-**	**-**
Marbled Murrelet Area (LSR3)	**2**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**2**	**-**	**-**
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-

TABLE RAAR-3

Distribution of *Ramaria araiospora* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Other (Matrix, Other)	19	1	1
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	**5**	**-**	**-**
District Designated Reserve	**17**	**1**	**-**
Harvest Land Base	35	1	-
Late Successional Reserve	**42**	**13**	**2**
Not Designated (ND)	2	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**41**	**9**	**-**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Ramaria araiospora is somewhat widely distributed across seven physiographic provinces in Washington (Western Cascades and Olympic Peninsula), Oregon (Coast Range, Cascades West, and Klamath Mountains), and California (Klamath and Coast) (see Figure RAAR-1). Most sites are found along the western Cascade Range and Coast Range in Oregon, where the sites tend to be clustered or relatively close to one another in groups. Scattered sites are located in California and Washington in the Coast Range, Klamath Mountains, and Olympic Peninsula. *Ramaria araiospora* appears to be well distributed in the Coast Range and western Cascade Range in Oregon based on the abundance and size of sites, proximity of sites to one another, and distribution of sites across forests that may provide suitable habitat in the mountain ranges.

Seventeen of 152 known sites are at least partially located on private, state, or other lands, 69 sites are located on NFS lands across the region, and 76 sites are at least partially located on BLM lands. Sites included on the National Forests that encompass the project area include 12 sites on the Umpqua National Forest. Sites included on other National Forests include four on the Gifford Pinchot National Forest, one on the Mt. Baker-Snoqualmie National Forest, five on the Mt. Hood National Forest, one on the Olympic National Forest, 15 on the Siuslaw National Forest, one on the Six-Rivers National Forest, and 31 on the Willamette National Forest.

Across the NSO range, 26 sites are at least partially located in NFS reserve lands, including 18 in LSRs, two in Marbled Murrelet Areas, two in Known Owl Activity Centers, and four in Congressionally Reserved areas (see Figure RAAR-2). This represents 38 percent of the total NFS-managed sites in the region. The remaining NFS-managed sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 39 sites are located entirely in reserve lands managed by BLM, which represents 51 percent of the total number of BLM-managed sites in the region. While the 39 sites in BLM reserves are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management.

Ramaria araiospora is primarily found in LSOG forests based on available data (142 of 152 total sites are in LSOG), but it is also found in non-LSOG forests and has been found in younger forests

near LSOG stands. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous forests below about 6,000 feet msl and has only been documented in the western part of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous and mixed hardwood-coniferous forests, including the LSOG component of these forests in the NSO range could provide habitat for *R. araiospora* and support additional sites. These forests encompass an estimated 18.1 million acres on BLM and NFS lands in the NSO range, including an estimated 10.7 million acres in reserve land allocations (59 percent of the forests; Table RAAR-4). Of this acreage, an estimated 5.9 million acres are LSOG (see Figure RAAR-3), including 3.9 million acres in reserve land allocations (66 percent of the forests). Although coniferous and mixed hardwood-coniferous forests below 6,000 feet msl are widespread across the western part of the NSO range, LSOG forests are less common.

TABLE RAAR-4

Extent of Forests That Could Provide Habitat for *Ramaria araiospora* on NFS and BLM Lands a/

Location	Coniferous and Mixed Forests below 6,000 feet		LSOG Forests below 6,000 feet	
	Total	**Reserves**	**Total**	**Reserves**
Regional Area	18,055,593	10,707,574	5,908,944	3,894,277
Local Area	568,307	369,371	181,349	133,178
Project Area	1,419	982	323	230

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

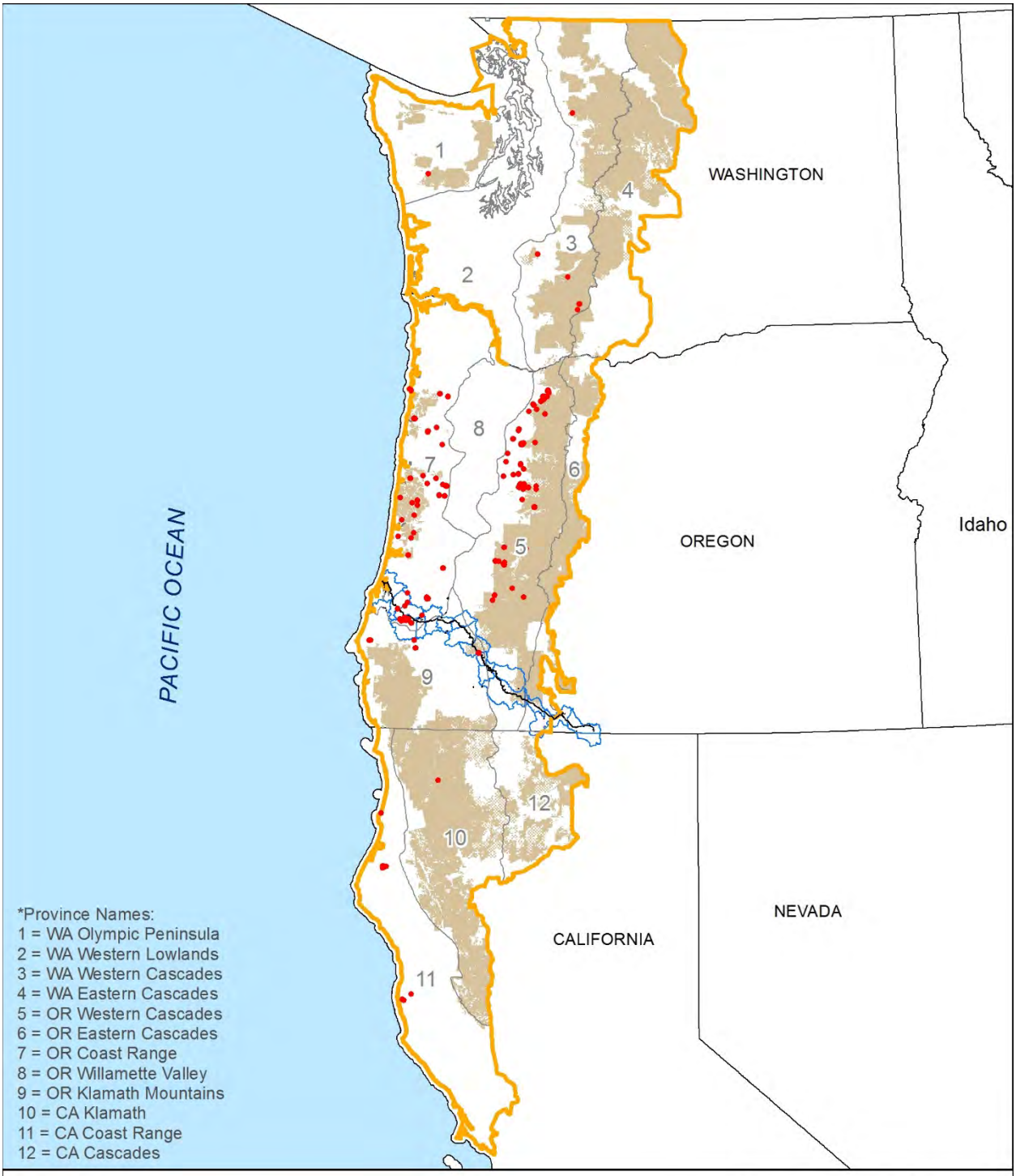


Figure RAAR-1
Regional Distribution of *Ramaria araiospora*

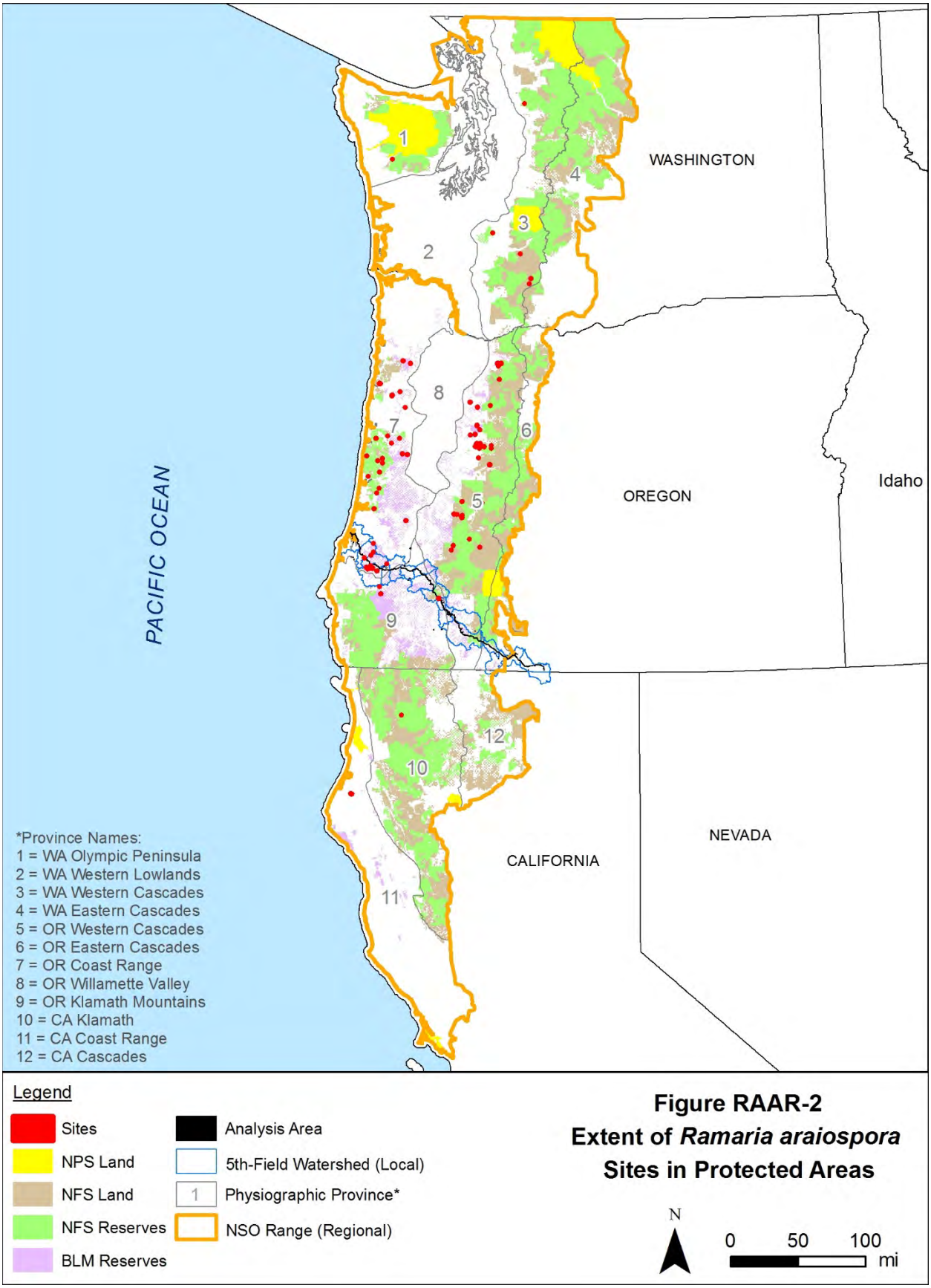
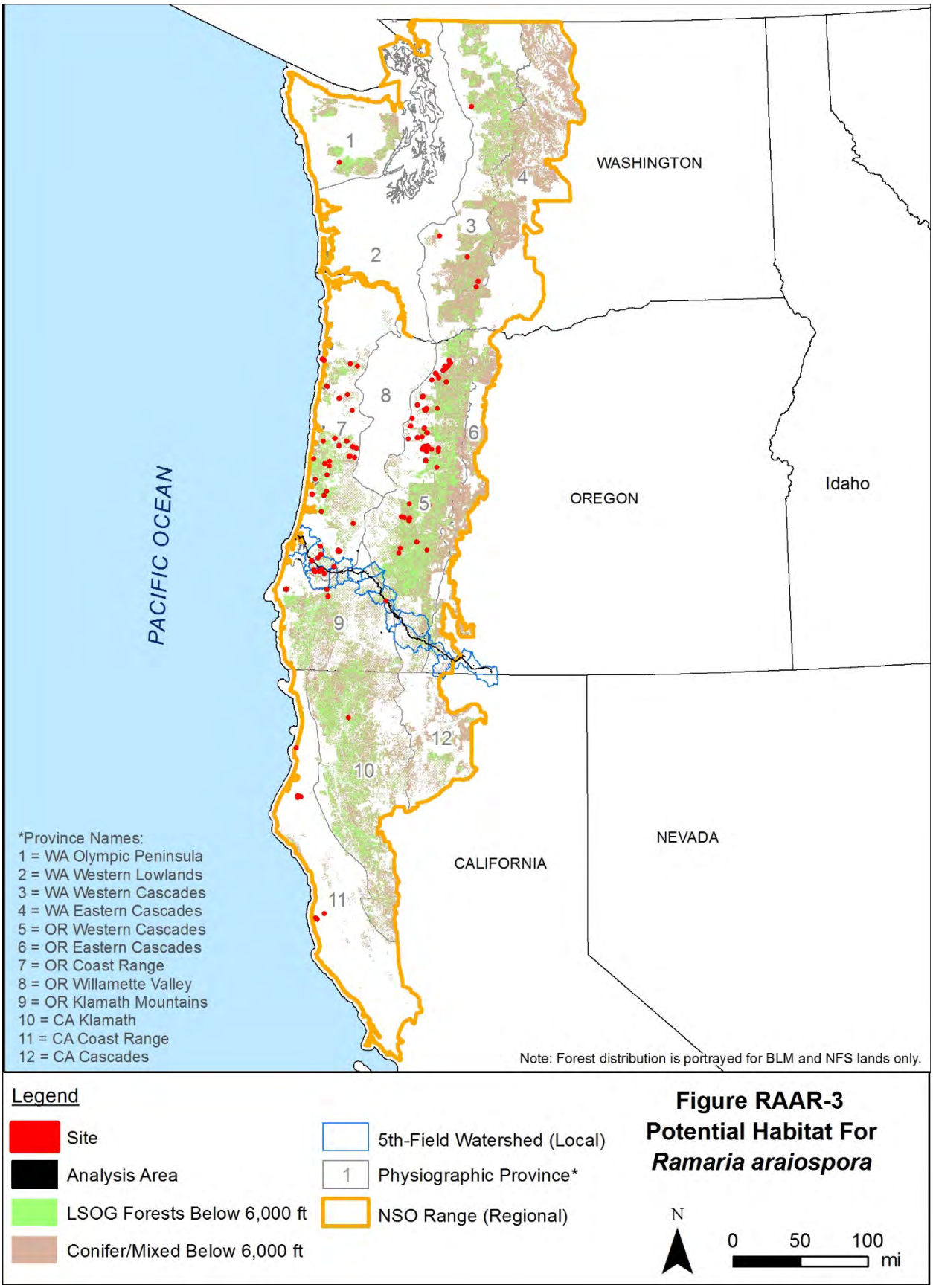


Figure RAAR-2
Extent of *Ramaria araiospora* Sites in Protected Areas


PACIFIC OCEAN
WASHINGTON
OREGON
Idaho
NEVADA
CALIFORNIA
1
2
3
4
5
6
7
8
9
10
11
12
*Province Names:
1 = WA Olympic Peninsula
2 = WA Western Lowlands
3 = WA Western Cascades
4 = WA Eastern Cascades
5 = OR Western Cascades
6 = OR Eastern Cascades
7 = OR Coast Range
8 = OR Willamette Valley
9 = OR Klamath Mountains
10 = CA Klamath
11 = CA Coast Range
12 = CA Cascades
Note: Forest distribution is portrayed for BLM and NFS lands only.
Legend
Site
Analysis Area
LSOG Forests Below 6,000 ft
Conifer/Mixed Below 6,000 ft
5th-Field Watershed (Local)
Physiographic Province*
NSO Range (Regional)
Figure RAAR-3
Potential Habitat For
Ramaria araiospora
N
0
50
100
mi

Local Distribution

Within the local area, *R. araiospora* is found in four 5th-field watersheds that overlap the project area (see Table RAAR-5 and Figure RAAR-4). Most sites are clustered and near one another in the Middle Fork and North Fork Coquille River, and East Fork Coquille River watersheds in the western portion of the local area. Several sites are located on NFS lands in the regional area within about 30 miles north in the Coast Range. A single site is located in the Trail Creek watershed in the central portion of the local area. This site is somewhat distant from other sites; the nearest sites are more than 35 miles north in the Cascade Range on NFS lands. Across the watersheds, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous and mixed forests, and opportunities for dispersal exist within the local area and to nearby regional areas.

One of the 14 sites in the local area is entirely on NFS land designated as Other (Matrix), 13 sites are at least partially located on BLM lands, and five are at least partially located on private lands. Of the 13 sites located on BLM lands, 12 are located entirely in reserves including LSRs and Riparian Reserves, representing 92 percent of all BLM sites in the local area.

TABLE RAAR-5

Distribution of *Ramaria araiospora* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	-	-	-
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	1	-	1
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	-	-	-
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	8	-	8
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	-	-	-
North Fork Coquille River (733)	4	-	4
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	-	-	-
Spencer Creek (865)	-	-	-
Trail Creek (804)	1	-	-
Upper Cow Creek (801)	-	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.

Coniferous and mixed hardwood-coniferous forests below 6,000 feet msl encompass approximately 568,307 acres on BLM and NFS lands in the local area, with 369,371 acres in reserve land allocations (65 percent of the forests). Of this acreage, an estimated 181,349 acres are LSOG, including 133,178 acres in reserves (73 percent of the forests). Other sites may also exist in the Coast Range in the local area where surveys have not been completed, based on the number of sites concentrated in the mountain range in the local and nearby regional areas and the extent of forests that may provide suitable habitat (see Figures RAAR-3 and RAAR-4).

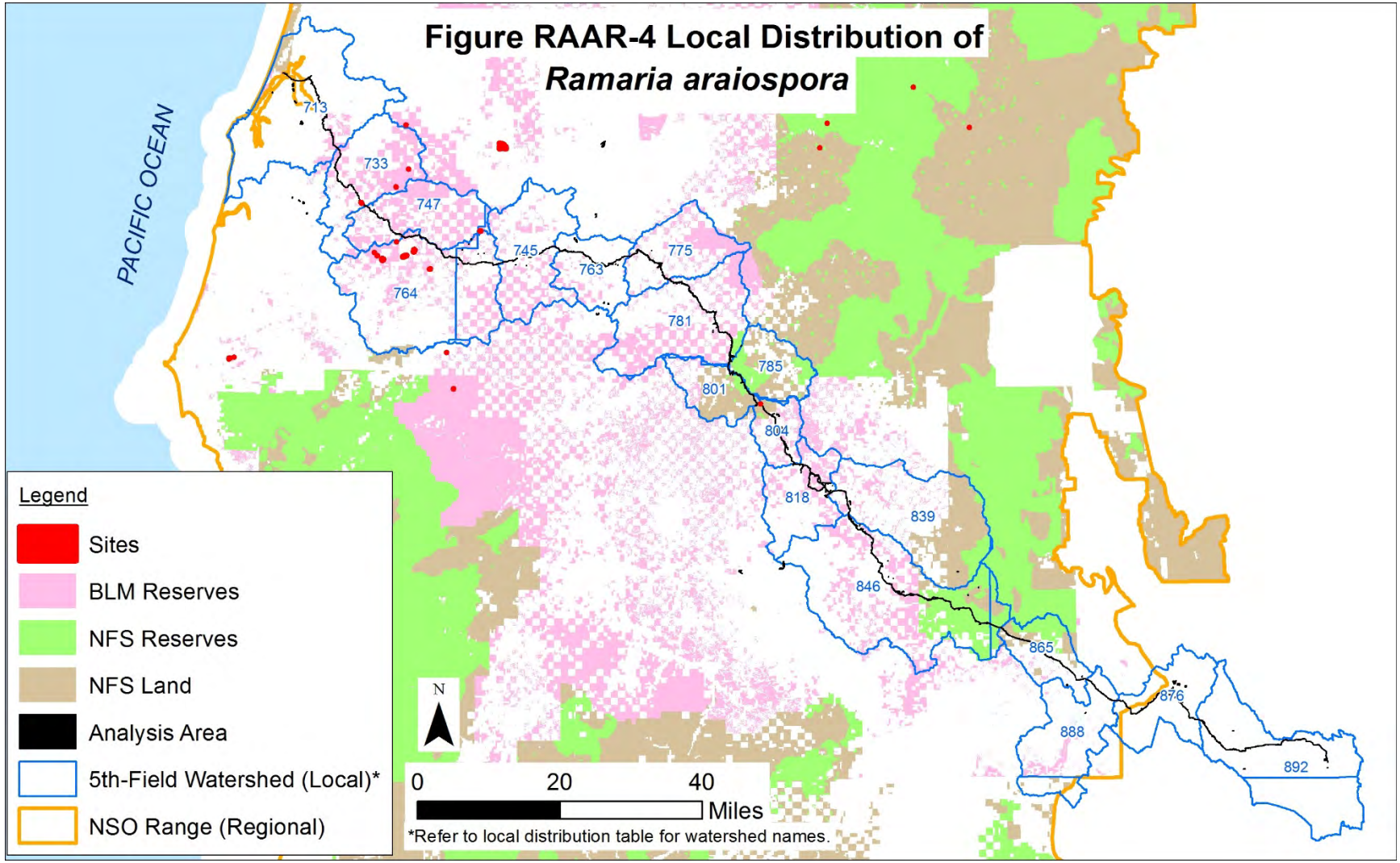


Figure RAAR-4 Local Distribution of
Ramaria araiospora
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis and project areas contain three sites of *R. araiospora*, one of which is located entirely on NFS lands designated as Other (Matrix), one is located entirely on BLM lands designated as LSR, and the third is partially on BLM lands and partially on private lands. The analysis area sites are distributed across two 5th-field watersheds (North Fork Coquille River and Trail Creek). The sites in the North Fork Coquille River watershed are on BLM lands and clustered near one another, while the site in the Trail Creek watershed is on NFS lands and somewhat distant from other sites (see Local Distribution discussion above). Several sites are also located within the immediate vicinity of the analysis area, including several entirely in BLM reserves within 10 miles in the North Fork and Middle Fork Coquille River watersheds.

Surveys for the PCGP Project resulted in seven total observations of the species in four locations in or near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). Six recorded observations comprise the three sites in the analysis area. Within the project area, two sites are between MPs 27.2 and 27.5, and one site is at MP 111.2.

Project Impacts

Analysis

The PCGP Project would affect one out of the 69 sites on NFS-managed lands in the region, representing approximately 1 percent of the sites. Site impacts on other land ownerships include two sites affected on BLM lands. The total number of sites affected is three sites out of the 152 total sites on all lands. Table RAAR-6 provides an overview of the features of the PCGP Project that would affect the *R. araiospora* site on NFS land. The construction corridor and associated work areas would affect approximately 1.1 acres within the site (about 41 percent of the site). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *R. araiospora* in and near the project area.

TABLE RAAR-6

Impacts to *Ramaria araiospora* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	1	0.7 ac
Temporary Extra Work Area (TEWA)	1	0.1 ac
Uncleared Storage Area (UCSA)	1	0.3 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 0.7 acre of vegetation and soil within the site and could result in the removal of *R. araiospora* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about 0.1 acre within the site. The establishment of the corridor could modify microclimate conditions around populations or individuals adjacent to the corridor. The removal of forests and host trees

and disturbance to soil could negatively affect *R. araiospora* in adjacent areas by removing its habitat, disturbing soil or duff around trees or roots of trees, and affecting its mycorrhizal association with the trees, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat conditions as a result of the corridor and TEWAs could make habitat within the site no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Material storage within UCSAs would disturb about 0.3 acre of understory habitat in the site, which could modify microhabitats near extant populations or individuals, potentially making the habitat no longer suitable for the species.

Across the project area, the PCGP Project would remove an estimated 1,142 acres of coniferous and mixed hardwood-coniferous forests below 6,000 feet msl, including 249 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *R. araiospora*. Within this impact area, about 567 acres (about 50 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 246 acres of coniferous and mixed forests below 6,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous and mixed forests below 6,000 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the single site on NFS lands as a result of the PCGP Project, no *R. araiospora* sites would remain on NFS lands in the local area, and 68 sites, including 26 in reserves, would remain on NFS lands in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but they would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 26 sites in NFS reserves are assumed to have additional protections provided by the NWFP Standards and Guidelines in place for those land allocations. Based on these site counts, approximately 38 percent of the remaining *R. araiospora* sites on NFS lands in the NSO range would be protected in reserves.

The PCGP project may also affect two sites on BLM lands. Assuming persistence cannot be maintained at the two sites, 11 sites would remain on BLM lands in the local area, including 10 entirely in reserves, and 74 sites, including 37 entirely in reserves would remain on BLM lands in the NSO range. While sites on BLM lands are not subject to S&M Standards and Guidelines protections, sites in reserves would likely receive some level of protection under BLM management.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this

approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Ramaria araiospora* is a Category B (rare) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category B species are likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information received since the species was listed in the 2001 ROD, however, indicates that the species appears to be more common than previously documented, as described below:

  - *Ramaria. araiospora* has a somewhat wide distribution across seven physiographic provinces and three states in the region and a moderate-high number of overall sites (69 on NFS lands, 152 on all lands). The species appears to be well distributed in the Coast Range and western Cascade Range in Oregon, but is less abundant in other parts of the region. The currently known number of sites on NFS and BLM lands has increased by 36 sites on NFS and BLM lands since 2007, with some sites documented during the PCGP Project surveys.

  - An estimated 55 percent of the sites (65 sites) are in reserves, which is an increase of about 22 sites in reserves since 2006 per Molina (2008).

- Coniferous and mixed hardwood-coniferous forests below 6,000 feet msl (general habitat for the species) are widely distributed across the NSO range and encompass approximately 18.1 million acres on BLM and NFS lands with an estimated 59 percent in reserves. Most of the forests are found in the Cascade Range, where most sites are documented, and in the Klamath Mountains, where some sites are documented. The Coast Range and other areas also contain coniferous and mixed hardwood-coniferous forests, and many sites are located in the Coast Range.

- The PCGP Project would affect one of 69 sites of *R. araiospora* on NFS lands, representing approximately 1 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the single site, a moderate-high number of sites (68) would remain on NFS lands in the region and 37 sites would remain entirely in BLM reserves in the region, with a somewhat wide distribution across Washington, Oregon, and California. While no sites would remain on NFS land in the local area, 10 sites would remain entirely in BLM reserves in the local area. The single site affected is fairly isolated, with the nearest sites located 35 miles to the north on NFS lands and 40 miles to the west in BLM reserves. Known observations of the species tend to be scattered in the vicinity of the affected site (the Cascades and Klamath Mountains in southern Oregon) and the removal of a single site would not significantly change its scattered distribution. Many sites would remain nearby in the Coast Range in southern Oregon, where the species is locally abundant. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be fairly similar to the currently documented distribution and range.

- The PCGP Project would not affect any sites in NFS reserves, and the percentage of sites in NFS reserves would be about the same (38 percent). Of the remaining sites, 22 are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and four are in Congressionally Reserved areas where management activities that

may adversely affect *R. araiospora* are unlikely. An additional 37 sites would remain entirely in BLM reserves, including LSRs where management actions are restricted to those activities that benefit LSOG forests, Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species, and Congressional Reserves and District Designated Reserves where management activities that may adversely affect *R. araiospora* are unlikely.

- The PCGP Project would result in a permanent loss of an estimated 246 acres of coniferous and mixed hardwood-coniferous forests below 6,000 feet msl (less than 1 percent of the total acreage in the NSO range). An estimated 10.7 million acres (59 percent) of coniferous and mixed forests and 3.9 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *R. araiospora*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Ramaria araiospora* is a Category B species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO, particularly in the Coast Range and Cascade Range, that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

2.22.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *R. araiospora* at one site on NFS lands and two sites on BLM lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 68 sites would remain on NFS lands across the region, and 37 sites would remain entirely in BLM reserves across the region. Ten sites would remain entirely in BLM reserves in the local area, although no sites would remain on NFS lands in the local area. Although the PCGP Project would affect site persistence of *R. araiospora* at one site on NFS land, this site occurs in an area where the species tends to have a scattered distribution. Several sites would remain on NFS lands or BLM reserves within 40 miles north and west of the affected site. Many more sites would remain further west of the affected site in the Coast Range, where the species is locally abundant. The species' distribution and range within the NSO range following project implementation would be fairly similar to its currently known distribution and range. *Ramaria araiospora* would persist in the region without considering the single site as part of the population.

- The PCGP Project would remove approximately 1,142 acres of coniferous and mixed hardwood-coniferous forests and 249 acres of LSOG coniferous and mixed forests below 6,000 feet msl (a negligible amount of the forests). An estimated 50 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 10.7 million acres (59 percent) of coniferous and mixed forests and 3.9 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the NSO range. Other sites may be located in

unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 1998.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely in BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is somewhat widely distributed.

The PCGP Project would not be able to avoid all *R. araiospora* sites in the analysis area, although some individuals or populations within the sites may persist following project implementation. Based on the above conclusions, avoidance of the single *R. araiospora* site on NFS land is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plan that applies to the affected site would waive implementation of Management Recommendations for the *R. araiospora* site affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

2.23 RAMARIA COULTERAE

Ramaria coulterae is a coral mushroom species in the Gomphaceae family (formerly in the Ramariaceae family) and is commonly known as Elsie's stringy pinky.

2.23.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *R. coulterae* as a Category B (rare) species. ORBIC evaluated *R. coulterae* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004), and again in its publications of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2007, 2010, and 2013) but it was not included in the 2016 publication. In 2013, it was considered to be at high to moderate risk of extinction due to a restricted range, very few to relatively few populations, and steep to recent widespread declines within in its global range (G2G3). In Oregon, it was considered to be at high risk of extinction due to a very restricted range, very few populations, and steep declines (S2?), although its ranking was uncertain. The species is not currently on any ORBIC lists. It is not considered a BLM Sensitive or Strategic species in Oregon, but it is considered a Forest Service Strategic species in Oregon.

2.23.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Ramaria coulterae is an ectomycorrhizal species and fruits in the spring to early summer (Castellano et al. 2003). The fruit bodies are in the form of branched stalks, which elevate the spore producing cells and increase the probability for dispersal (Dai 2010). ORBIC (2004) rates *R. coulterae* as highly vulnerable, slow to mature, with low fecundity such that populations are very slow to recover from decreases in abundance. The species is also thought to have low dispersal capability such that extirpated populations are unlikely to become reestablished through natural recolonization (unaided by humans) (ORBIC 2004).

Range

Ramaria coulterae is endemic to the western United States. It is known from the intermountain area of northern and west-central Idaho, northeastern California into the Sierra Nevada (Barnhart and Beug 2010), and the eastern slope of the Cascade Range into eastern Oregon (ORBIC 2004). The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, it was likely similar to the current range, with populations distributed across western North America. Local distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported six to 20 occurrences distributed across the species' range. In the range of the NSO, nine occurrences were in Oregon and one to five occurrences were in California. More studies are needed to determine its rarity or abundance in the Pacific Northwest (ORBIC 2004). The species was found in one location during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented 18 new sites of *R. coulterae* in the NSO range between 1998 and 2006, with a total of 18 sites by 2006; four sites were found in reserves or protected areas. The 2007 Final SEIS reported eight sites on NFS and BLM lands and eight total sites on all lands in the NSO range (USDA and USDI 2007).

Pre-disturbance surveys are not practical for Category B species. Instead, equivalent-effort surveys were conducted during the fall and spring from 2010 to 2016 in old-growth stands in the PCGP Project area and within 100 feet of habitat removal to comply with the Standards and Guidelines for Category B species where strategic surveys are not complete (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). The equivalent-effort surveys targeted all Category B species, including *R. coulterae*, and resulted in four new observations of individuals or populations of *R. coulterae*. Based on the increased number of known sites since 1998 as a result of the increased number of surveys (0 sites to 18 sites between 1998 and 2006 per Molina 2008 records), additional surveys would be expected to locate additional populations within the NSO range, particularly in Oregon where most observations have been reported. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Ramaria coulterae fruits are found in coniferous debris and its habit is scattered (Castellano et al. 2003). As an ectomycorrhizal species, *R. coulterae* is limited by the type of trees that will participate in nutrient exchange between fungal hyphae and tree roots (Dai 2010). A recent study demonstrated that competition for root tips and soil resources between ectomycorrhizal fungi has a direct influence on the structure and distribution of the fungal community; however, how these competitive interactions unfold is still not fully known (Kennedy 2010). *Ramaria coulterae* has been reported to associate with trees only in the Pine family and has a narrow specificity for that community type (ORBIC 2004).

Threats

The main threat to *R. coulterae* is logging activities (ORBIC 2004), and habitat for the species has been reduced by logging, especially in low to mid-elevation forests (Holthausen at al. 1994).

Management Recommendations

As a Category B S&M species, the direction under the 2001 ROD is to manage all known sites and reduce the inadvertent loss of undiscovered sites (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *R. coulterae*:

- As a mycorrhizal species, *R. coulterae* forms symbiotic associations with the fine root systems of plants, growing out into the soil matrix. Consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.23.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *R. coulterae* across the NSO range and in and near the project area is discussed below. The discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table RACO-1 shows the total number of known sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 135 observations from BLM and Forest Service geodatabases were converted into 67 sites in the NSO range (region). Table RACO-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table RACO-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure RACO-2 displays the extent of known sites located in protected

areas (NFS lands, NFS reserves, BLM reserves, NPS lands), and Figure RACO-3 displays the species' regional distribution as well as the extent of coniferous forests and LSOG forests above 3,000 feet msl on BLM and NFS lands.

TABLE RACO-1

Number of *Ramaria coulterae* Sites (2017)

Location*	Number of Sites
Regional Area	67
Local Area	37
Analysis Area (Project Area)	3 (3)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE RACO-2

Distribution of *Ramaria coulterae* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	19	5	3
BLM	47	32	-
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	6	5	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE RACO-3

Distribution of *Ramaria coulterae* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	-	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	-	-	-
Congressionally Reserved (CR)	**-**	**-**	**-**
Late Successional Reserve (LSR)	**6**	**1**	**1**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**-**	**-**	**-**
Managed Late Successional Area (MLSA)	1	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	13	4	2
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	**-**	**-**	**-**
District Designated Reserve	**18**	**9**	**-**
Harvest Land Base	35	21	-
Late Successional Reserve	**22**	**17**	**-**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**8**	**6**	**-**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Ramaria coulterae is somewhat limited in distribution across four physiographic provinces in Oregon (East and West Cascades, and Klamath) and California (Cascades) (see Figure RACO-1). The majority of sites are clustered in the East and West Cascades in southern Oregon, where the species appears to be locally abundant. Sites are also scattered sparsely north and south through the Cascades in Oregon and California, and two sites are located near one another in the Klamath Mountains in Oregon. *Ramaria coulterae* does not appear to be well distributed within its range in the NSO range.

Six of the 67 known sites are at least partially located on private, state, or other lands; 47 sites are at least partially on BLM lands; and 19 sites are at least partially on NFS lands. Sites included on the National Forests that encompass the project area include one site on the Umpqua National Forest, five sites on the Fremont-Winema National Forest, and three sites on the Rogue River-Siskiyou National Forest. Sites included on other National Forests include two sites on the Deschutes National Forest, three sites on the Modoc National Forest, four sites on the Shasta-Trinity National Forest, and one site on the Willamette National Forest.

Across the NSO range, six sites are located entirely in reserve lands managed by the Forest Service, all of which are located in LSRs (See Figure RACO-2). These sites represent 32 percent of the total NFS-managed sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 12 sites are located entirely in reserve lands managed by BLM, which represents 26 percent of the total number of BLM-managed sites in the region. While the 12 sites in BLM reserves are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management.

Ramaria coulterae is primarily found in LSOG forests based on available data (56 of 67 total sites are in LSOG). Based on current site locations, the species is found in coniferous forests above 3,000 feet msl throughout most of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous forests, including the LSOG component of these forests, within the NSO range could provide habitat for *R. coulterae* and support additional sites. These forests encompass an estimated 11.9 million acres on BLM and NFS lands in the region, including an estimated 7 million acres in reserve land allocations (59 percent of the forests; Table ALEL-4). Of this acreage, an estimated 3.2 million acres are LSOG (see Figure ALEL-3), including 2 million acres in reserve land allocations (63 percent of the forests). Although coniferous forests above 3,000 feet msl are widespread across the region, LSOG forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

TABLE RACO-4

Extent of Forests That Could Provide Habitat for *Ramaria coulterae* on NFS and BLM Lands a/

Location	Coniferous Forests above 3,000 feet		LSOG Forests above 3,000 feet	
	Total	**Reserves**	**Total**	**Reserves**
Regional Area	11,868,755	7,029,524	3,192,923	2,011,891
Local Area	232,484	109,346	69,528	38,262
Project Area	581	365	180	110

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

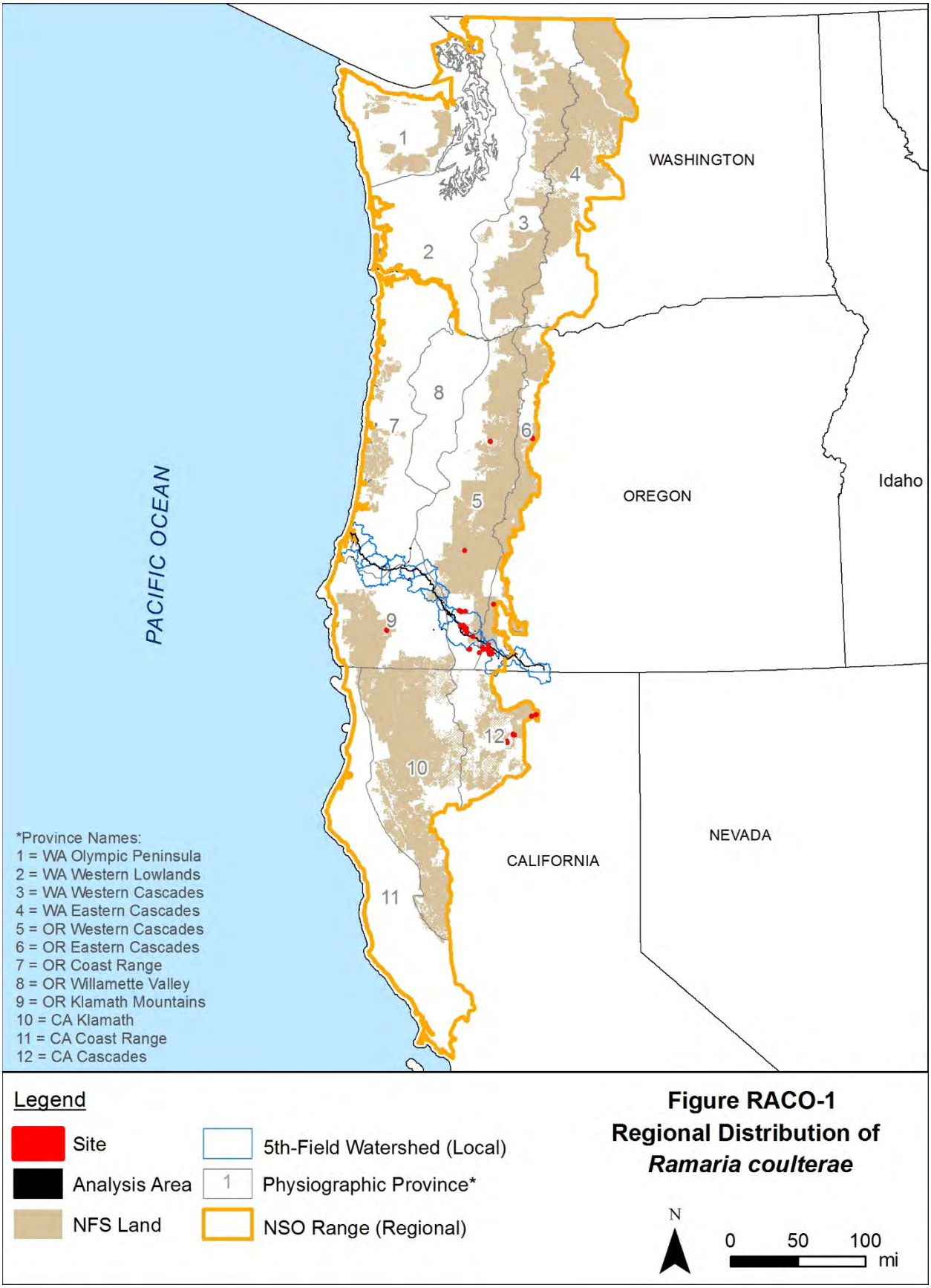


Figure RACO-1
Regional Distribution of *Ramaria coulterae*

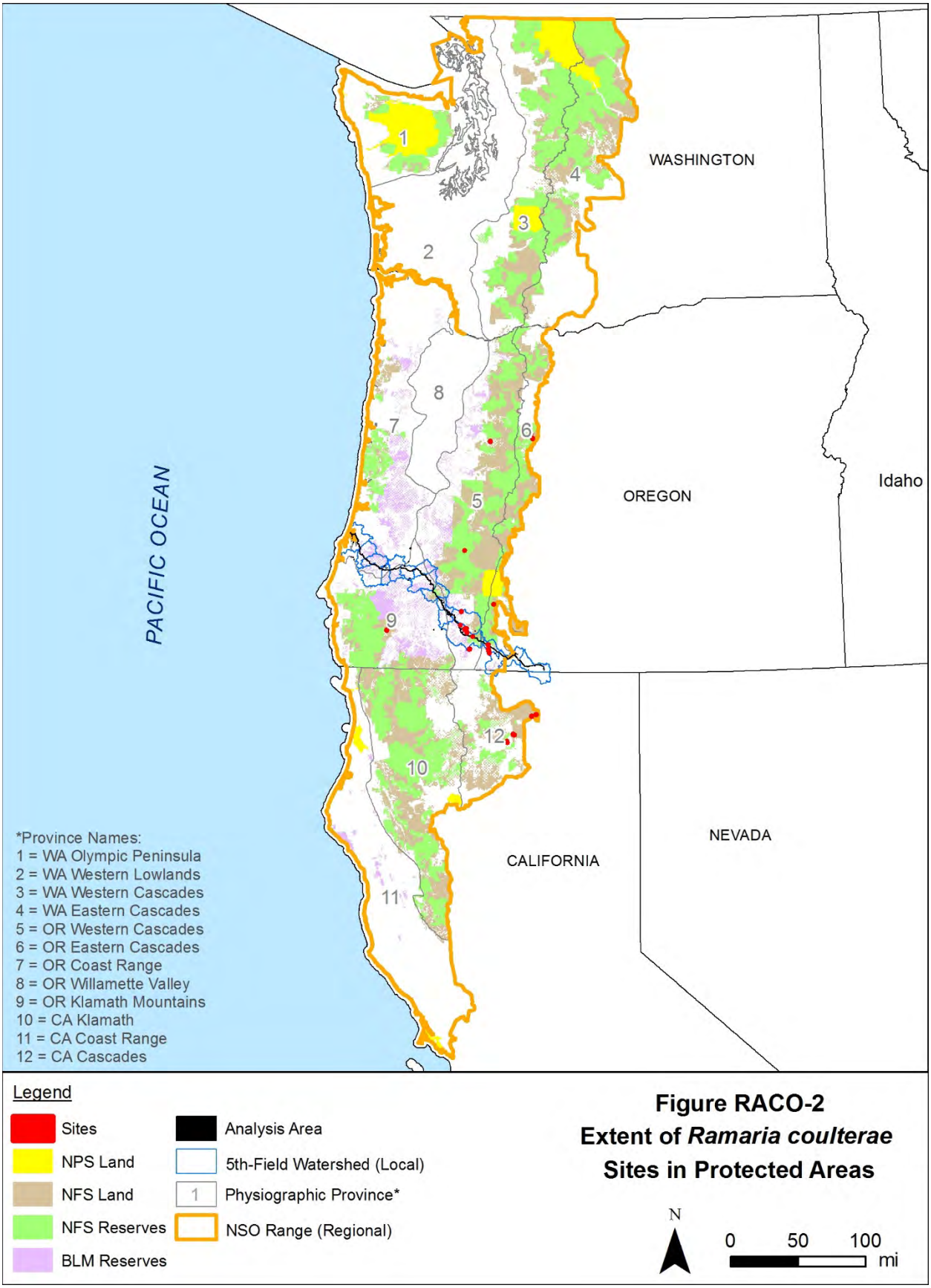

WASHINGTON
OREGON
CALIFORNIA
NEVADA
Idaho
PACIFIC OCEAN
1
2
3
4
5
6
7
8
9
10
11
12
*Province Names:
1 = WA Olympic Peninsula
2 = WA Western Lowlands
3 = WA Western Cascades
4 = WA Eastern Cascades
5 = OR Western Cascades
6 = OR Eastern Cascades
7 = OR Coast Range
8 = OR Willamette Valley
9 = OR Klamath Mountains
10 = CA Klamath
11 = CA Coast Range
12 = CA Cascades
Legend
Sites
NPS Land
NFS Land
NFS Reserves
BLM Reserves
Analysis Area
5th-Field Watershed (Local)
Physiographic Province*
NSO Range (Regional)
Figure RACO-2
Extent of Ramaria coulterae
Sites in Protected Areas
N
0
50
100
mi

Figure RACO-3
Potential Habitat For
Ramaria coulterae

Local Distribution

Within the local area, *R. coulterae* is distributed across four 5th-field watersheds that overlap the project area (see Figure RACO-4 and Table RACO-5.) Most sites are clustered in the Little Butte Creek and Spencer Creek watersheds, with the population in the Spencer Creek watershed crossing the boundary into the upper Klamath River-John C Boyle Reservoir watershed. Three isolated sites are additionally located in the upper portion of the Big Butte Creek watershed. Across these watersheds, multiple avenues outside the of connectivity appear to be available between sites based on the extent of coniferous forests, and opportunities for dispersal exist within the local area and to nearby regional areas based on the proximity of other sites in the region. Several sites are located on BLM lands directly outside the local area in the Cascade Range, of which several are entirely in BLM reserves. Sites on NFS lands are located further from the local area, with one site located 20 miles north of the local area and several sites located 60 miles south of the local area, all of which are in the eastern Cascade Range.

Of the 37 sites in the local area, five are located on NFS lands. These sites are located on lands designated as Other (Matrix) and LSRs. Five sites are partially on private lands and 32 sites are at least partially on BLM lands. Of the sites in the local area, one site is located entirely in NFS reserve land and 11 sites are entirely within BLM reserve lands, representing 32 percent of the NFS and BLM sites.

Coniferous forests above 3000 feet msl encompass approximately 232,484acres on BLM and NFS lands in the local area, with 109,346acres in reserve land allocations (47 percent of the forests). Of this acreage, an estimated 69,528acres are LSOG, including 38,262acres in reserves (55 percent of the forests).

TABLE RACO-5

Distribution of *Ramaria coulterae* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	3	-	2
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	1	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	13	1	10
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	-	-	-
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	-	-	-
Spencer Creek (865)	20	-	10
Trail Creek (804)	-	-	-
Upper Cow Creek (801)	-	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.

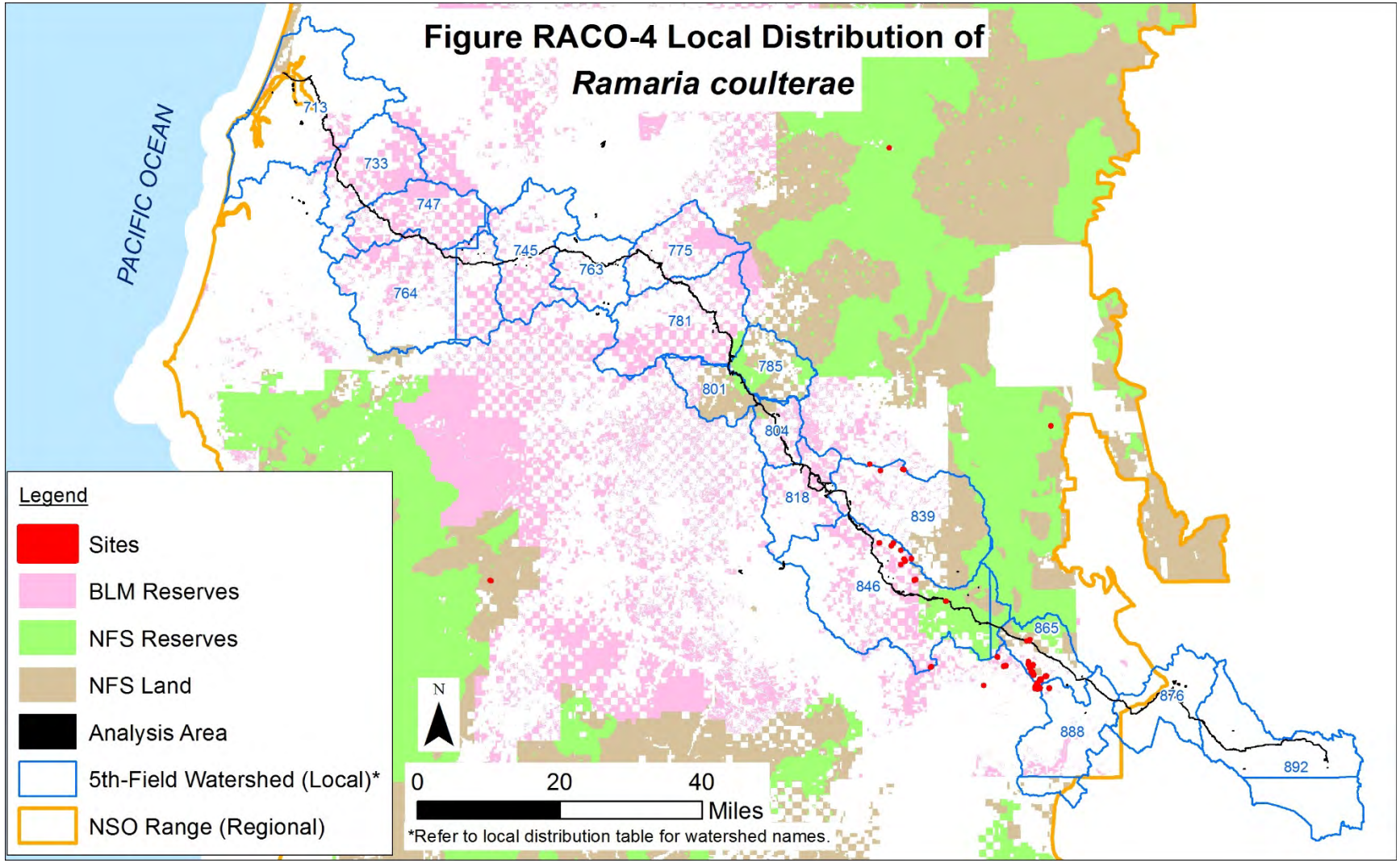


Figure RACO-4 Local Distribution of
Ramaria coulterae
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis and project areas contain three sites of *R. coulterae*, which are located on NFS lands on the Fremont-Winema and Rogue River-Siskiyou National Forests. One site is in LSRs while the other two sites are on lands designated as Other (Matrix). The analysis area sites are distributed across two 5th-field watersheds in the eastern portion of the analysis area. Two sites are located in Spencer Creek watershed and one site is in the Little Butte Creek watershed. Many sites are also located within the immediate vicinity of the analysis areas in the Cascade Range (see Local Distribution discussion above), including several immediately outside the local area in BLM reserves.

Surveys for the PCGP Project resulted in four total observations of the species in three locations in or near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These recorded observations comprise the three sites in the project area. Within the project area, one site is located near MP 158.1, while the other two sites are located between MPs 172.2 and 172.5.

Analysis

The PCGP Project would affect three out of the 19 sites on NFS lands in the region, representing approximately 16 percent of the sites, or three out of 67 total sites on all lands in the NSO range. Table RACO-6 provides an overview of the features of the PCGP Project that would affect the *R. coulterae* sites on NFS land. The construction corridor and associated work and storage areas would affect approximately 3 acres within the sites (about 28 percent of the sites). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impact on *R. coulterae* in and near the project area. Due to the proportion of sites affected, the effects on three sites could potentially alter the distribution of the species in the NSO range if site persistence is affected.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 2.1 acres of vegetation and soil within three sites and could result in the removal of *R. coulterae* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about 0.3 acre within two sites. Material storage within UCSAs would disturb about 0.7 acre of understory habitat in three sites, which could modify microhabitats near extant populations or individuals, potentially making the habitat no longer suitable for the species.

TABLE RACO-6

Impacts to *Ramaria coulterae* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	3	2.1 ac
Temporary Extra Work Area (TEWA)	2	0.3 ac
Uncleared Storage Area (UCSA)	3	0.7 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

The PCGP Project would result in ground disturbance and vegetation removal in three sites in the analysis area (Table RACO-7). The only recorded observation of the species in two of these sites (MP 158.1 and MP 172.2) would likely be removed by construction within the corridor (see Figures RACO-5 and RACO-6). The site at MP 172.5 contains two observations, one of which may be indirectly affected and the other would not likely be indirectly affected due to the distance from the corridor. For all of the sites, individuals outside the corridor and TEWAs may also be subject to indirect effects associated with the PCGP Project based on the proximity of project activities to the sites, as discussed below.

TABLE RACO-7

Site-Specific Overview of Impacts to *Ramaria coulterae* Sites

Site Location	Source of Impacts	Area of Disturbance	Individuals Likely to Persist?
MP 158.1	Corridor	0.9 ac	No
	TEWA	0.1 ac	
	UCSA	0.3 ac	
MP 172.2	Corridor	0.8 ac	No
	TEWA	0.1 ac	
	UCSA	0.2 ac	
MP 172.5	Corridor	0.4 ac	Yes
	UCSA	0.2 ac	

Notes: MP = milepost; ac = acres

Establishment of the corridor could modify microclimate conditions around populations or individuals adjacent to the corridor. The removal of forests and host trees and disturbance to soil could negatively affect *R. coulterae* in adjacent areas by removing its habitat, disturbing soil or duff around trees or roots of trees, and affecting its mycorrhizal association with the trees, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat conditions as a result of the corridor and TEWAs could make habitat within the sites no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. *Ramaria coulterae* is not likely to persist at two of the three sites because of the extent of impacts within the sites and the proximity of the recorded observations to the corridor (see Table RACO-7). *Ramaria coulterae* is likely to persist at one site (MP172.5), despite impacts to some individuals, because one observation within that site is more than 100 feet from the corridor, where direct effects are not anticipated and indirect effects are unlikely. The site at MP 172.5 is comprised of two observations in a moderately wooded area, although a paved road intersects the eastern portion of the site. One observation is located approximately 245 feet from the corridor and is likely to persist. The other observation is located 80 feet from the corridor and would likely be indirectly affected.

Based on this analysis, *R. coulterae* is not likely to persist at two of the three sites in the analysis area following project implementation. The site that is likely to persist in the analysis area is located in the Eastern Cascades Range of Oregon in the Fremont-Winema National Forest on land designated as Other (Matrix).

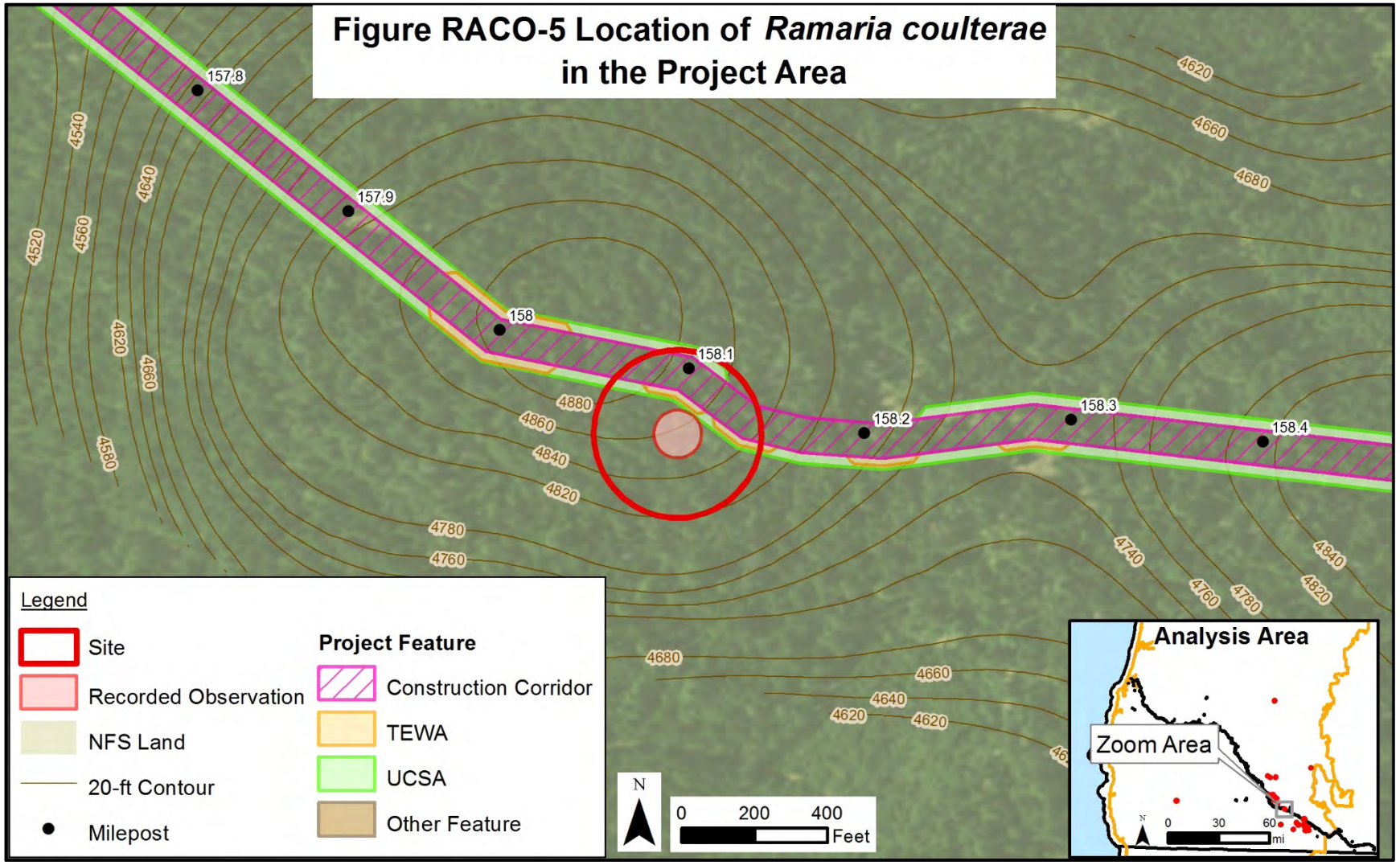


Figure RACO-5 Location of *Ramaria coulterae* in the Project Area
157.8
157.9
158
158.1
158.2
158.3
158.4
4620
4660
4680
4540
4640
4520
4560
4580
4880
4860
4840
4820
4780
4760
4740
Legend
Site
Recorded Observation
NFS Land
20-ft Contour
Milepost
Project Feature
Construction Corridor
TEWA
UCSA
Other Feature
N
0 200 400
Feet
Analysis Area
Zoom Area
0 30 60
mi

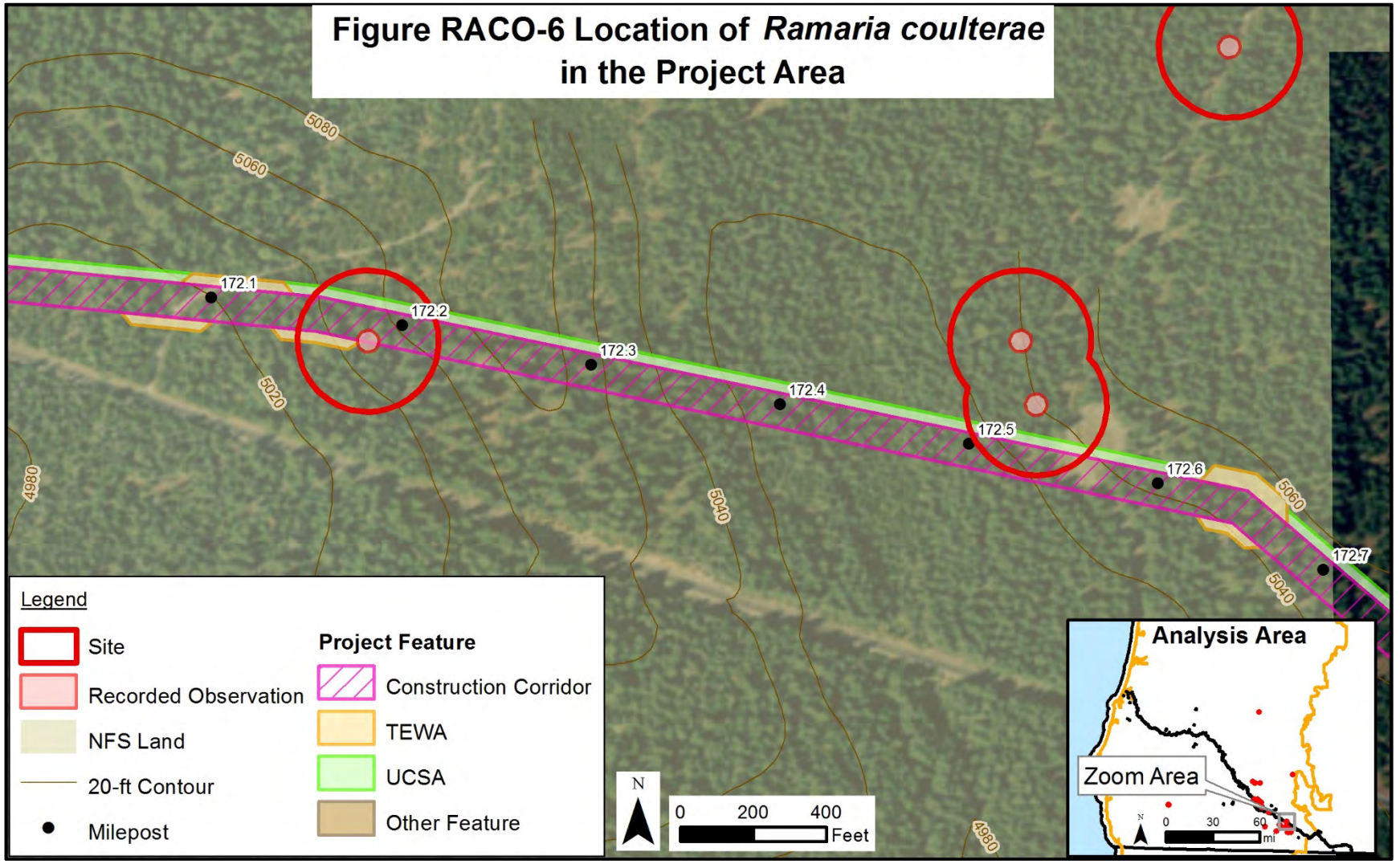


Figure RACO-6 Location of *Ramaria coulterae* in the Project Area
5080
5060
172.1
172.2
172.3
172.4
172.5
172.6
172.7
5020
4980
5040
5060
5040
4980
Legend
Site
Recorded Observation
NFS Land
20-ft Contour
Milepost
Project Feature
Construction Corridor
TEWA
UCSA
Other Feature
N
0 200 400
Feet
Analysis Area
Zoom Area
N
0 30 60
mi

Across the project area, the PCGP Project would remove an estimated 476acres of coniferous forests above 3,000 feet msl, including 143 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *R. coulterae*. Within this impact area, about 258 acres (54 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 114 acres of coniferous forests above 3,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests above 3,000 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the two of the three sites in the analysis area as a result of the PCGP Project, three *R. coulterae* sites would remain on NFS lands in the local area, with no sites in reserves, and 17 sites, including five in reserves, would remain on NFS lands in the NSO range. An additional 11 sites would remain entirely in BLM reserves in the local area and 12 sites would remain entirely in reserves in the region. The remaining sites could be affected by natural hazards (e.g., fire, drought), but the NFS sites would be subject to S&M Standards and Guidelines protections and applicable management recommendations with regard to agency-related actions. The sites in reserves are assumed to have additional protections provided by the NWFP Standards and Guidelines in place for those land allocations. While sites on BLM lands are not subject to S&M Standards and Guidelines protections, the sites entirely in reserves would likely receive some level of protection under BLM management.

Based on these site counts, approximately 26 percent of the remaining *R. coulterae* sites on NFS or BLM lands in the NSO range would be protected in reserves.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Ramaria coulterae* is a Category B (rare) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category B species are likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information received since the species was listed in the 2001 ROD, however, indicates that the species appears to be more common than previously documented, as described below:

    - *Ramaria coulterae* has a somewhat limited distribution across four physiographic provinces and two states in the region and a low-moderate number of overall sites (19 on NFS lands, 67 on all lands). The species is locally abundant in the Cascade Range in southern Oregon, but less abundant in other areas. The currently known number of sites on NFS and BLM lands has increased by 57 sites since 2007, with four sites documented during the PCGP Project surveys.

  - An estimated 28 percent of the sites (18 sites) on NFS and BLM lands are in reserves, which is an increase of 14 sites in reserves since 2006 per Molina (2008).

- Coniferous forests above 3,000 feet msl (general habitat for the species) are widely distributed across the region and encompass approximately 11.9 million acres on BLM and NFS lands, with an estimated 59 percent in reserves. Most of the forests are found in the Cascade Range and Klamath Mountains, where most sites are documented.

- The PCGP Project would affect two of 19 sites of *R. coulterae* on NFS lands, representing approximately 10 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the two sites, a low-moderate number of sites (17) would remain on NFS lands in the region, with a somewhat limited distribution across Oregon and California. Several sites (three sites) would remain on NFS lands in the local vicinity of the analysis area. An additional 12 sites would remain entirely in BLM reserves in the NSO range and 11 sites would remain entirely in BLM reserves in the local area. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would affect site persistence of one site in LSRs and the percentage of sites on NFS lands in reserves would remain about the same (30 percent). Of the remaining sites, five are in LSRs where management actions are restricted to those activities that benefit LSOG forests. An additional 12 sites are entirely in BLM reserves, including LSRs where management actions are restricted to those activities that benefit LSOG forests, District Designated Reserves where management activities that may adversely affect *R. coulterae* are unlikely, and Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species.

- The PCGP Project would result in a permanent loss of an estimated 114 acres of coniferous forests above 3,000 feet msl (less than 1 percent of the total regional acreage). An estimated 7 million acres (59 percent) of coniferous forests and 2million acres (63 percent) of LSOG forests above 3,000 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *R. coulterae*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Ramaria coulterae* is a Category B species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

2.23.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *R. coulterae* at two sites on NFS lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 17 sites would remain on NFS lands across the region, including five sites in reserves, and three sites would remain on NFS lands in the local area (none in reserves). Additionally, 12 sites would remain entirely in BLM reserves across the region, and 11 sites would remain in BLM reserves in the local area. Although the PCGP Project would affect site persistence of *R. coulterae* at two sites on NFS lands, these sites are part of a large cluster of sites on NFS lands or BLM reserves in the Cascade Range in southern Oregon where the species is locally abundant. After project implementation the species would remain locally abundant. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Ramaria coulterae* would persist in the region without considering the two sites as part of the population.

- The PCGP Project would remove approximately 476 acres of coniferous forests and 143 acres of LSOG coniferous forests above 3,000 feet msl (a negligible amount of the forests). An estimated 54 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 7 million acres (59 percent) of coniferous forests and 2 million acres (63 percent) of LSOG forests above 3,000 feet msl would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 1998.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely in BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is widely distributed.

The PCGP Project would not be able to avoid impacts to all *R. coulterae* sites in the analysis area, although some individuals or populations within the sites may persist following project implementation. Based on the above conclusions, avoidance of the three *R. coulterae* sites is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plans that apply to the affected sites would waive implementation of Management Recommendations for *R. coulterae* sites affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

2.24 RAMARIA RUBRIEVANESCENS

Ramaria rubrievanescens is a coral mushroom species in the Gomphaceae family (formerly in the Ramariaceae family) and does not have a common name.

2.24.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *R. rubrievanescens* as a Category B (rare) species. ORBIC evaluated *R. rubrievanescens* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004), but it was not included in the most recent update of *Rare, Threatened, and Endangered Species of Oregon*

(ORBIC 2016). In 2004, the species was considered to be uncommon but not rare with some cause for long-term concern due to declines or other factors within its global range and in Oregon (G4, S4, respectively). The species is not currently on any ORBIC lists. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.24.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Relatively little is known about the autecology or reproductive biology of *R. rubrievanescens*. It is presumed to be ectomycorrhizal, forming symbiotic associations with conifer trees for translocation of minerals, water, and nutrients (Castellano and O'Dell 1997). *Ramaria rubrievanescens* fruits in humus or soil and matures above the ground; fruiting has been documented most often in fall, but also between June and October in the NSO range (Castellano et al. 1999, Exeter et al. 2006). Spore dispersal is assumed to be via wind and possibly animals (arthropods) (Castellano and O'Dell 1997).

Range

Ramaria rubrievanescens is found in the Pacific Northwest and eastern North America (ORBIC 2004). In the Pacific Northwest, it is mostly found in Oregon, with fewer recorded observations in Washington and California. It has also been documented in Idaho (Trappe, pers. comm. 2013). Based on data available in 2001, the species had a scattered distribution across Oregon and a spotty distribution in California and was infrequent in Washington (Hibler et al. 2001b). The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, it was likely similar to the current range, with populations distributed across western and eastern North America and possibly on other continents. Local distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported *R. rubrievanescens* from an estimated 54 element occurrences in the Pacific Northwest in 2004. An estimated 37 of these occurrences were in Oregon, with fewer in California (13) and Washington (4) (ORBIC 2004). The species was found in three locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented 50 new sites of *R. rubrievanescens* in the NSO range between 1998 and 2006, and 65 total sites were documented by 2006, including 31 in reserves or

protected areas. The 2007 Final SEIS reported 51 sites on NFS and BLM lands and 59 total sites on all lands in the NSO range (USDA and USDI 2007).

Pre-disturbance surveys are not practical for Category B species. Instead, equivalent-effort surveys were conducted during the fall and spring from 2010 to 2016 in old-growth stands in the PCGP Project area and within 100 feet of habitat removal to comply with the Standards and Guidelines for Category B species where strategic surveys are not complete (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). The equivalent-effort surveys targeted all Category B species, including *R. rubrievanescens*, and resulted in four new observations of individuals or populations of *R. rubrievanescens*. Based on the increased number of sites since 1998 as a result of the increased number of surveys (a four-fold increase between 1998 and 2006 per Molina 2008 records), additional survey effort would be expected to locate additional populations within the NSO range. The current estimated number of sites and distribution of the species based on 2017 data are provided below under the Species Distribution.

Habitat

Ramaria rubrievanescens has been found primarily in LSOG coniferous forests in association with trees in the Pine family (Castellano et al. 1999, ORBIC 2004). It has also been found in urban parks and younger forests neighboring LSOG stands (Hibler et al. 2001b, Trappe, pers. comm. 2013). Coarse woody debris appears to be an important component of the species' habitat (Hibler et al. 2001b). Based on data available in 2007, it was found between about 700 and 7,200 feet msl (Cushman and Huff 2007). *Ramaria rubrievanescens* may prefer specific microclimate conditions of LSOG forests, but it may not be as restricted to these conditions.

Threats

Threats to *R. rubrievanescens* are those that affect its host tree and disturb the soil, such as road and trail construction, logging, and campground establishment (Castellano and O'Dell 1997). Other specific threats to the species are not currently known.

Management Recommendations

As a Category B S&M species, the direction under the 2001 ROD is to manage all known sites and reduce the inadvertent loss of undiscovered sites (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. Management recommendations were developed for *R. rubrievanescens* along with other *Ramaria* spp. (Group 7 of Castellano and O'Dell 1997). The primary guidance is to maintain current habitat and microclimate conditions by retaining forest structure and soil conditions. In order to maintain habitat conditions around known locations, impacts from soil disturbing activities should be minimized and damage to or removal of host trees should be prevented. Known sites on federal land should be managed to include an area that is large enough to maintain the habitat and associated microclimate of the population. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *R. rubrievanescens*:

- As a mycorrhizal species, *R. rubrievanescens* forms symbiotic associations with the fine root systems of plants, growing out into the soil matrix. Consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.24.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *R. rubrievanescens* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table RARU5-1 shows the total number of known sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 153 observations from BLM and Forest Service geodatabases were converted into 143 sites in the NSO range (region). Table RARU5-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table RARU5-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure RARU5-1 displays the regional distribution of the species across NFS lands, Figure RARU5-2 displays the extent of the known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure RARU5-3 displays the species' regional distribution as well as the extent of coniferous and mixed hardwood-coniferous forests and LSOG forests on BLM and NFS lands.

TABLE RARU5-1

Number of *Ramaria rubrievanescens* Sites (2017)

Location*	Number of Sites
Regional Area	143
Local Area	8
Analysis Area (Project Area)	2 (2)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE RARU5-2

Distribution of *Ramaria rubrievanescens* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	105	2	2
BLM	30	6	-
NPS	4	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	12	-	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE RARU5-3

Distribution of *Ramaria rubrievanescens* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	4	-	-
Adaptive Management Reserves (AMR)	-	-	-

TABLE RARU5-3

Distribution of *Ramaria rubrievanescens* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	8	-	-
Congressionally Reserved (CR)	**13**	**-**	**-**
Late Successional Reserve (LSR)	**41**	**-**	**-**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**1**	**-**	**-**
Managed Late Successional Area (MLSA)	4	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	39	2	2
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	**1**	**-**	**-**
District Designated Reserve	**1**	**-**	**-**
Harvest Land Base	4	-	-
Late Successional Reserve	**25**	**6**	**-**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	1	-	-
Riparian Reserve	**13**	**1**	**-**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Ramaria rubrievanescens is widely distributed across nine physiographic provinces in Washington (Western and Eastern Cascades), Oregon (Coast Range, Cascades West and East, and Klamath Mountains), and California (Klamath, Cascades, and Coast) (see Figure RARU5-1). Most sites are scattered along the Cascade Range and Klamath Mountains, with a few clusters of sites in the Cascade Range. Scattered sites are located in the Coast Range, although *R. rubrievanescens* is less abundant outside the Cascade Range and Klamath Mountains based on current site locations. *Ramaria rubrievanescens* appears to be well distributed in the Cascade Range in Oregon based on the relative abundance of sites in the mountain range, proximity of sites to one another, and the distribution of sites across forests that may provide suitable habitat.

Twelve of 143 known sites are at least partially located on private, state, or other lands; four sites are at least partially on NPS lands (Crater Lake National Park); 105 are at least partially located on NFS lands; and 30 sites are at least partially on BLM lands across the region. Sites included on National Forests that encompass the project area include four sites on the Fremont-Winema National Forest, five sites on the Rogue River-Siskiyou National Forest, and 26 sites on the Umpqua National Forest. The remaining NFS sites are located on the Deschutes, Gifford Pinchot, Klamath, Lassen, Mendocino, Modoc, Mt. Baker-Snoqualmie, Mt. Hood, Okanogan-Wenatchee, Six Rivers, Shasta-Trinity, and Willamette National Forests.

Across the NSO range, 53 sites on NFS lands are at least partially located in reserves, including 41 at least partially in LSRs, one in a Known Owl Activity Center, and 13 at least partially in Congressionally Reserved areas (see Figure RARU5-2). This represents 50 percent of the total NFS-managed sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 25 sites are located entirely in BLM reserve lands, which represents 83 percent of the total number of BLM-managed sites in the region. While the 25 sites in BLM

reserves and the four NPS sites are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management and National Park management.

Ramaria rubrievanescens is more common in LSOG forests based on available data (114 of 143 total sites are in LSOG), but it is also somewhat common in non-LSOG forests and has been found in urban parks and younger forests near LSOG stands. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous forests across a wide elevation range and has been documented in most of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous and mixed hardwood-coniferous forests, including the LSOG component of these forests, across the NSO range could provide habitat for *R. rubrievanescens* and support additional sites. These forests encompass an estimated 19.2 million acres on BLM and NFS lands in the region, including an estimated 11.6 million acres in reserve land allocations (60 percent of the forests; Table RARU5-4). Of this acreage, an estimated 6.1 million acres are LSOG (see Figure RARU5-3), including 4 million acres in reserve land allocations (66 percent of the forests). Although coniferous and mixed hardwood-coniferous forests are widespread across the region, LSOG forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

TABLE RARU5-4

Extent of Forests That Could Provide Habitat for *Ramaria rubrievanescens* on NFS and BLM Lands a/

Location	Coniferous/ Mixed Forests		LSOG Conifer/Mixed Forests	
	Total	Reserves	Total	Reserves
Regional Area	19,220,427	11,550,638	6,063,902	3,995,392
Local Area	5,801,16	377,603	183,215	134,758
Project Area	1,411	975	318	225

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

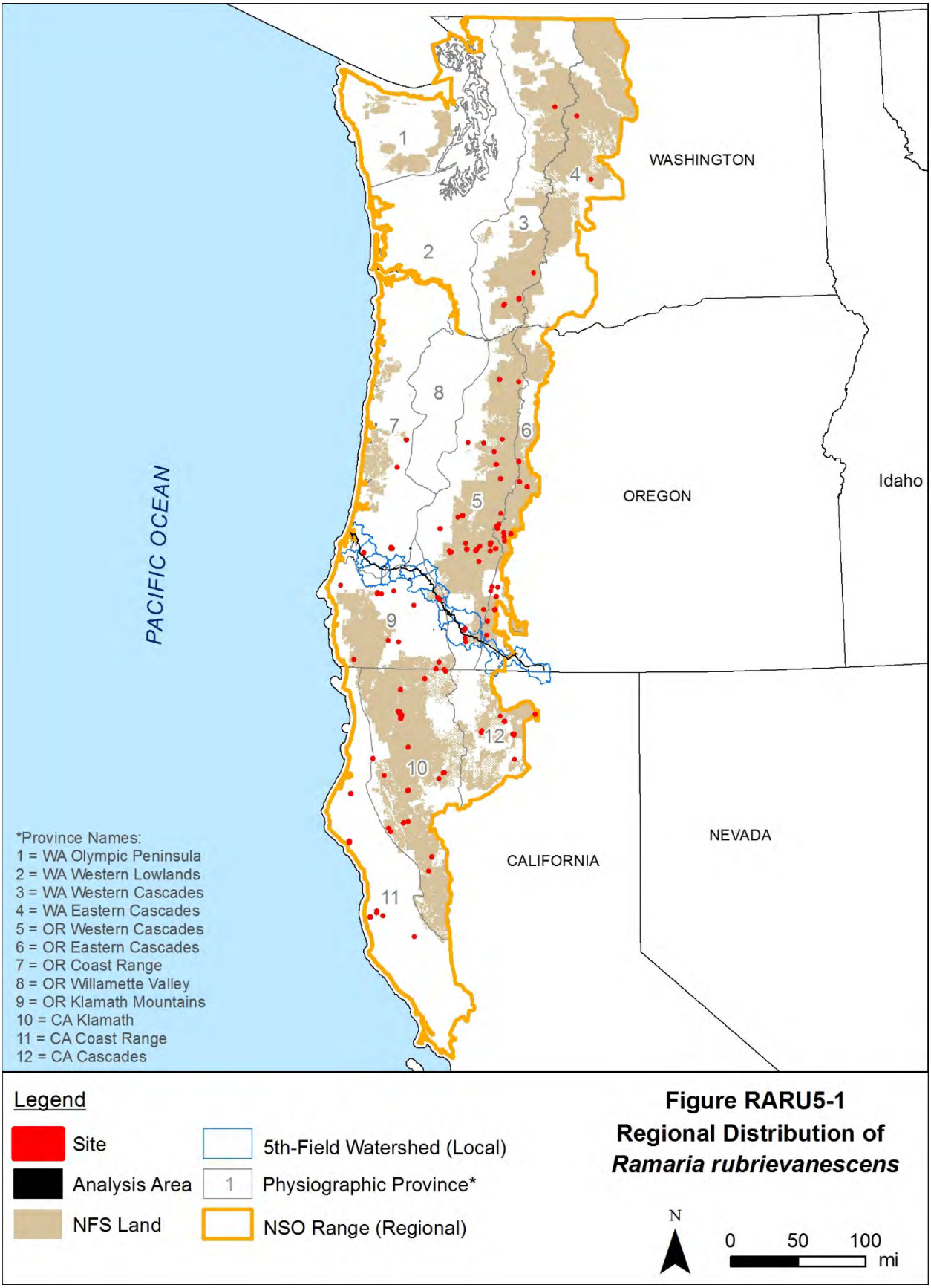


Figure RARU5-1
Regional Distribution of
Ramaria rubrievanescens

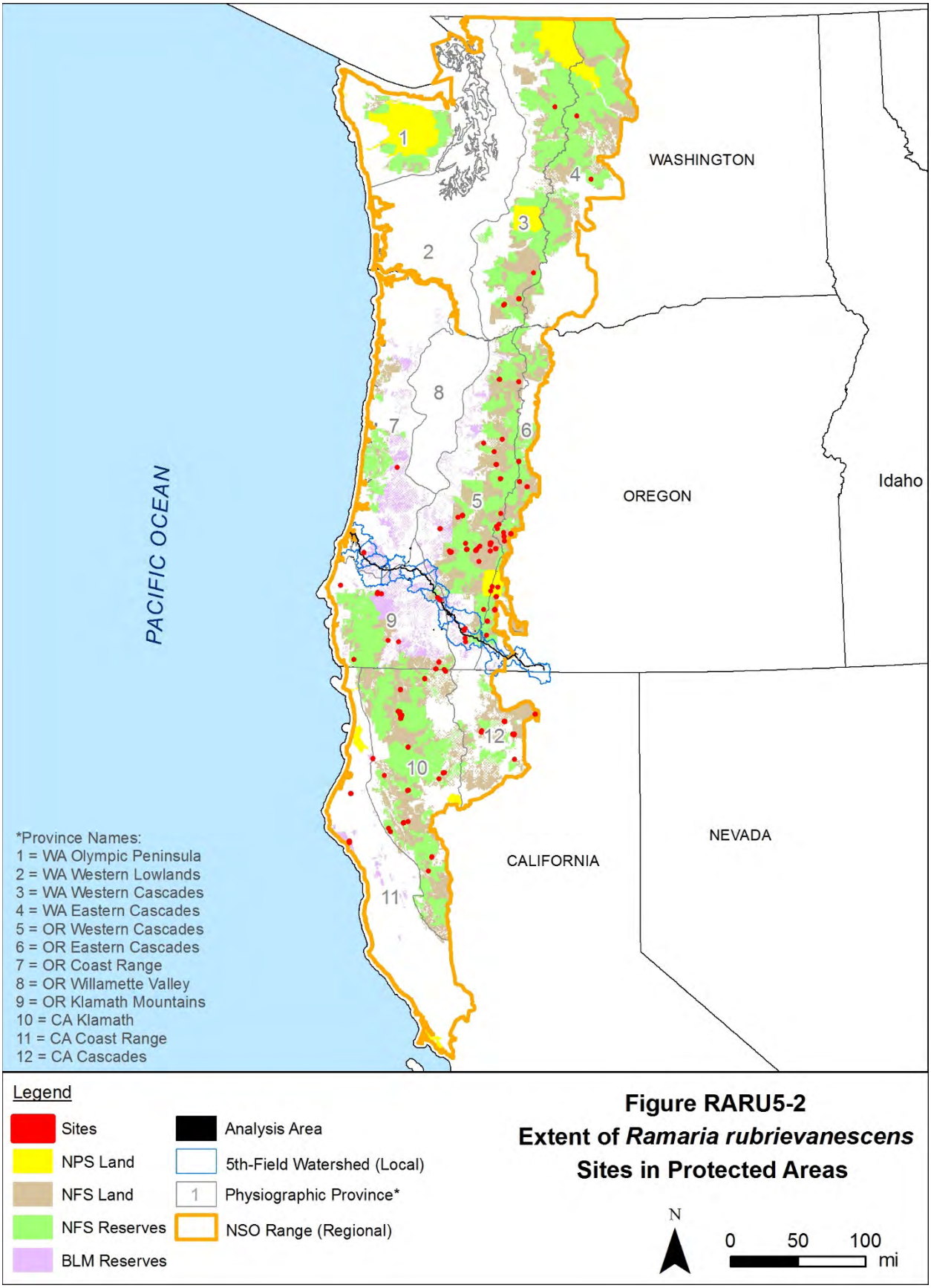


Figure RARU5-2
Extent of *Ramaria rubrievanescens* Sites in Protected Areas

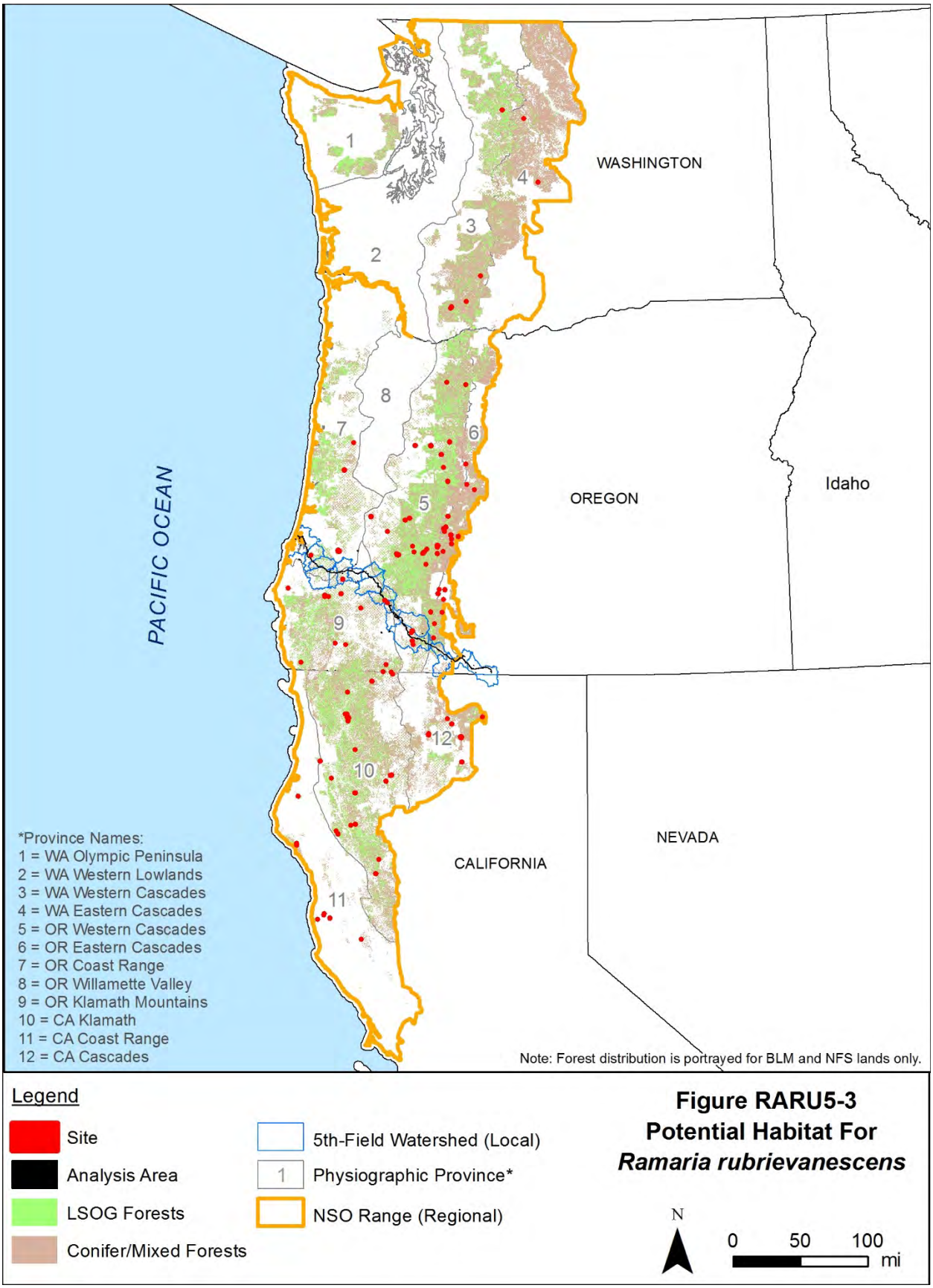


Figure RARU5-3
Potential Habitat For
Ramaria rubrievanescens

Local Distribution

Within the local area, *R. rubrievanescens* is distributed across five 5th-field watersheds that overlap the project area (see Table RARU5-5 and Figure RARU5-4). The sites appear somewhat scattered across the watersheds, with sites in three general groups (Little Butte Creek, Trail Creek/Upper Cow Creek/Elk Creek-South Umpqua, and Olalla Creek-Lookingglass Creek). Across these watersheds, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous and mixed hardwood-coniferous forests, and opportunities for dispersal exist within the local area and to nearby regional areas. Many regional sites are located within about 30 miles in the surrounding Coast Range, Cascade Range, and Klamath Mountains. The majority of the sites in the vicinity of the local area are on NFS lands.

TABLE RARU5-5

Distribution of *Ramaria rubrievanescens* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	-	-	-
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	4	-	4
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	-	-	-
North Fork Coquille River (733)	1	-	1
Olalla Creek-Lookingglass Creek (745)	1	-	1
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	-	-	-
Spencer Creek (865)	-	-	-
Trail Creek (804)	1	-	-
Upper Cow Creek (801)	1	1	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.

Of the eight sites in the local area, two are located on NFS lands. These sites are located on lands designated as Other (Matrix). The remaining six sites are located on BLM land, all of which are located entirely in BLM reserves.

Coniferous and mixed hardwood-coniferous forests encompass approximately 580,116 acres on BLM and NFS lands in the local area, including 377,603 acres in reserve land allocations (65 percent of the forests). Of this acreage, an estimated 183,215 acres are LSOG, including 134,758 acres in reserve land allocations (74 percent of the forests). Other sites may also exist in the local area where surveys have not been completed, based on the number of sites in the local area, distribution of those sites, and the extent of forests that may provide suitable habitat (see Figures RARU5-3 and RARU5-4).

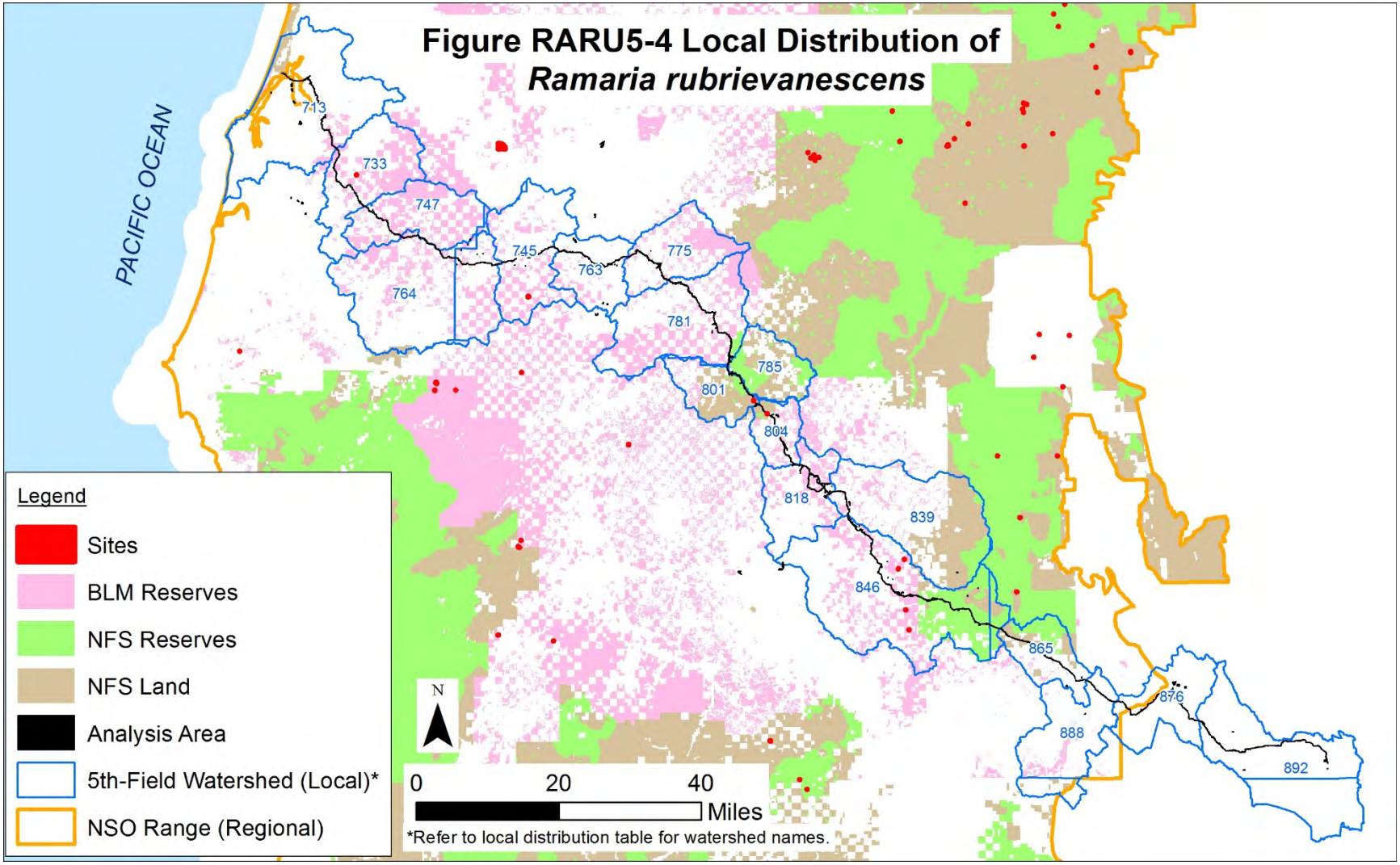


Figure RARU5-4 Local Distribution of
Ramaria rubrievanescens
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis and project areas contain two sites of *R. rubrievanescens*, both of which are on NFS lands (Umpqua National Forest) on lands designated as Other (Matrix). The analysis area sites are distributed across two 5th-field watersheds in the Klamath Mountains in the central portion of the analysis area. The sites are located near each other, and many sites are located within the vicinity of the analysis area (see Local Distribution discussion above), although they are fairly scattered across the mountain ranges in Oregon.

Surveys for the PCGP Project resulted in four total observations of the species in three locations in or near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These recorded observations comprise the three sites in the project area. Within the project area, the sites are between MPs 104.5 and 113.

Project Impacts

Analysis

The PCGP Project would affect two sites out of the 105 sites on NFS lands in the region, representing approximately 2 percent of the sites (or two out of 143 total sites on all lands in the NSO range). Table RARU5-6 provides an overview of the features of the PCGP Project that would affect the *R. rubrievanescens* sites on NFS lands. The construction corridor and associated work and storage areas would affect approximately 1.9 acres within the sites (about 18 percent of the sites). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *R. rubrievanescens* in and near the project area. This discussion presents an overview of the types of impacts that would be expected in the sites based on the features of the PCGP Project and that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 1.6 acres of vegetation and soil within two sites and could result in the removal of *R. rubrievanescens* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about 0.1 acre within one site. The establishment of the corridor could modify microclimate conditions around populations or individuals adjacent to the corridor. The removal of forests and host trees and disturbance to soil could negatively affect *R. rubrievanescens* in adjacent areas by removing its habitat, disturbing soil or woody debris around trees or roots of trees, and affecting its mycorrhizal association with the trees, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat conditions as a result of the corridor and TEWAs could make habitat within the sites no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Material storage within UCSAs would disturb about 0.1 acre of understory habitat in one site, which could modify microhabitats near extant populations or individuals, potentially making the habitat no longer suitable for the species.

TABLE RARU5-6

Impacts to *Ramaria rubrievanescens* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	2	1.6 ac
Temporary Extra Work Area (TEWA)	1	0.1 ac
Uncleared Storage Area (UCSA)	2	0.1 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

Across the project area, the PCGP Project would remove an estimated 1,138 acres of coniferous and mixed hardwood-coniferous forests, including 246 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *R. rubrievanescens*. Within this impact area, about 565 acres (about 50 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of an estimated 245 acres of coniferous and mixed hardwood-coniferous forests. This loss of forests represents less than 1 percent of the total estimated area of coniferous and mixed hardwood-coniferous forests across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the two sites as a result of the PCGP Project, no sites of *R. rubrievanescens* would remain on NFS lands in the local area, and 103 sites, including 53 in reserves, would remain on NFS lands in the NSO range. An additional six sites would remain entirely in BLM reserves in the local area and 25 sites would remain entirely in BLM reserves in NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but the NFS sites would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 53 sites in NFS reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. While the sites on BLM land would not be covered under the S&M Standards and Guidelines, the sites entirely in reserves would likely receive some level of protection under BLM reserve management. Based on these site counts, approximately 59 percent of the remaining *R. rubrievanescens* sites on BLM and NFS lands in the NSO range would be protected in reserves.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The BLM and Forest Service have embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Ramaria rubrievanescens* is a Category B (rare) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category B species are likely to be necessary to

provide reasonable assurance of species persistence in the range of the NSO. New information, however, since the species was listed in the 2001 ROD indicates that the species appears to be more common than previously documented, as noted below:

- *Ramaria rubrievanescens* has a wide, but scattered, distribution across nine physiographic provinces and three states in the region and a moderate-high number of overall sites (105 on NFS lands, 143 on all lands). The species appears to be well distributed in the Cascade Range in Oregon, but is scattered across other mountain ranges within its range in the NSO range. The currently known number of sites on NFS and BLM lands is an increase of 83 sites on NFS and BLM lands since 2007, with some sites documented during the PCGP Project surveys.

- An estimated 58 percent of the sites (78 sites) are in reserves, which is an increase of about 47 sites in reserves since 2006 per Molina (2008).

- Coniferous and mixed hardwood-coniferous forests (general habitat for the species) are widely distributed across the region and encompass approximately 19.2 million acres on BLM and NFS lands with an estimated 60 percent in reserves. Most of the forests are found in the Cascade Range and Klamath Mountains, where most sites are documented. The Coast Range and other areas also contain coniferous and mixed hardwood-coniferous forests, but sites are more scattered in these areas. A subcomponent of these forests likely provides habitat for *R. rubrievanescens*.

- The PCGP Project would affect two of 105 Forest Service-managed sites of *R. rubrievanescens*, representing approximately 2 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the two sites, a moderate-high number of sites (103) would continue to be documented on NFS lands in the region with a wide distribution across Washington, Oregon, and California. An additional 25 sites would remain entirely in BLM reserves across the region. No sites would remain on NFS lands in the local area, however, six sites would remain entirely in BLM reserves in the local area. These sites would be distributed across three 5th-field watersheds. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would not affect site persistence at any sites in reserves. Of the remaining sites on NFS land, 42 are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, and 13 are at least partially in Congressionally Reserved areas where management activities that may adversely affect *R. rubrievanescens* are unlikely. An additional 25 sites would remain entirely in BLM reserves across the region, including LSRs where management actions are restricted to those activities that benefit LSOG forests, Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species, and Congressionally Reserves and District Designated Reserves where management activities that may adversely affect *R. rubrievanescens* are unlikely.

- The PCGP Project would result in a permanent loss of an estimated 245 acres of coniferous and mixed hardwood-coniferous forests (less than 1 percent of the total regional acreage).

An estimated 11.6 million acres (60 percent) of the forests and 4 million acres (66 percent) of LSOG forests would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *R. rubrievanescens*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. This is a Category B species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

2.24.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *R. rubrievanescens* at two sites on NFS lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 103 sites would remain on NFS lands across the region. An additional 25 sites would remain entirely in BLM reserves in the region and six sites would remain entirely in BLM reserves in the local area. Although the PCGP Project would affect site persistence of *R. rubrievanescens* at two sites, many sites are scattered across the Cascade and Coast Ranges and Klamath Mountains in Oregon. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Ramaria rubrievanescens* would persist in the region without considering the two sites as part of the population.

- The PCGP Project would remove approximately 1,138 acres of coniferous and mixed hardwood-coniferous forests and 246 acres of LSOG forests (a negligible amount of the forests). An estimated 50 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 11.6 million acres (60 percent) of the forests and 4 million acres (66 percent) of LSOG forests would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 1998.

- The remaining sites are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites in BLM reserves are expected to receive significant protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is widely distributed.

The PCGP Project would not be able to avoid impacts to all *R. rubrievanescens* sites in the analysis area, although some individuals or populations within the sites may persist following project implementation. Based on the above conclusions, avoidance of the two *R. rubrievanescens* sites is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plan that applies to the affected sites would waive implementation of Management Recommendations for *R. rubrievanescens* sites affected by the PCGP Project. The applicant shall prepare and implement

a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

2.25 RAMARIA RUBRIPERMANENS

Ramaria rubripermanens is a coral mushroom species in the Gomphaceae family and does not have a common name.

2.25.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *R. rubripermanens* as a Category D (uncommon) species in Oregon. ORBIC evaluated *R. rubripermanens* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004), but it was not included in the most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2004, the species was considered to be uncommon but not rare with some cause for long-term concern due to declines or other factors within its global range and in Oregon (G4, S4, respectively). The species is not currently on the ORBIC lists. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.25.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Relatively little is known about the autecology or reproductive biology of *R. rubripermanens*. It is presumed to be ectomycorrhizal, forming symbiotic associations with conifer trees for translocation of minerals, water, and nutrients (Castellano and O'Dell 1997). *Ramaria rubripermanens* fruits in humus or soil and matures above the ground; fruiting has been documented primarily in spring, but also in fall and between May and October in the NSO range (Castellano et al. 1999, Exeter et al. 2006, Trappe, pers. comm. 2013). It is presumed to be dependent on wind and possibly on animals, particularly arthropods, for the dispersal of spores (Castellano and O'Dell 1997).

Range

Ramaria rubripermanens is endemic to the Pacific Northwest, where it has been found in Washington, Oregon, California, Idaho, and Alberta, Canada (ORBIC 2004, Trappe, pers. comm. 2013). It is mostly found in Oregon, with fewer recorded observations in Washington and California (ORBIC 2004). Based on data available in 2001, this species was considered well-represented in southern Oregon and appeared to be locally abundant in the central portion of its range in the Pacific Northwest (Hibler et al. 2001b). The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, it may have been similar to the current range, with populations limited to the Pacific Northwest. It may have had more abundant local distributions across its range, but habitat modifications and other environmental factors, as discussed under Threats below, have likely reduced available habitat and may have further restricted the species' distribution.

Population Status

The ORBIC (2004) reported *R. rubripermanens* from an estimated 146 element occurrences in the Pacific Northwest in 2004. An estimated 133 of these occurrences were in Oregon, with much fewer in California (9) and Washington (3) (ORBIC 2004). Many of the occurrences were in protected areas in 2004. Based on data available in 2004, population trends of this species were unknown, but it was apparently secure in Oregon (ORBIC 2004). The species was found in 10 locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented 157 new sites of *R. rubripermanens* in the NSO range between 1998 and 2006, and 171 total sites were documented by 2006, including 41 in reserves or protected areas. The 2007 Final SEIS reported 146 sites on NFS and BLM lands and 160 total sites on all lands in the NSO range (USDA and USDI 2007).

Equivalent-effort surveys were conducted during the fall and spring from 2010 to 2016 in old-growth stands in the PCGP Project area and within 100 feet of habitat removal to comply with the Standards and Guidelines for Category B species where strategic surveys are not complete (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). As a category D species, *R. rubripermanens* was not specifically targeted during surveys, although incidental sightings of Category D species were recorded and resulted in five new observations of *R. rubripermanens* in or near the project area. Additional surveys for other species in LSRs in nearby areas resulted in one additional incidental observation of the species. Based on the relatively high number of sites and the increased number of sites since 1998 as a result of the increased number of surveys (a 12-fold increase between 1998 and 2006 per Molina 2008 records), it is likely that this species is more abundant than previously known, and additional surveys would be expected to locate additional populations within the NSO range. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Ramaria rubripermanens has been found primarily in LSOG coniferous forests in association with trees in the pine family (Castellano et al. 1999, ORBIC 2004). It has also been found in younger forests neighboring LSOG stands and in mixed hardwood-coniferous forests (Hibler et al. 2001b, Trappe, pers. comm. 2013). Coarse woody debris appears to be an important component of the species' habitat (Hibler et al. 2001b). Based on data available in 2007, it was found between about 900 and 6,500 feet msl (Cushman and Huff 2007). Observations have also been recorded down to about 200 feet msl (Trappe, pers. comm. 2013). *Ramaria rubripermanens* may prefer specific microclimate conditions of LSOG forests, but it may not be as restricted to these conditions.

Threats

Threats to *R. rubripermanens* are those that affect its host tree and disturb the soil, such as road and trail construction, logging, and campground establishment (Castellano and O'Dell 1997). Other specific threats to the species are not currently known.

Management Recommendations

As a Category D S&M species, the direction under the 2001 ROD is to manage high priority sites to provide a reasonable assurance of species persistence (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. Management recommendations were developed for *R. rubripermanens* with other *Ramaria* spp. (Group 7 of Castellano and O'Dell 1997). The primary guidance is to maintain current habitat and microclimate conditions by retaining forest structure and soil conditions. In order to maintain habitat conditions around known locations, impacts from soil disturbing activities should be minimized and damage to or removal of host trees should be prevented. Known sites on federal land should be managed to include an area that is large enough to maintain the habitat and associated microclimate of the population. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *R. rubripermanens*:

- As a mycorrhizal species, *R. rubripermanens* forms symbiotic associations with the fine root systems of plants, growing out into the soil matrix. Consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.25.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *R. rubripermanens* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table RARU6-1 shows the total number of known sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 286 observations from BLM and Forest Service geodatabases were converted into 231 sites in the NSO range (region). Table RARU6-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table RARU6-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure RARU6-1 displays the regional distribution of the species across NFS lands, Figure RARU6-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure RARU6-3 displays the species' regional distribution with the extent of coniferous and mixed hardwood-coniferous forests and LSOG forests on BLM and NFS lands.

TABLE RARU6-1

Number of *Ramaria rubripermanens* Sites (2017)

Location*	Number of Sites
Regional Area	231
Local Area	70
Analysis Area (Project Area)	8 (6)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE RARU6-2

Distribution of *Ramaria rubripermanens* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	103	16	7
BLM	112	48	1
NPS	3	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	33	16	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE RARU6-3

Distribution of *Ramaria rubripermanens* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	6	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	6	-	-
Congressionally Reserved (CR)	**13**	**-**	**-**
Late Successional Reserve (LSR)	**19**	**-**	**-**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**3**	**1**	**-**
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	62	16	7
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	**-**	**-**	**-**
District Designated Reserve	**38**	**23**	**1**
Harvest Land Base	54	32	1
Late Successional Reserve	**68**	**24**	**1**
Not Designated (ND)	1	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**61**	**22**	**-**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Ramaria rubripermanens is widely distributed across nine physiographic provinces in Washington (Western and Eastern Cascades and Olympic Peninsula), Oregon (Coast Range, Cascades West and East, and Klamath Mountains), and California (Klamath and Coast) (see Figure RARU6-1). Most sites are scattered along the Cascade Range and Klamath Mountains in Oregon, where many sites tend to be relatively close to one another in groups. Scattered sites are located in the Coast Range and Klamath Mountains in California and Cascade Range and Olympic Peninsula in

Washington, although *R. rubripermanens* is less abundant outside Oregon based on current site locations. *Ramaria rubripermanens* appears to be well distributed in the Cascade Range and Klamath Mountains in Oregon based on the abundance of sites, proximity of sites to one another, and distribution of sites across forests that may provide suitable habitat in the mountain ranges.

Thirty-three of 231 known sites are at least partially located on private, state, or other lands; three sites are at least partially on NPS lands (Crater Lake National Park); 103 sites are at least partially on NFS lands; and 112 sites are at least partially on BLM lands across the region. Sites included on the National Forests that encompass the project area include six sites on the Fremont-Winema National Forest, 10 sites on the Rogue River-Siskiyou National Forest, and 28 sites on the Umpqua National Forest. The remaining sites on NFS lands are on the Deschutes, Gifford Pinchot, Klamath, Mendocino, Mt. Baker-Snoqualmie, Mt. Hood, Olympic, Okanogan-Wenatchee, Six Rivers, Shasta-Trinity, and Willamette National Forests.

Across the NSO range, 35 sites are at least partially located in reserve lands managed by the Forest Service, including 19 in LSRs, three in Known Owl Activity Centers, and 13 in Congressionally Reserved areas. This represents 34 percent of the total NFS-managed sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 57 sites are located entirely in BLM reserve lands, representing 51 percent of the total BLM-managed sites in the region. While the 57 sites in BLM reserves and the three NPS sites are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection under BLM management and National Park management.

Ramaria. rubripermanens is more common in LSOG forests based on available data (181 of 231 total sites are in LSOG), but it is also somewhat common in non-LSOG forests and has been found in urban parks and younger forests near LSOG stands. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous forests across a wide elevation range and has been documented in most of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous and mixed hardwood-coniferous forests, including the LSOG component of these forests, across the NSO range could provide habitat for *R. rubripermanens* and support additional sites. These forests encompass an estimated 19.2 million acres on BLM and NFS lands in the region, including an estimated 11.6 million acres in reserve land allocations (60 percent of the forests; Table RARU6-4). Of this acreage, an estimated 6.1 million acres are LSOG (see Figure RARU6-3), including 4 million acres in reserve land allocations (66 percent of the forests). Although coniferous and mixed hardwood-coniferous forests are widespread across the region, LSOG forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

TABLE RARU6-4

Extent of Forests That Could Provide Habitat for *Ramaria rubripermanes* on NFS and BLM Lands a/

Location	Coniferous and Mixed Forests		LSOG Coniferous/Mixed Forests	
	Total	**Reserves**	**Total**	**Reserves**
Regional Area	19,220,427	11,550,638	6,063,902	3,995,392
Local Area	5,801,16	377,603	183,215	134,758
Project Area	1,411	975	318	225

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

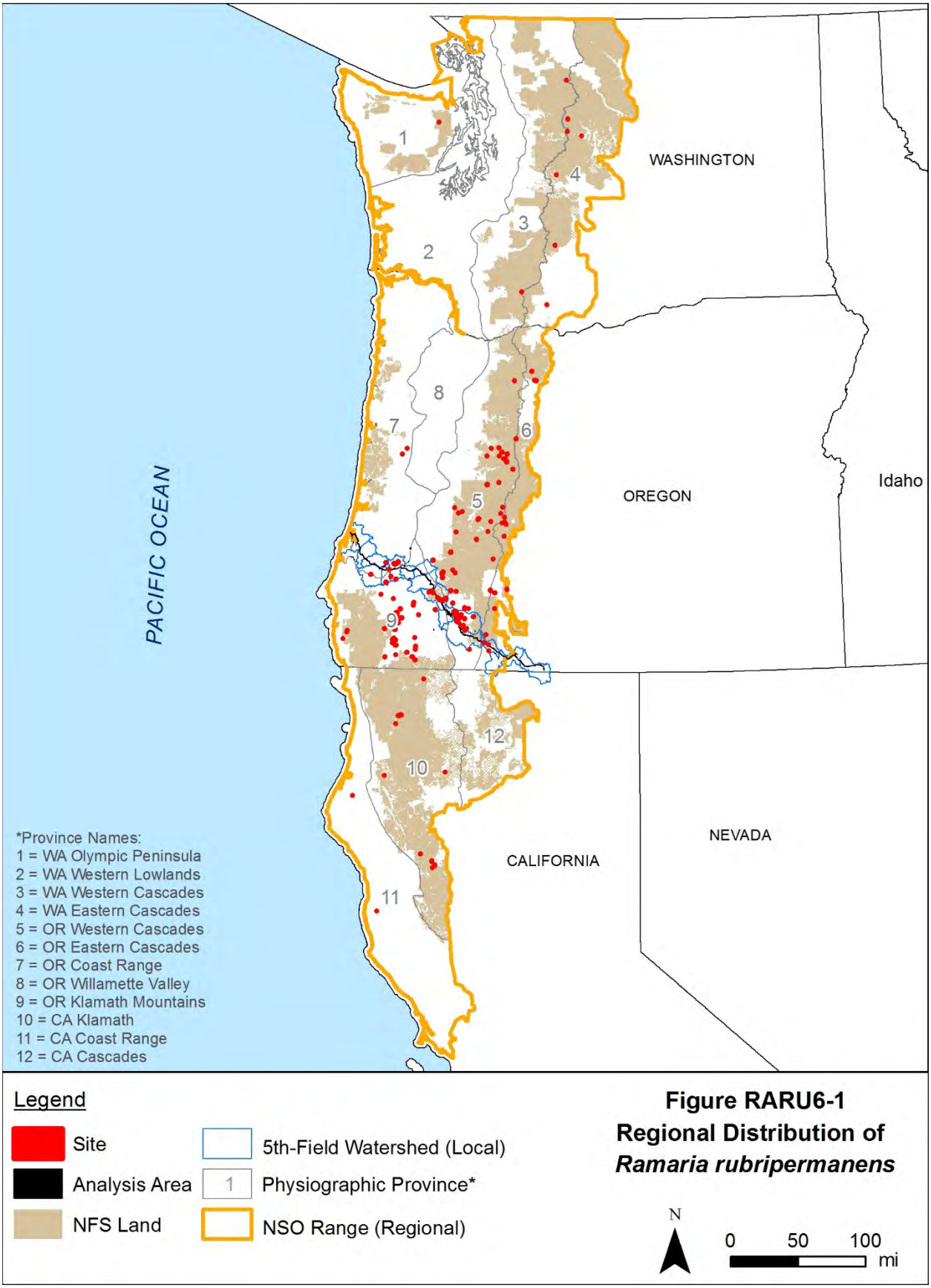


Figure RARU6-1
Regional Distribution of
Ramaria rubripermanens

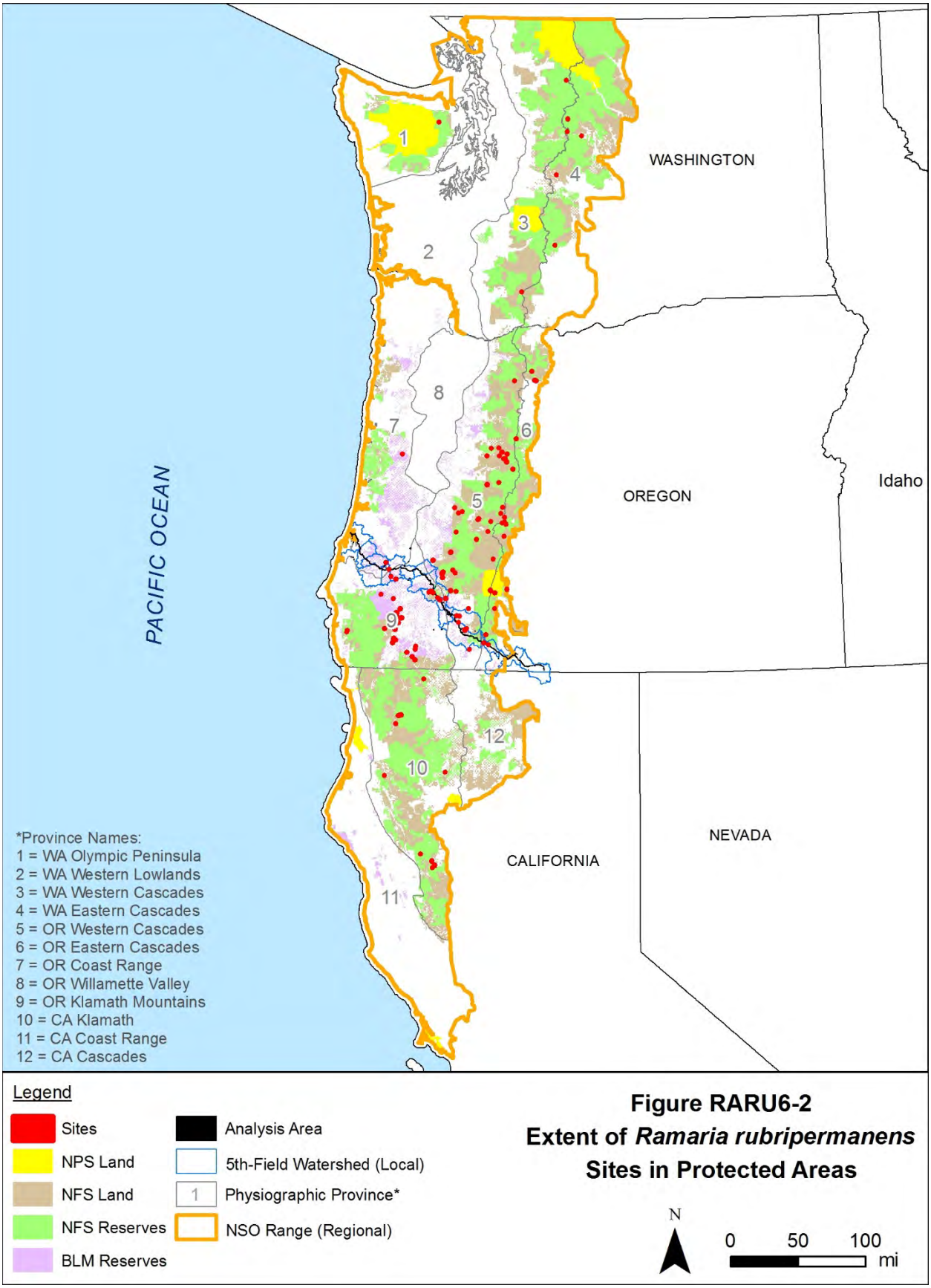


Figure RARU6-2
Extent of *Ramaria rubripermanens* Sites in Protected Areas

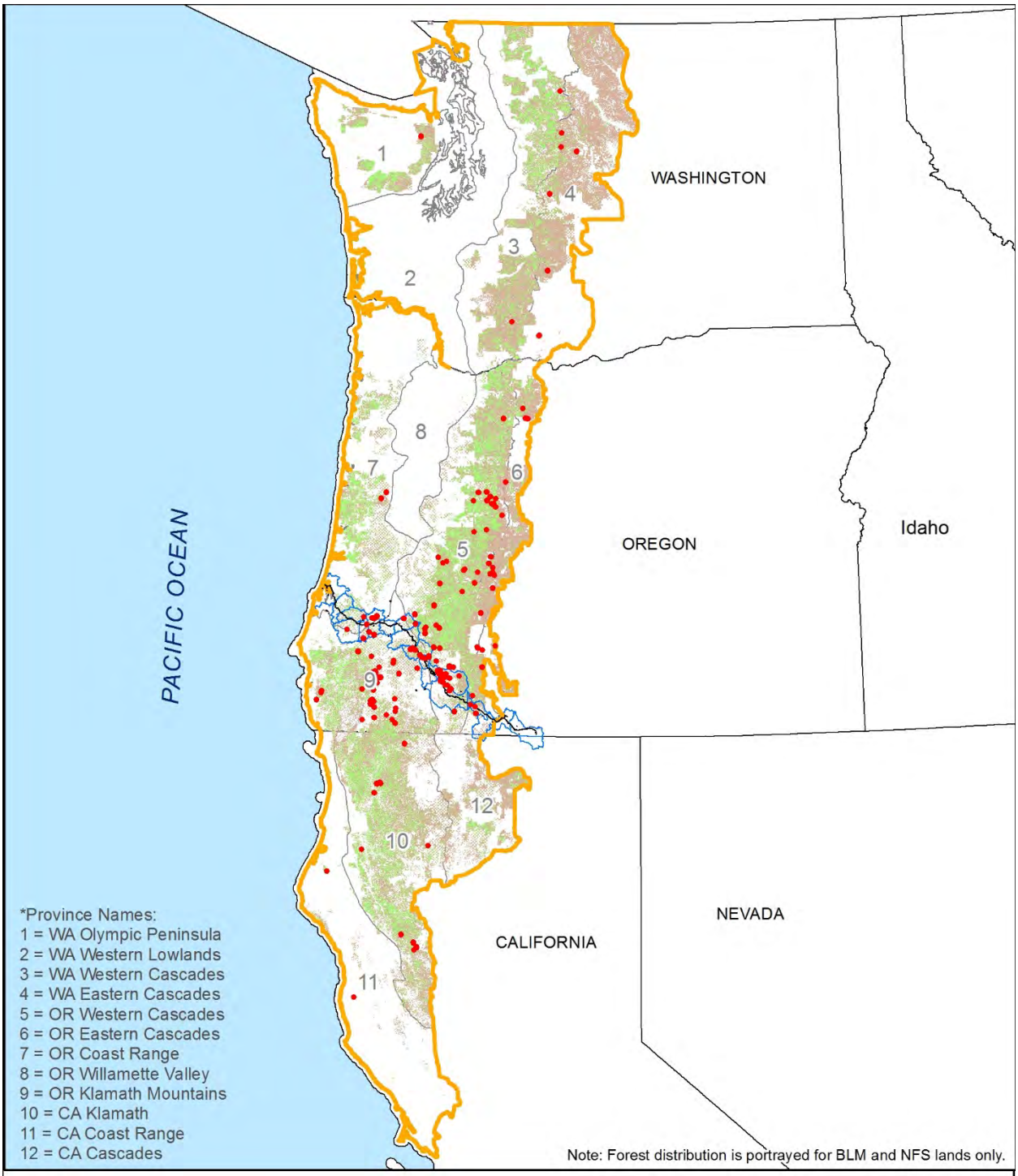


Figure RARU6-3
Potential Habitat For
Ramaria rubripermanens

Local Distribution

Within the local area, *R. rubripermanens* is distributed across eleven 5th-field watersheds that overlap the project area (see Figure RARU6-4 and Table RARU6-5.) Most of the sites appear clustered and near one another in the Cascade Range and eastern Klamath Mountains, whereas sites in the Coast Range and other portions of the Klamath Mountains appear more scattered. Across these watersheds, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous and mixed hardwood-coniferous forests, and opportunities for dispersal exist within the local area and to nearby regional areas. Many regional sites are located either on NFS lands or located entirely in BLM reserves within about 30 miles in the surrounding Cascade Range and Klamath Mountains.

Sixteen of the 70 sites in the local area are at least partially located on private lands, 16 sites are at least partially located on NFS lands, and 48 sites are at least partially on BLM lands. The NFS sites are located on lands designated as Other (Matrix) and Known Owl Activity Centers. Of the sites located on BLM lands in the local area, 16 are located entirely in BLM reserves. The distribution of the reserve sites across the watersheds is depicted in Table RARU6-5 and on Figure RARU6-4.

TABLE RARU6-5

Distribution of *Ramaria rubripermanens* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	30	-	18
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	1	-	1
Elk Creek-South Umpqua (785)	1 a/	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	8	-	7
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	3	-	3
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	2	-	2
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	6	-	6
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	1a/	-	-
Spencer Creek (865)	4	-	1
Trail Creek (804)	6	-	3
Upper Cow Creek (801)	10	1	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.
Site counts are not additive because some sites occur in multiple watersheds and the counts overlap, as noted below:
a/ One site is located on both Elk Creek-South Umpqua and South Umpqua River watersheds.

Coniferous and mixed hardwood-coniferous forests encompass approximately 580,116 acres on BLM and NFS lands in the local area, including 377,603 acres in reserve land allocations (65 percent of the forests). Of this acreage, an estimated 183,215 acres are LSOG, including 134,758 acres in reserve land allocations (74 percent of the forests). Other sites may also exist in the local area where surveys have not been completed, based on the number of sites in the local area, distribution of those sites, and the extent of forests that may provide suitable habitat (see Figures RARU6-3 and RARU6-4).

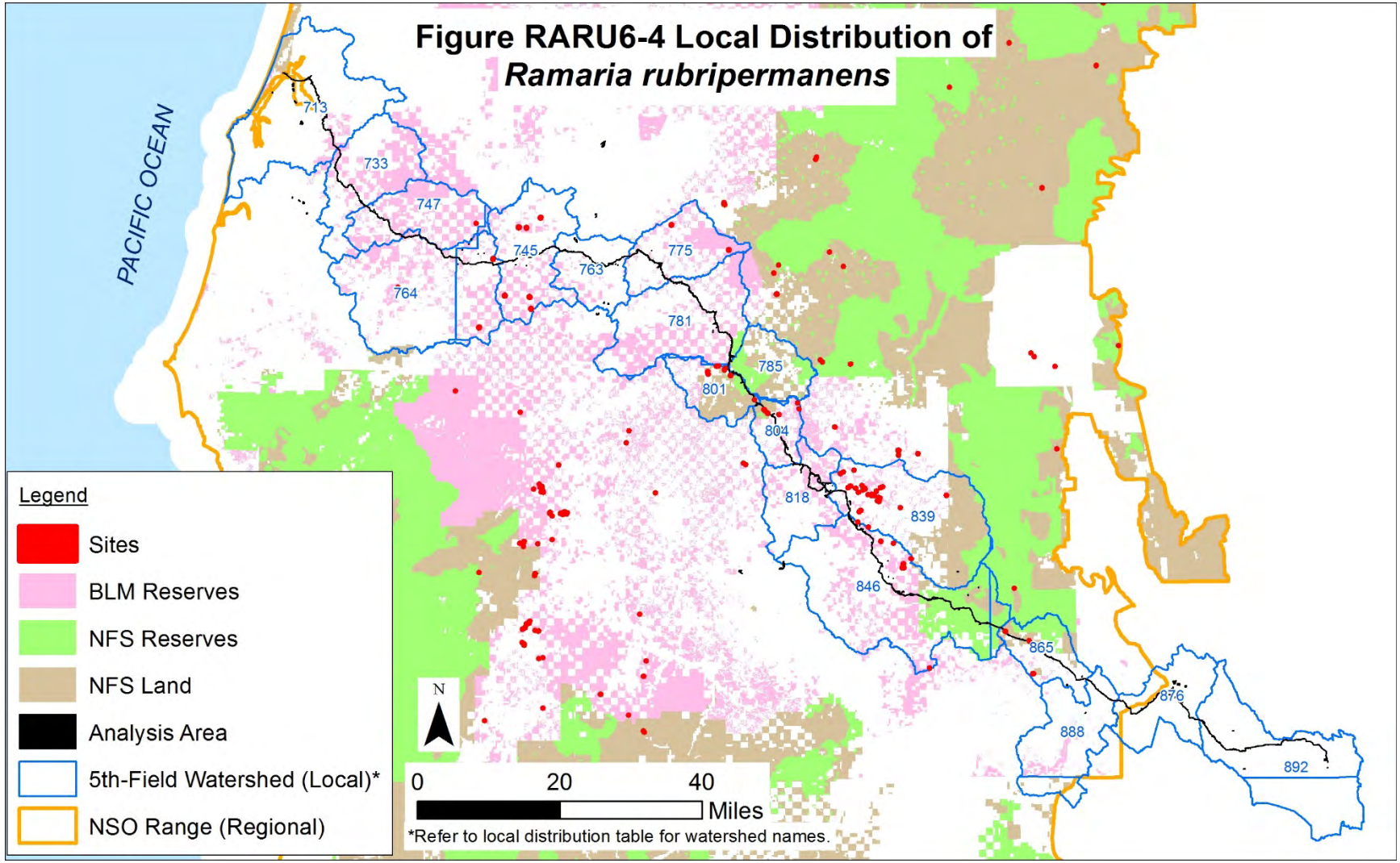


Figure RARU6-4 Local Distribution of
Ramaria rubripermanens
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis area contains eight sites of *R. rubripermanens*, and the project area contains six sites. Seven of the analysis area sites (including all of the sites in the project area) are on NFS lands (Umpqua National Forest), and one site is on BLM land. The analysis area sites are distributed across four 5th-field watersheds in the Klamath Mountains in the central portion of the analysis area. The sites are located near each other, and many sites are located within the vicinity of the analysis area (see Local Distribution discussion above).

The sites on NFS lands are located on lands designated as Other (Matrix), while the site on BLM lands is partially in reserves (District Designated Reserves and LSRs).

Surveys for the PCGP Project resulted in six total observations of the species within or near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These recorded observations in combination with agency records comprise the eight sites in the analysis area. Within the project area, the sites are between MPs 109.5 and 172.6.

Project Impacts

Analysis

The PCGP Project would affect seven sites out of the 103 sites on NFS lands in the region, representing approximately 7 percent of the sites. Site impacts on other land ownerships include one site on BLM land. The total number of sites affected is eight sites out of the 231 total sites on all lands. Table RARU6-6 presents an overview of the features of the PCGP Project that would affect the *R. rubripermanens* sites on NFS land. The construction corridor and associated work and storage areas would affect approximately 6.9 acres within six of the sites (about 29 percent of all sites in the analysis area). The remaining NFS site in the analysis area may be subject to indirect effects associated with the corridor. Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *R. rubripermanens* in and near the project area.

TABLE RARU6-6

Impacts to *Ramaria rubripermanens* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	6	5.4 ac
Temporary Extra Work Area (TEWA)	3	0.4 ac
Uncleared Storage Area (UCSA)	5	1.1 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 5.4 acres of vegetation and soil within six sites and could result in the removal of *R. rubripermanens* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about 0.4 acre within three sites. The establishment of the corridor could modify

microclimate conditions around populations or individuals adjacent to the corridor. The removal of forests and host trees and disturbance to soil could negatively affect *R. rubripermanens* in adjacent areas by removing its habitat, disturbing soil or woody debris around trees or roots of trees, and affecting its mycorrhizal association with the trees, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat conditions as a result of the corridor and TEWAs could make habitat within the sites no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Material storage within UCSAs would disturb about 1.1 acre of understory habitat in five sites, which could modify microhabitats near extant populations or individuals, potentially making the habitat no longer suitable for the species.

Across the project area, the PCGP Project would remove an estimated 1,138 acres of coniferous and mixed hardwood-coniferous forests, including 246 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *R. rubripermanens*. Within this impact area, about 565 acres (about 50 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 245 acres of coniferous and mixed hardwood-coniferous forests. This loss of forests represents less than 1 percent of the total estimated area of coniferous and mixed hardwood-coniferous forests across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the seven sites as a result of the PCGP Project, nine sites of *R. rubripermanens* would remain on NFS lands in the local area, including one in reserves, and 96 sites, including 35 in reserves, would remain on NFS lands in the NSO range. An additional 16 sites would remain entirely in BLM reserves in the local area and 57 sites would remain entirely in BLM reserves in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but the NFS sites would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 35 sites in reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. While the sites on BLM lands are not subject to S&M Standards and Guidelines protections, the 57 sites entirely in reserves would likely receive some degree of protection under BLM management. Based on these site counts, approximately 44 percent of the remaining *R. rubripermanens* sites on NFS and BLM lands in the NSO range would be protected in reserves.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states “instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision” (Standards and Guidelines, pg. 4). The Forest Service has embraced this

approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Ramaria rubripermanens* is a Category D (uncommon) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category D species are not likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information since the species was listed in the 2001 ROD indicates that the species appears to be more common than previously documented, as noted below:

  - *Ramaria rubripermanens* has a widespread distribution across nine physiographic provinces and three states in the region and a moderate-high number of overall sites (103 on NFS lands, 231 on all lands). The species appears to be well distributed in the Cascade Range and Klamath Mountains in Oregon, but is less abundant outside these mountain ranges. The currently known number of sites on NFS and BLM lands is an increase of 69 sites on NFS and BLM lands since 2007, with several sites documented during the PCGP Project surveys.

  - An estimated 43 percent of the sites (92 sites) are in reserves, which is an increase of about 51 sites in reserves since 2006 per Molina (2008).

- Coniferous and mixed hardwood-coniferous forests (general habitat for the species) are widely distributed across the region and encompass approximately 19.2 million acres on BLM and NFS lands with an estimated 60 percent in reserves. Most of the forests are found in the Cascade Range and Klamath Mountains, where most sites are documented. The Coast Range and other areas also contain coniferous and mixed hardwood-coniferous forests, but sites are more scattered in these areas. A subcomponent of these forests likely provides habitat for *R. rubripermanens*.

- The PCGP Project would affect seven of 103 Forest Service-managed sites of *R. rubripermanens*, representing approximately 7 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the seven sites, a moderate-high number of sites (96) would continue to be documented on NFS lands in the region with a wide distribution across Washington, Oregon, and California. Nine sites would remain in the local vicinity of the analysis area on NFS lands; these sites would be located in one 5th-field watershed (Upper Cow Creek). Sixteen sites would remain entirely in BLM reserves in the local area; these sites would be distributed across seven 5th-field watersheds across the project area. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would not affect site persistence at any sites in NFS reserves. Of the remaining sites on NFS lands, 22 are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, and 13 are at least partially in Congressionally Reserved areas where management activities that may adversely affect *R. rubrievanescens* are unlikely. Additionally, 57 sites would remain entirely in BLM reserves, including Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species, LSRs where management actions are restricted to those activities that benefit LSOG

forests, and District Designated Reserves where management activities that may adversely affect *R. rubrievanescens* are unlikely.

- The PCGP Project would result in a permanent loss of an estimated 245 acres of coniferous and mixed hardwood-coniferous forests (less than 1 percent of the total regional acreage). An estimated 11.6 million acres (60 percent) of the forests and 4 million acres (66 percent) of LSOG forests would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *R. rubripermanens*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. This is a Category D species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

2.25.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *R. rubripermanens* at seven sites on NFS lands and one site on BLM lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 96 would remain on NFS lands across the region, and nine sites would remain on NFS lands in the local area. Additionally, 57 sites would remain entirely in BLM reserves in the region and 16 sites would remain entirely in BLM reserves in the local area. Although the PCGP Project would affect site persistence of *R. rubripermanens* at seven sites on NFS lands, these sites are part of the many sites in the Cascade Range and Klamath Mountains in southern Oregon where the species is well distributed. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Ramaria rubripermanens* would persist in the region without considering the seven sites as part of the population.

- The PCGP Project would remove approximately 1,138 acres of coniferous and mixed hardwood-coniferous forests and 246 acres of LSOG forests (a negligible amount of the forests). An estimated 50 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 11.6 million acres (60 percent) of the forests and 4 million acres (66 percent) of LSOG forests would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 1998.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely in BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is widely distributed.

The PCGP Project would not be able to avoid impacts to all *R. rubripermanens* sites in the analysis area, although some individuals or populations within the sites may persist following project implementation. Based on the above conclusions, avoidance of the seven *R. rubripermanens* sites is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plan that applies to the affected sites would waive implementation of Management Recommendations for *R. rubripermanens* sites affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

2.26 RHIZOPOGON TRUNCATUS

Rhizopogon truncatus is a false truffle species in the Rhizopogonaceae family and does not have a common name.

2.26.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *R. truncatus* as a Category D (uncommon) species. ORBIC evaluated *R. truncatus* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and again in its most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2016 the species was considered to be uncommon but not rare with some cause for long-term concern due to declines or other factors within its global range and in Oregon (G4, S4, respectively). The species is on ORBIC List 4. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.26.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Little is known about the autecology or reproductive biology of *R. truncatus*. It is ectomycorrhizal, forming symbiotic associations with conifer trees for translocation of minerals, water, and nutrients (ORBIC 2004). Fruiting bodies grow below ground (hypogeous), which is a distinguishing characteristic of truffles (Castellano et al. 2003). Fruiting has been documented from April through November. As with other sequestrate fungi, *R. truncatus* may be dependent on mycophagy for spore dispersal (Castellano and O'Dell 1997).

Range

Rhizopogon truncatus is found in western and eastern North America, from the Sierra, Siskiyou, and Cascade mountains in California to the central Cascade Range in Oregon in the west and from North Carolina to Nova Scotia in the east (Castellano et al. 2003). In Oregon, it has been documented in Clackamas, Curry, Douglas, Jackson, Josephine, Klamath, and Lane counties.

Based on data available in 2004, *R. truncatus* appeared to be relatively common in Oregon and California, as well as in eastern North America (ORBIC 2004). The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, it was likely similar to the current range, with populations distributed in western and eastern North America. Local distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported *R. truncatus* from more than 300 element occurrences in North America in 2004. An estimated 50 of these occurrences were in Oregon, with fewer in California (8) and none in Washington (ORBIC 2004). The species was found in 15 locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented 22 new sites of *R. truncatus* in the NSO range between 1998 and 2006, and 53 total sites were documented by 2006, including 30 in reserves or protected areas. The 2007 Final SEIS reported 60 sites on NFS and BLM lands and 87 total sites on all lands in the NSO range (USDA and USDI 2007).

Equivalent-effort surveys for Category B species were conducted during the fall and spring from 2010 to 2016 in old-growth stands in the PCGP Project area and within 100 feet of habitat removal to comply with the Standards and Guidelines for Category B species where strategic surveys are not complete (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). Incidental sightings of Category D species were recorded during these surveys and resulted in six new observations of *R. truncatus*. Based on the increased number of sites since 1998 as a result of the increased number of surveys (70 percent increase between 1998 and 2006 per Molina 2008 records), additional surveys would be expected to locate additional populations within the NSO range. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Rhizopogon truncatus has primarily been found in coniferous forests in association with trees in the Pine family and other conifers. It has been documented on true firs, Pacific madrone (*Arbutus menziesii*), kinnikinnick or bearberry (*Arctostaphylos uva-ursi*), lodgepole pine, sugar pine, western white pine (*Pinus monticola*), ponderosa pine, red pine (*Pinus resinosa*), Douglas-fir, eastern hemlock (*Tsuga canadensis*), and mountain hemlock (Molina and Trappe 1994). It grows scattered or in groups (Castellano et al. 2003). In Oregon, *R. truncatus* is most commonly found in alpine habitats between 4,000 and 7,500 feet msl and is usually associated with mountain hemlock and subalpine fir (*Abies lasiocarpa*) (Trappe, pers. comm. 2013). *Rhizopogon truncatus* may prefer specific microclimate conditions of LSOG forests, but it may not be as restricted to these conditions.

Threats

Similar to other *Rhizopogon* species, threats to *R. truncatus* are those that affect its host tree and disturb the soil, such as road and trail construction, logging, and campground establishment (Castellano and O'Dell 1997). Other specific threats to the species are not currently known.

Management Recommendations

As a Category D S&M species, the direction under the 2001 ROD is to manage high-priority sites to provide a reasonable assurance of species persistence (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *R. truncatus*:

- As a mycorrhizal species, *R. truncatus* forms symbiotic associations with the fine root systems of plants, growing out into the soil matrix. To provide a reasonable assurance of the continued persistence of occupied sites consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.26.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *R. truncatus* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table RHTR-1 shows the total number of known sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 266 observations from BLM and Forest Service geodatabases were converted into 210 sites in the NSO range (region). Table RHTR-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table RHTR-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure RHTR-1 displays the regional distribution of the species across NFS lands, Figure RHTR-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure RHTR-3 displays the species' regional distribution as well as the extent of coniferous and mixed hardwood-coniferous forests and LSOG forests on BLM and NFS lands within the currently known range of the species.

TABLE RHTR-1

Number of *Rhizopogon truncatus* Sites (2017)

Location*	Number of Sites
Regional Area	210
Local Area	52
Analysis Area (Project Area)	7 (7)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE RHTR-2

Distribution of *Rhizopogon truncatus* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	70	8	6
BLM	131	45	1
NPS	3	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	41	11	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE RHTR-3

Distribution of *Rhizopogon truncatus* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	8	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	8	-	-
Congressionally Reserved (CR)	**11**	**-**	**-**
Late Successional Reserve (LSR)	**14**	**2**	**1**
Marbled Murrelet Area (LSR3)	**1**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**-**	**-**	**-**
Managed Late Successional Area (MLSA)	1	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	31	6	5
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	**3**	**-**	**-**
District Designated Reserve	**47**	**18**	**-**
Harvest Land Base	71	33	-
Late Successional Reserve	**59**	**12**	**1**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**49**	**14**	**-**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Rhizopogon truncatus has a somewhat wide distribution across six physiographic provinces in Oregon (Willamette Valley, Cascades East and West, and Klamath Mountain) and California (Cascades, Klamath). Most sites are found in the Klamath Mountains, where the sites tend to be clustered or relatively close to one another in groups. Scattered sites are located in the Cascade Range and Willamette Valley with some clusters of sites located in southern Oregon. *Rhizopogon truncatus* is less abundant outside the Klamath Mountains based on current site locations, but is somewhat common in the Cascade Range. *Rhizopogon truncatus* appears to be well distributed in the Klamath Mountains in Oregon based on the abundance and size of sites, proximity of sites to one another, and distribution of sites across forests that may provide suitable habitat in the mountain range.

Forty-one of 210 known sites are at least partially located on private or state lands; three sites are on NPS lands (Crater Lake National Park); 131 sites are at least partially located on BLM lands;

and 70 sites are at least partially on NFS lands across the region. Sites included on the National Forests that encompass the project area include two sites on the Fremont-Winema National Forest, 21 sites on the Rogue River-Siskiyou National Forest, and 14 sites on the Umpqua National Forest. Sites included on other National Forests include six sites on the Deschutes National Forest, one site on the Klamath National Forest, two sites on the Lassen National Forest, four sites on the Mendocino National Forest, one site on the Mt. Hood National Forest, three sites on the Six Rivers National Forest, and nine sites on the Willamette National Forest.

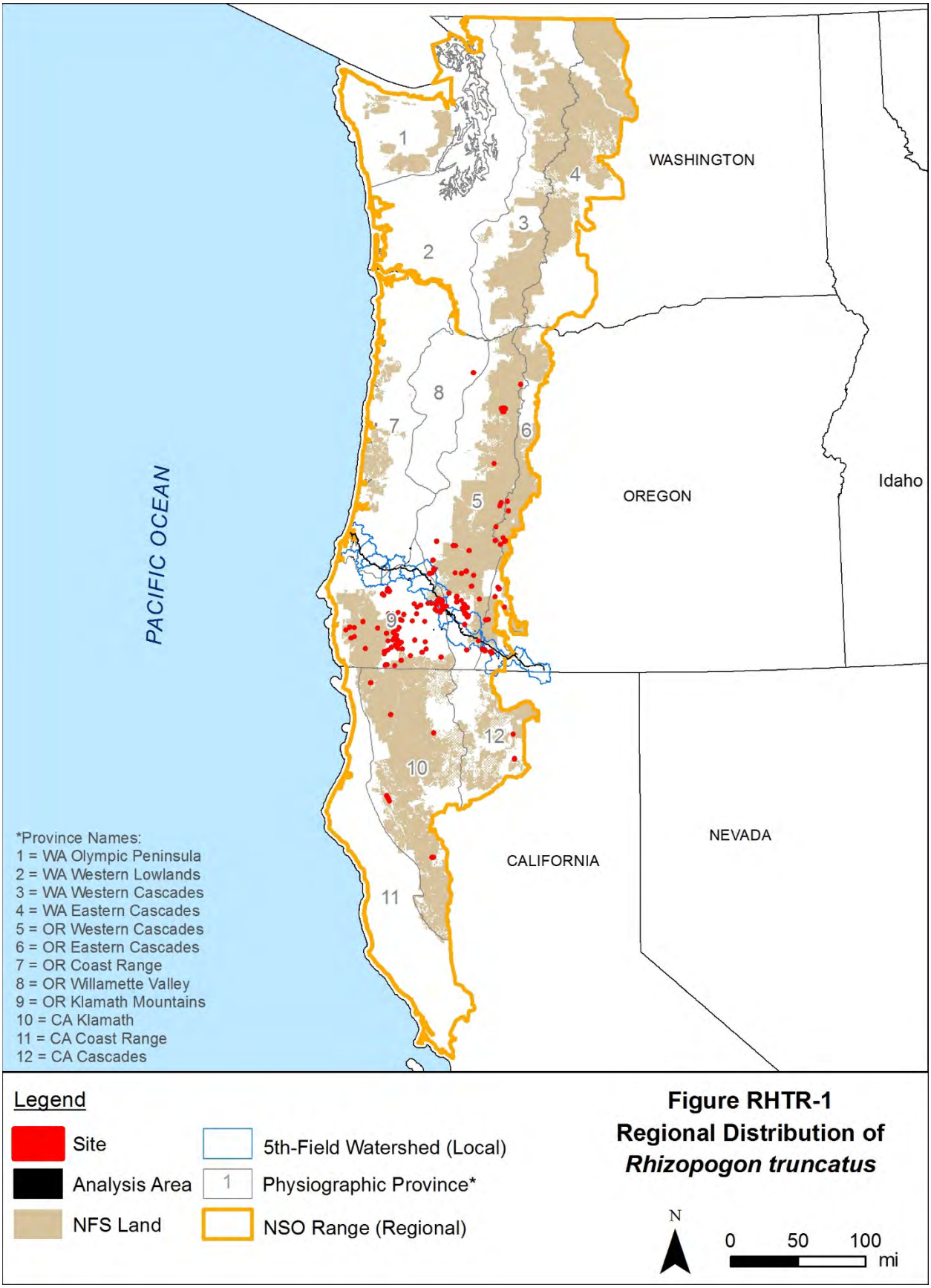


Figure RHTR-1
Regional Distribution of *Rhizopogon truncatus*

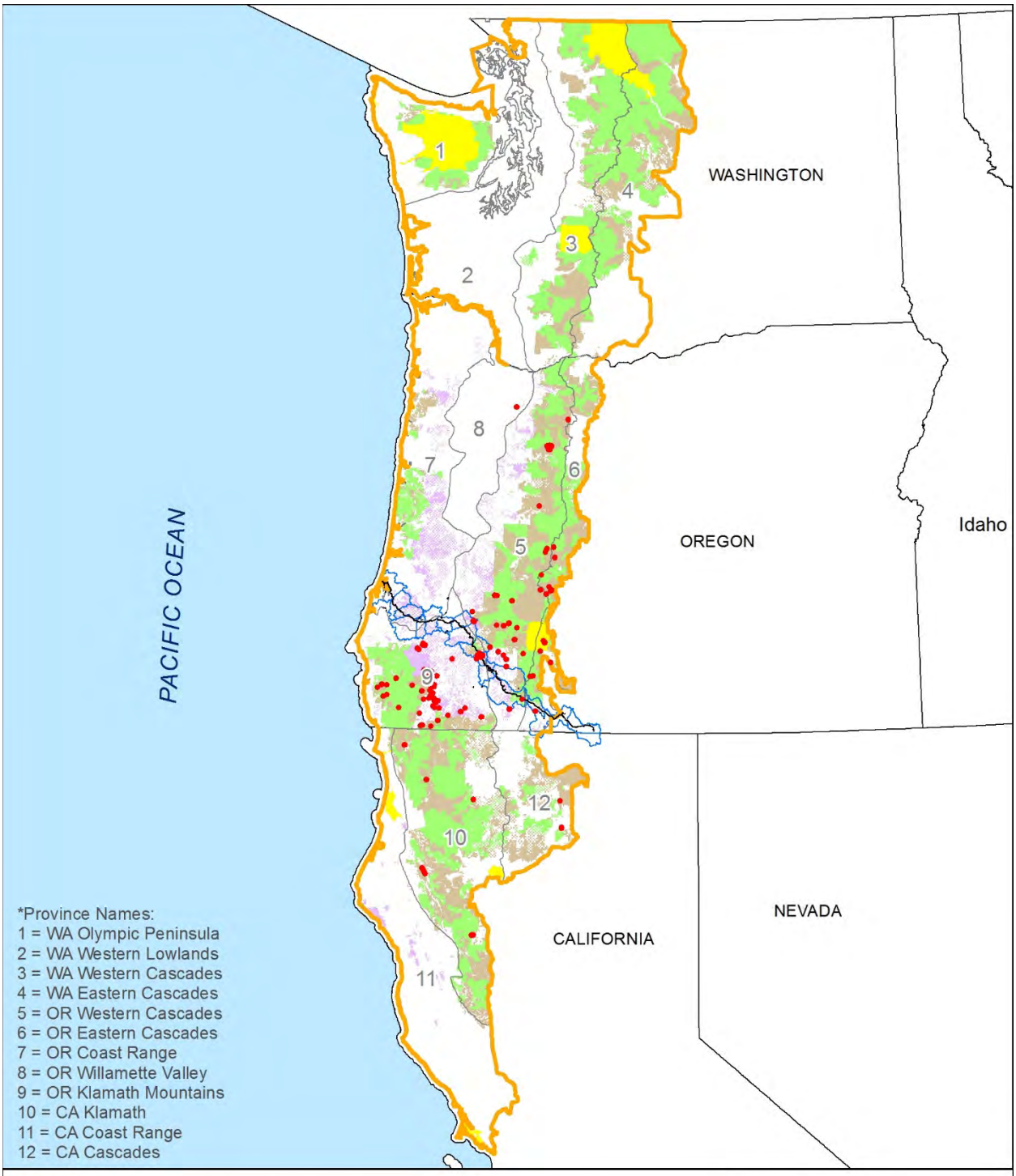


Figure RHTR-2
Extent of *Rhizopogon truncatus* Sites in Protected Areas

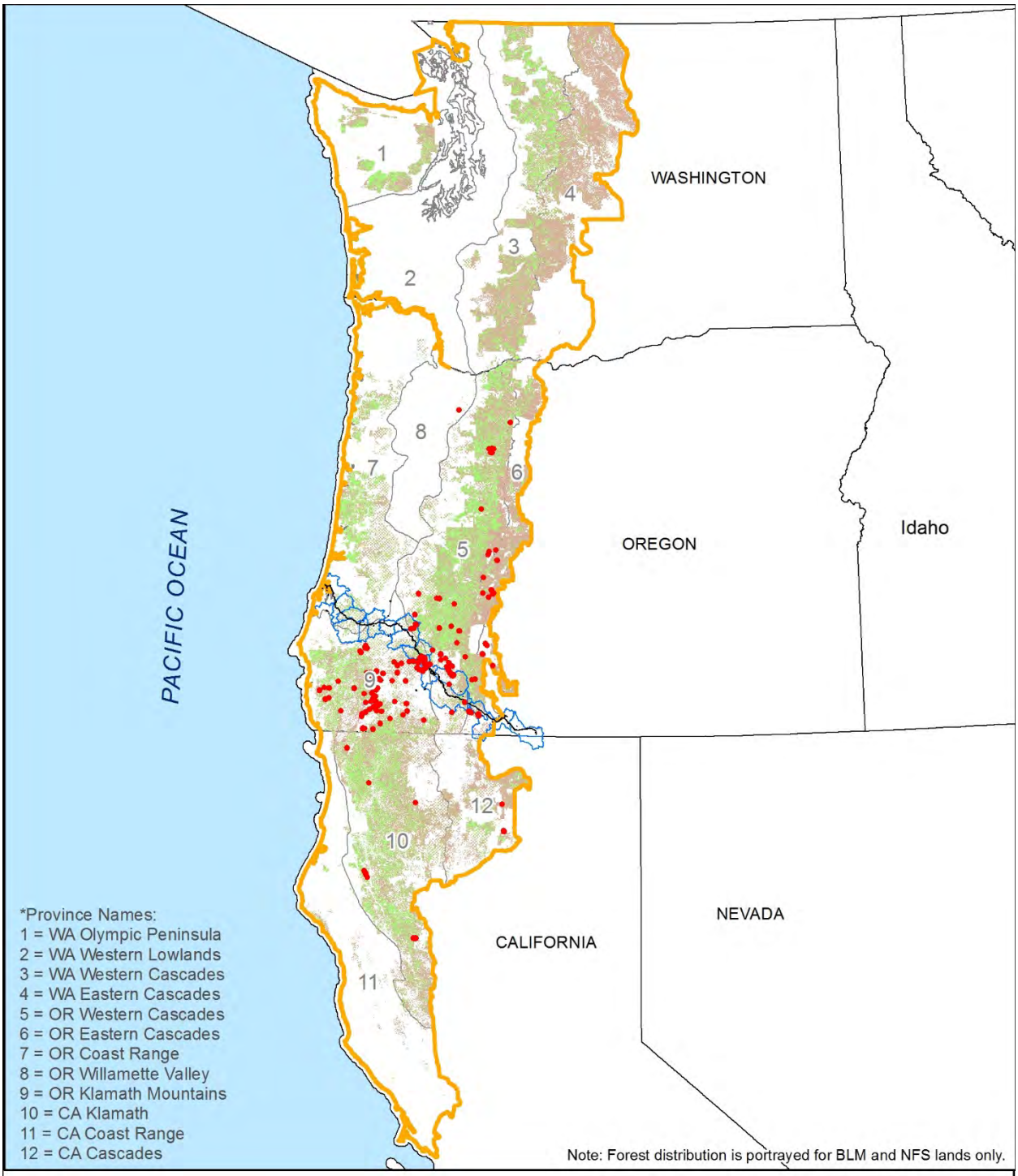


Figure RHTR-3
Potential Habitat For
Rhizopogon truncatus

Across the NSO range, 26 sites are at least partially located in reserve lands managed by the Forest Service, including 14 in LSRs, one in a Marbled Murrelet Area, and 11 in Congressionally Reserved areas (see Figure RHTR-2). This represents 34 percent of the total NFS-managed sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 58 sites are entirely located in reserve lands managed by BLM, which represents 44 percent of the total number of BLM-managed sites in the region. While the 58 sites in BLM reserves and the three NPS sites are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management and National Park Management.

Rhizopogon. truncatus is more commonly found in LSOG forests based on available data (169 of 210 total sites are in LSOG), but it is also somewhat common in non-LSOG forests. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous forests across a wide elevation range and has only been found in the eastern part of the NSO range in Oregon and California. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships and included in this potential habitat discussion. Coniferous and mixed hardwood-coniferous forests, including the LSOG component of these forests, within the NSO range could provide habitat for *R. truncatus* and support additional sites. These forests encompass an estimated 19.2 million acres on BLM and NFS lands in the region, including an estimated 11.6 million acres in reserve land allocations (60 percent of the forests; Table RHTR-4). Of this acreage, an estimated 6.1 million acres are LSOG (see Figure RHTR-2), including 4 million acres in reserve land allocations (66 percent of the forests). Although coniferous and mixed hardwood-coniferous forests are widespread across the eastern part of the NSO range, LSOG forests are less common and are primarily found in the Cascade Ranges and Klamath Mountains.

TABLE RHTR-4

Extent of Forests That Could Provide Habitat for *Rhizopohon truncatus* on NFS and BLM Lands a/

Location	Coniferous/Mixed Forests		LSOG Coniferous/Mixed Forests	
	Total	Reserves	Total	Reserves
Regional Area	19,220,427	11,550,638	6,063,902	3,995,392
Local Area	5,801,16	377,603	183,215	134,758
Project Area	1,411	975	318	225

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

Local Distribution

Within the local area, *R. truncatus* is distributed across nine 5th-field watersheds that overlap the project area (see Table RHTR-5 and Figure RHTR-4). The sites are somewhat scattered across the watersheds in the Klamath Mountains and Cascade Range; sites in the Trail Creek, Myrtle Creek, South Umpqua River, Big Butte Creek, and Spencer Creek watersheds are more clustered and near one another. Across these watersheds, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous and mixed hardwood-coniferous forests, and opportunities for dispersal exist within the local area and to nearby regional areas.

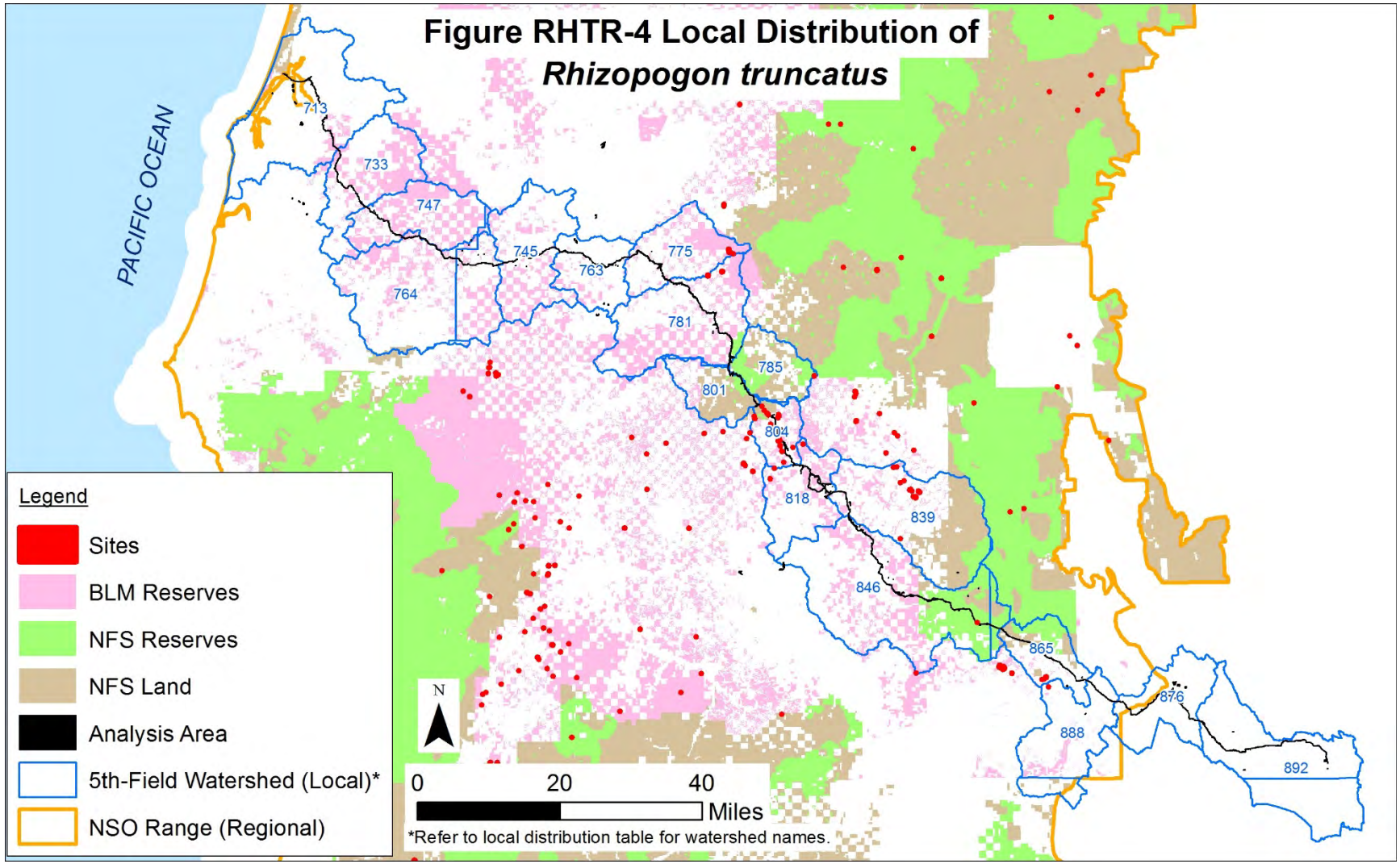


Figure RHTR-4 Local Distribution of
Rhizopogon truncatus
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Many regional sites are located within 20 miles to the northeast in the Cascade Range and within 30 miles to the southwest in the Klamath Mountains. Many of these nearby regional sites are located on NFS lands and several more are located entirely in BLM reserves. Eight of the 52 sites in the local area are on NFS lands (Rogue River-Siskiyou and Umpqua National Forests). Six of the local sites on NFS land are on land designated as Other (Matrix) and two sites are in LSRs. Additionally, 45 sites are located on BLM lands, 12 of which are located entirely in reserves (LSRs). The sites in both NFS and BLM reserves represent 27 percent of all the sites in the local area.

TABLE RHTR-5

Distribution of *Rhizopogon truncatus* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	16	-	9
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	1	1	-
Klamath River-John C Boyle Reservoir (888)	1	1	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	2	1	1
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	4	-	4
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	3	-	3
South Umpqua River (781)	2	-	2
Spencer Creek (865)	5	-	2
Trail Creek (804)	20	-	14
Upper Cow Creek (801)	-	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.

Coniferous and mixed hardwood-coniferous forests encompass approximately 580,116 acres on BLM and NFS lands in the local area, including 377,603 acres in reserve land allocations (65 percent of the forests). Of this acreage, an estimated 183,215 acres are LSOG, including 134,758 acres in reserve land allocations (74 percent of the forests). Other sites may also exist in the local area where surveys have not been completed, based on the number and distribution of sites in the regional and local areas and the extent of forests that may provide suitable habitat (see Figures RHTR-3 and RHTR-4).

Analysis/Project Area Distribution

The analysis and project areas contain seven sites of *R. truncatus*. Six of the sites are on NFS lands in the Rogue River and Umpqua National Forests. Five NFS sites are on land designated as Other (Matrix), and one site is in an LSR. One site is located on BLM land in LSRs. The analysis area sites are found in two 5th-field watersheds (Little Butte Creek and Trail Creek). Most of the sites are clustered and near one another in the Little Butte Creek watershed, and one site is in the Trail Creek watershed. The sites are in the eastern half of the analysis area and other sites are located within the immediate vicinity of the analysis area in the Cascade Range and Klamath Mountains (see Local Distribution discussion above).

Surveys for the PCGP Project resulted in six total observations of the species in or near the project area during 2010 and 2011 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These recorded observations comprise six of the sites in the analysis area. A recorded observation from agency databases from 2012 comprises the seventh site in the analysis area. Within the project area, five sites are between MPs 111.5 and 113.1, and one site is near MP 164.4.

Project Impacts

Analysis

The PCGP Project would affect six sites out of the 70 sites on NFS lands in the region, representing approximately 9 percent of the sites. Impacts on sites on other land ownerships include one site on BLM land. The total number of sites affected is seven sites out of the 210 total sites on all lands. Table RHTR-6 presents an overview of the features of the PCGP Project that would affect the *R. truncatus* sites on NFS lands. The construction corridor and associated work and storage areas would affect approximately 6.7 acres within the sites (about 44 percent of the sites). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *R. truncatus* in and near the project area.

TABLE RHTR-6

Impacts to *Rhizopogon truncatus* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	6	4.6 ac
Temporary Extra Work Area (TEWA)	3	0.6 ac
Uncleared Storage Area (UCSA)	6	1.5 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 4.6 acres of vegetation and soil within six sites and could result in the removal of *R. truncatus* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about 0.6 acre within three sites. The establishment of the corridor could modify microclimate conditions around populations or individuals adjacent to the corridor. The removal of forests and host trees and disturbance to soil could negatively affect *R. truncatus* in adjacent areas by removing its habitat, disturbing soil around trees or roots of trees, and affecting its mycorrhizal association with the trees, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat conditions as a result of the corridor and TEWAs could make habitat within the sites no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Material storage within UCSAs would disturb about 1.5 acres of understory habitat in six sites, which could modify microhabitats

near extant populations or individuals, potentially making the habitat no longer suitable for the species.

Across the project area, the PCGP Project would remove an estimated 1,138 acres of coniferous and mixed hardwood-coniferous forests, including 246 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *R. truncatus*. Within this impact area, about 565 acres (about 50 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 245 acres of coniferous and mixed hardwood-coniferous forests. This loss of forests represents less than 1 percent of the total estimated area of coniferous and mixed hardwood-coniferous forests across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the six sites on NFS lands as a result of the PCGP Project, two sites of *R. truncatus* would remain on NFS lands in the local area, including one in a reserve, and 64 sites, including 25 in reserves, would remain on NFS lands in the NSO range. An additional 11 sites would remain entirely in BLM reserves in the local area and 57 sites would remain entirely in BLM reserves in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but the NFS sites would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 29 sites in NFS reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. While the sites on BLM land would not be covered under the S&M Standards and Guidelines, the sites entirely in BLM reserves would likely receive some level of protection under BLM reserve management. Based on these site counts, approximately 41 percent of the remaining *R. truncatus* sites on federal lands in the NSO range would be protected in either NFS or BLM reserves.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Rhizopogon truncatus* is a Category D (uncommon) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category D species are not likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information since the species was listed in the 2001 ROD indicates that the species appears to be more common than previously documented, as noted below:

    - *Rhizopogon truncatus* has a somewhat widespread distribution across six physiographic provinces and two states in the region and a moderate-high number of overall sites (70 on NFS lands, 210 on all lands). The species appears to be well distributed in the Klamath Mountains in Oregon and is fairly abundant in the Cascade

Range in Oregon. The currently known number of sites on NFS and BLM lands is an increase of 46 sites on NFS and BLM lands since 2007, with many sites documented during the PCGP Project surveys.

- An estimated 42 percent of the sites (84 sites) are in reserves, which is an increase of 54 sites in reserves since 2006 per Molina (2008).

- Coniferous and mixed hardwood-coniferous forests (general habitat for the species) are widely distributed across the NSO range and encompass approximately 19.2 million acres on BLM and NFS lands with an estimated 60 percent in reserves. Most of the forests are found in the Cascade Range and Klamath Mountains, where most sites are documented. A subcomponent of these forests likely provides habitat for *R. truncatus*.

- The PCGP Project would affect six of 70 Forest Service-managed sites of *R. truncatus*, representing approximately 9 percent of the sites on NFS lands in the NSO range. Another single site would be affected on BLM lands. Assuming site persistence cannot be maintained at the seven sites, a moderate-high number of sites (64) would continue to be documented on NFS lands in the region with a somewhat wide distribution across Washington, Oregon, and California. Two sites would remain on NFS lands in the local vicinity of the analysis area; these sites would occur in two 5th-field watersheds. An additional 57 sites would remain entirely in BLM reserves in the region and 11 sites would remain entirely in BLM reserves in the local area. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would affect site persistence at one site in an LSR on NFS lands, and the percentage of sites in NFS reserves would be about the same (40 percent). Of the remaining sites on NFS lands, 15 are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and 11 are in Congressionally Reserved areas where management activities that may adversely affect *R. truncatus* are unlikely. One site in BLM reserves would also be affected, leaving 57 sites entirely in BLM reserves in the region. The sites in BLM reserves would be located in LSRs where management actions are restricted to those activities that benefit LSOG forests, Congressionally Reserved Areas and District Designated Reserves where management activities that may adversely affect *R. truncatus* are unlikely, and Riparian Reserves, where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species.

- The PCGP Project would remove result in a permanent loss of an estimated 245 acres of coniferous and mixed hardwood-coniferous forests (less than 1 percent of the total regional acreage). An estimated 11.6 million acres (60 percent) of the forests and 4 million acres (66 percent) of LSOG forests would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *R. truncatus*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. This is a Category D species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO that have not

been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

2.26.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *R. truncatus* at six sites on NFS lands and one site on BLM lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 64 sites would remain on NFS lands across the region, and two sites would remain on NFS lands in the local area. Additionally, 57 sites would remain entirely in BLM reserves in the region and 11 sites would remain entirely in BLM reserves in the local area. The PCGP Project would affect site persistence of *R. truncatus* at six sites on NFS lands; these sites are part of a small group of NFS sites at the northern end of the Klamath Mountains. Excepting the two sites remaining in the local area, the nearest NFS sites are located 20 miles to the northeast in the Cascade Range in Oregon and 35 miles to the southwest in the Klamath Mountains in Oregon. Sites on BLM lands are much more abundant in the vicinity of the analysis area, and many sites are distributed across the Klamath Mountains and Western Cascade Range in southern Oregon. It is expected that BLM management would enable the majority of the sites in reserves to persist. Due to the significant number of sites on BLM lands in the local area (44) with a significant proportion of sites in BLM reserves (25 percent), it can be assumed that many sites would be protected and the species would remain locally abundant. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Rhizopogon truncatus* would persist in the region without considering the six sites as part of the population.

- The PCGP Project would remove approximately 1,138 acres of coniferous and mixed hardwood-coniferous forests and 246 acres of LSOG forests (a negligible amount of the forests). An estimated 50 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 11.6 million acres (60 percent) of the forests and 4 million acres (66 percent) of LSOG forests would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 1998.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely in BLM reserves are expected to receive some level of protection under the 2016 RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is somewhat widely distributed.

The PCGP Project would not be able to avoid impacts to all *R. truncatus* sites in the analysis area, although some individuals or populations within the sites may persist following project implementation. Based on the above conclusions, avoidance of the six *R. truncatus* sites is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plans that apply to

the affected sites would waive implementation of Management Recommendations for *R. truncatus* sites affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

2.27 SARCODON FUSCOINDICUS

Sarcodon fuscoindicus is a toothed fungal species that is in the Bankeraceae family. It has two synonyms (*Hydnum fuscoindicum* and *Sarcodon fuscoindicum*) and is commonly known as violet hedgehog.

2.27.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *S. fuscoindicus* as a Category B (rare) species. ORBIC evaluated *S. fuscoindicus* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and again in its most recent publication of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2016, the species was considered to be at moderate risk of extinction due to a restricted range, relatively few populations, recent and widespread declines within its global range (G3). It was considered to be at high risk of extinction due to a very restricted range, very few populations and steep declines within Oregon (S2). This species is on ORBIC List 2. It is not considered a BLM Sensitive or Strategic species in Oregon, but it is considered a Forest Service Strategic species in Oregon.

2.27.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Sarcodon fuscoindicus is an ectomycorrhizal fungus that depends on host trees for nutrients (carbohydrates) and fruits in the autumn and winter (Castellano et al. 2003). It is considered erratic in its fruiting behavior, meaning that it is absent some years and abundant in others (Arora 1986). It has spines or downward hanging teeth which contain its spores (Henderson 2017). Little is known about its reproductive biology or dispersal mechanisms but it can be assumed that its downward hanging teeth drop spores directly to the ground, creating a spore bank.

Range

Sarcodon fuscoindicus is distributed across western North America. It is known from British Columbia, Washington, Oregon, California, and Mexico. The species is most abundant throughout the Pacific Northwest but has been also documented along the northern Coastal Range and Cascades Range of northern California (ORBIC 2004). In Mexico, it has been documented along the western part of the central Neo-volcanic axis (The Global Fungal Red List Initiative 2017).

The currently known range of the species within the NSO range based on 2017 data is presented below under Species Distribution.

Although information on the species' historical range is not known, it was likely similar to the current range, with populations distributed across western North America. Local distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported an estimated 21 to 80 occurrences of *S. fuscoindicus* distributed across the species' range. In the Pacific Northwest, up to 20 occurrences were in Washington and up to 20 occurrences were in Oregon (ORGIC 2004). In California, there were an estimated 21 to 80 occurrences (ORBIC 2004). The species was found in six locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented 12 new sites of *S. fuscoindicus* in the NSO range between 1998 and 2006, and 49 total sites were documented by 2006, including 24 in reserves or protected areas. The 2007 Final SEIS reported 27 sites on NFS and BLM lands and 40 total sites on all lands in the NSO range (USDA and USDI 2007).

Pre-disturbance surveys are not practical for Category B species. Instead, equivalent-effort surveys were conducted during the fall and spring from 2010 to 2016 in old-growth stands in the PCGP Project area and within 100 feet of habitat removal to comply with the Standards and Guidelines for Category B species where strategic surveys are not complete (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). The equivalent-effort surveys targeted all Category B species, including *S. fuscoindicus*, and resulted in two new observations of individuals or populations of *S. fuscoindicus*. Based on the increased number of known sites since 1998 as a result of the increased number of surveys (a 32 percent increase between 1998 and 2006 per Molina 2008 records), additional surveys would be expected to locate additional populations within the NSO range. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Sarcodon fuscoindicus has a scattered to gregarious habit and can be found growing in soil rather than duff (Castellano et al. 2003). It is an ectomycorrhizal fungus that is associated with mature forests and old trees in conifer and mixed temperate forests (The Global Fungal Red List Initiative 2017). In the Pacific Northwest, *S. fuscoindicus* has been documented in western hemlock-Douglas fir forests in Washington (O'Dell et al. 1999) and western hemlock-lodgepole pine forests in British Colombia (Kranabetter et al. 2005). It has also been observed in tanoak and Pacific madrone forests in higher elevations in the California Coast Range (Arora 1986). The Mexican subpopulation host is presumably the sacred fir (*Abies religiosa*), which is a tree endemic to central Mexico; however, more research is needed to determine its exact host(s) (The Global Fungal Red List Initiative 2017).

Threats

Major threats to *S. fuscoindicus* are logging or thinning, since studies have shown that if a host tree is killed, its mycorrhizal symbiont will die shorty after (ORBIC 2004). Activities such as

agriculture and animal husbandry may also be threat to this species; specifically in the Mexican temperate forests (The Global Fungal Red List Initiative 2017).

Management Recommendations

As a Category B S&M species, the direction under the 2001 ROD is to manage all known sites and reduce the inadvertent loss of undiscovered sites (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *S. fuscoindicus*:

- As a mycorrhizal species, *S. fuscoindicus* forms symbiotic associations with the fine root systems of plants, growing out into the soil matrix. Consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.27.1 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *S. fuscoindicus* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table SAFU-1 shows the total number of known sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 82 observations from BLM and Forest Service geodatabases were converted into 74 sites in the NSO range (region). Table SAFU-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table SAFU-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure SAFU-1 displays the regional distribution of the species across NFS lands, Figure SAFU-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure SAFU-3 displays the species' regional distribution as well as the extent of coniferous, mixed hardwood-coniferous, and hardwood forests, and LSOG forests below 4,500 feet msl on BLM and NFS lands.

TABLE SAFU-1

Number of *Sarcodon fuscoindicus* Sites (2017)

Location*	Number of Sites
Regional Area	74
Local Area	7
Analysis Area (Project Area)	2 (2)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE SAFU-2

Distribution of *Sarcodon fuscoindicus* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	38	1	1
BLM	15	6	1
NPS	8	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	15	1	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE SAFU-3

Distribution of *Sarcodon fuscoindicus* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	4	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	5	-	-
Congressionally Reserved (CR)	**4**	**-**	**-**
Late Successional Reserve (LSR)	**14**	**-**	**-**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**-**	**-**	**-**
Managed Late Successional Area (MLSA)	1	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	13	2	1
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	**-**	**-**	**-**
District Designated Reserve	**5**	**2**	**-**
Harvest Land Base	5	3	-
Late Successional Reserve	**10**	**4**	**1**
Not Designated (ND)	1	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**3**	**3**	**1**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Sarcodon fuscoindicus is widely distributed across eleven physiographic provinces in Washington (Western Lowlands, Western and Eastern Cascades, and Olympic Peninsula), Oregon (Coast Range, Cascades East and West, and Klamath Mountains), and California (Klamath, Coast, and Cascades) (see Figure SAFU-1). Most sites are located in the Cascade Range in Oregon, where sites are fairly clustered or located close to one another in groups. Scattered sites are located in

the Klamath Mountains, Coast Range, and other outlying areas with some clusters of sites in western Washington. *Sarcodon fuscoindicus* does not appear to be well distributed in any part of its range due to its scattered distribution.

Fifteen of the 74 known sites are at least partially located on private, state, or other lands; eight sites are located on NPS land (Mt. Rainer National Park); 15 sites are at least partially located on BLM lands; and 39 sites are at least partially located on NFS lands. Sites included on the National Forests that encompass the project area include five sites on the Umpqua National Forest. The remaining NFS sites are located on the Columbia River Gorge National Scenic Area, and on the Gifford Pinchot, Klamath, Modoc, Mt. Baker-Snoqualmie, Mt. Hood, Okanogan-Wenatchee, Shasta-Trinity, Siuslaw, Six Rivers, and Willamette National Forests.

Across the NSO range, 18 sites are located entirely in reserve lands managed by the Forest Service, including 14 in LSRs and four in Congressionally Reserved areas (see Figure SAFU-2). These sites represent 46 percent of the total NFS-managed sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, nine sites are located entirely in reserve lands managed by BLM, which represents 60 percent of the total number of BLM-managed sites in the region. While the sites in BLM reserves and NPS lands are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management and National Park Management.

Sarcodon fuscoindicus is primarily found in LSOG forests based on available data (54 of 74 total sites are in LSOG). Based on current site locations, the species is found in all forest types below 4,500 feet msl throughout most of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous, mixed hardwood-coniferous, and hardwood forests, including the LSOG component of these forests, within the NSO range could provide habitat for *S. fuscoindicus* and support additional sites. These forests encompass an estimated 14.6 million acres on BLM and NFS lands in the region, including an estimated 8.4 million acres in reserve land allocations (57 percent of the forests; Table SAFU-4). Of this acreage, an estimated 5.1 million acres are LSOG (see Figure SAFU-3), including 3.3 million acres in reserve land allocations (65 percent of the forests). Although all forest types below 4,500 feet msl are widespread across the region, LSOG forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

TABLE SAFU-4

Extent of Forests That Could Provide Habitat for *Sarcodon fuscoindicus* on NFS and BLM Lands a/

Location	All Forests below 4,500 feet		LSOG Forests below 4,500 feet	
	Total	Reserves	Total	Reserves
Regional Area	14,627,387	8,376,859	5,131,258	3,344,397
Local Area	509,300	348,453	153,678	116,648
Project Area	1,219	855	227	161

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

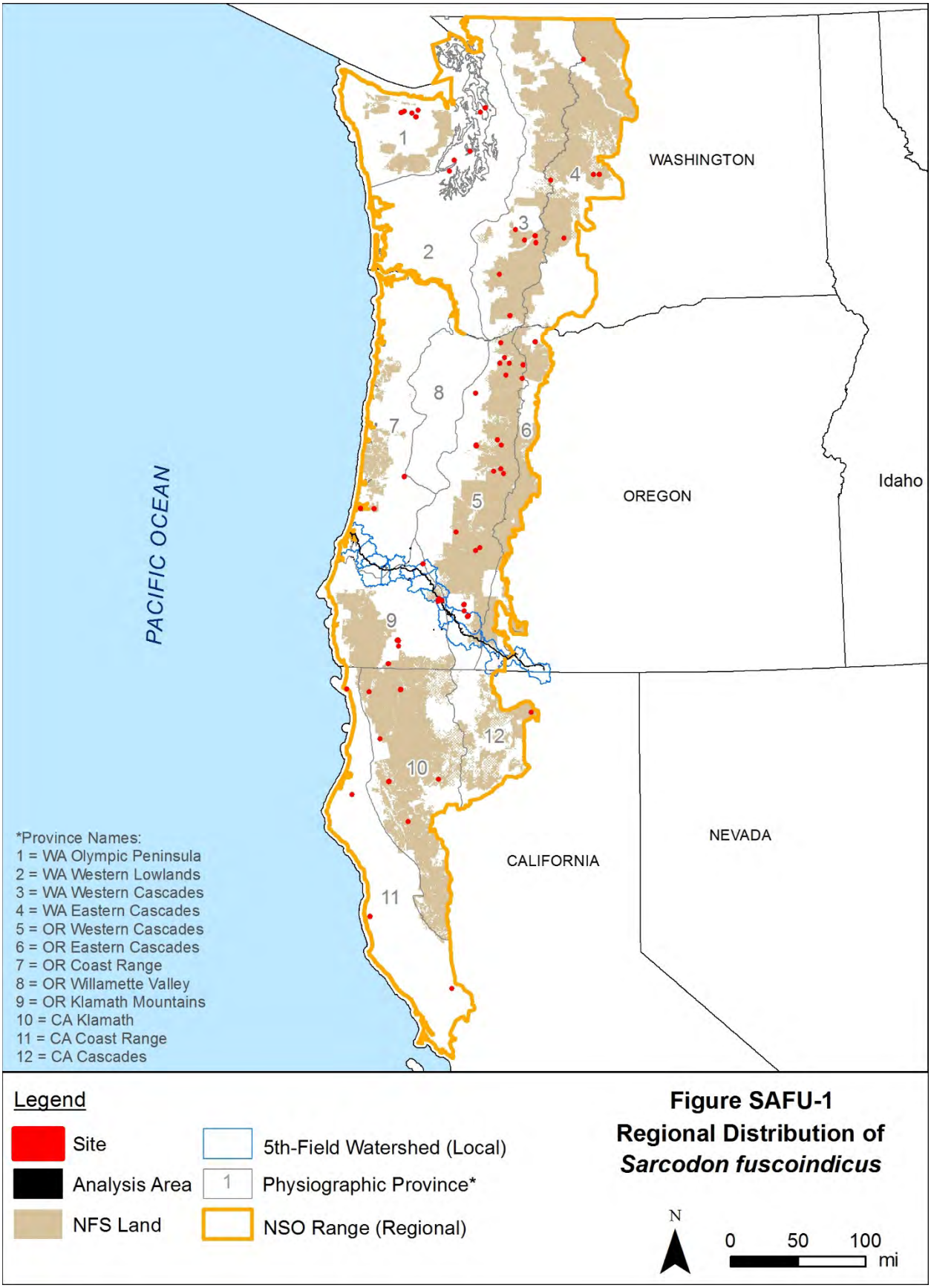


Figure SAFU-1
Regional Distribution of *Sarcodon fuscoindicus*

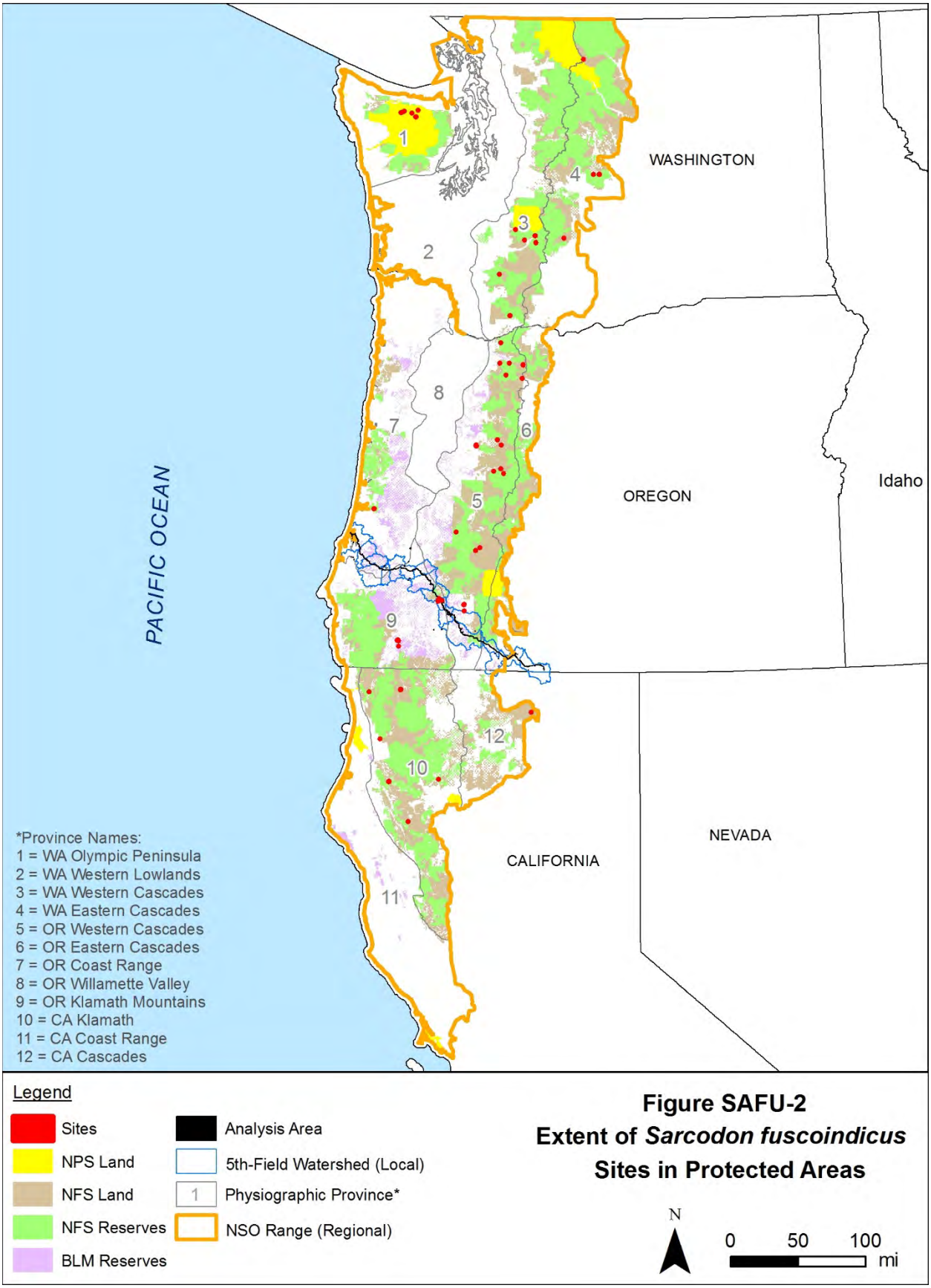


Figure SAFU-2
Extent of *Sarcodon fuscoindicus*
Sites in Protected Areas

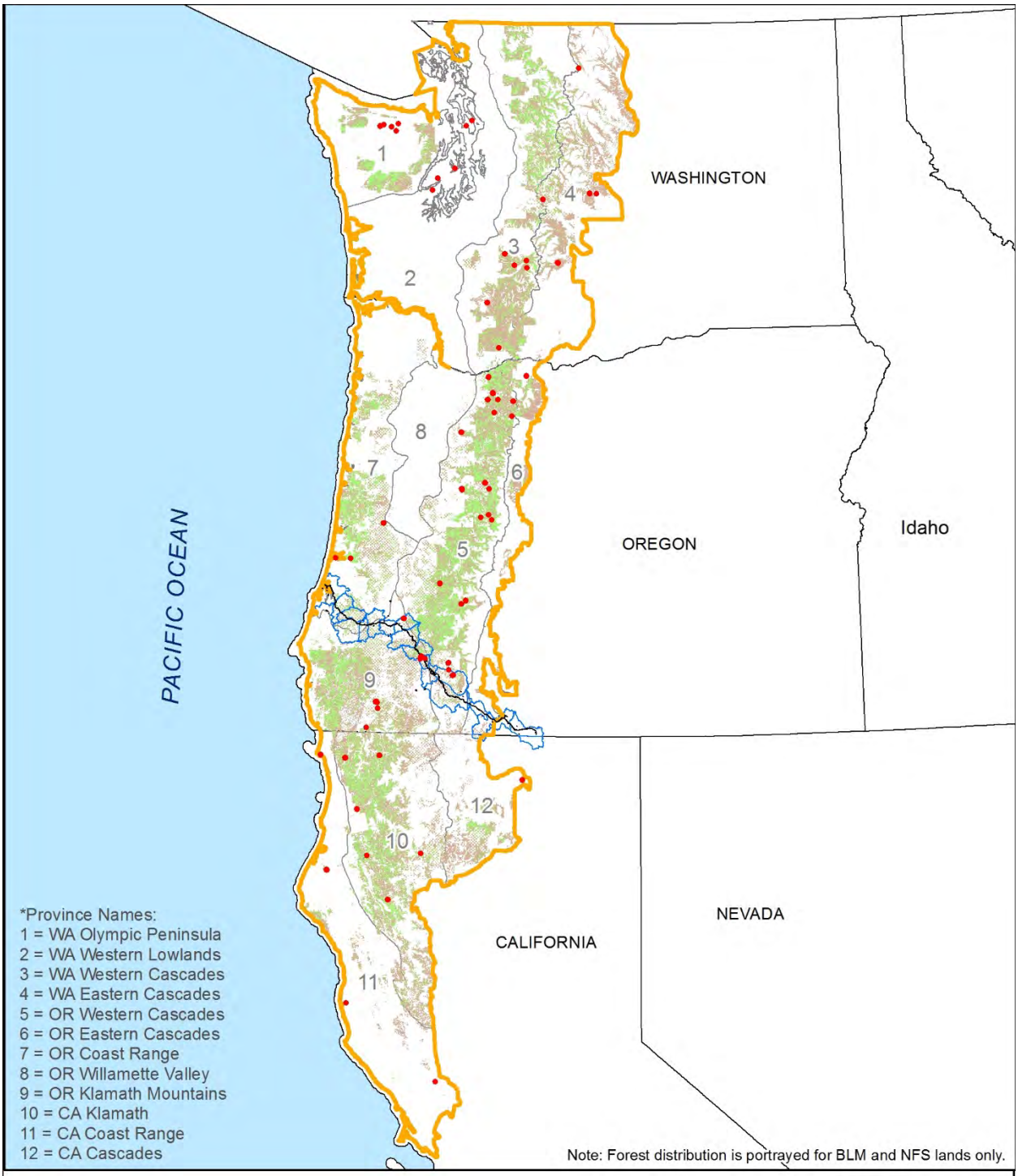


Figure SAFU-3
Potential Habitat For
Sarcodon fuscoindicus

Local Distribution

Within the local area, *S. fuscoindicus* is distributed across three 5th-field watersheds that overlap the project area (see Table SAFU-5 and Figure SAFU-4). Two clusters of sites are present in the Trail Creek and Big Butte Creek watersheds, and one site is somewhat isolated in the northern portion of the Myrtle Creek watershed. Across these watersheds, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous, mixed hardwood-coniferous, and hardwood forests, and opportunities for dispersal exist within the local area and to nearby regional areas based on the proximity of other sites in the region. Within the Cascade Range, several sites are located entirely in BLM reserves approximately 10 miles north of the project area and several more sites are located on NFS lands approximately 40 miles north of the project area. The nearest sites to the south are located 50 miles away in the Klamath Mountains in BLM reserves.

TABLE SAFU-5

Distribution of *Sarcodon fuscoindicus* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	3	-	2
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	-	-	-
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	1	-	1
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	-	-	-
Spencer Creek (865)	-	-	-
Trail Creek (804)	3	-	2
Upper Cow Creek (801)	-	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.

Of the seven sites in the local area, one is located on NFS lands on lands designated as Other (Matrix). Six sites are at least partially located on BLM lands (one site is partially on private lands), including three sites located entirely in reserves. Of the sites in the local area, 43 percent of the sites are located in reserves managed by either the NFS or BLM.

Coniferous, mixed hardwood-coniferous, and hardwood forests below 4,500 feet msl encompass approximately 509,300 acres on BLM and NFS lands in the local area, with 348,453 acres in reserve land allocations (68 percent of the forests). Of this acreage, an estimated 153,678 acres are LSOG, including 116,648 acres in reserves (76 percent of the forests).

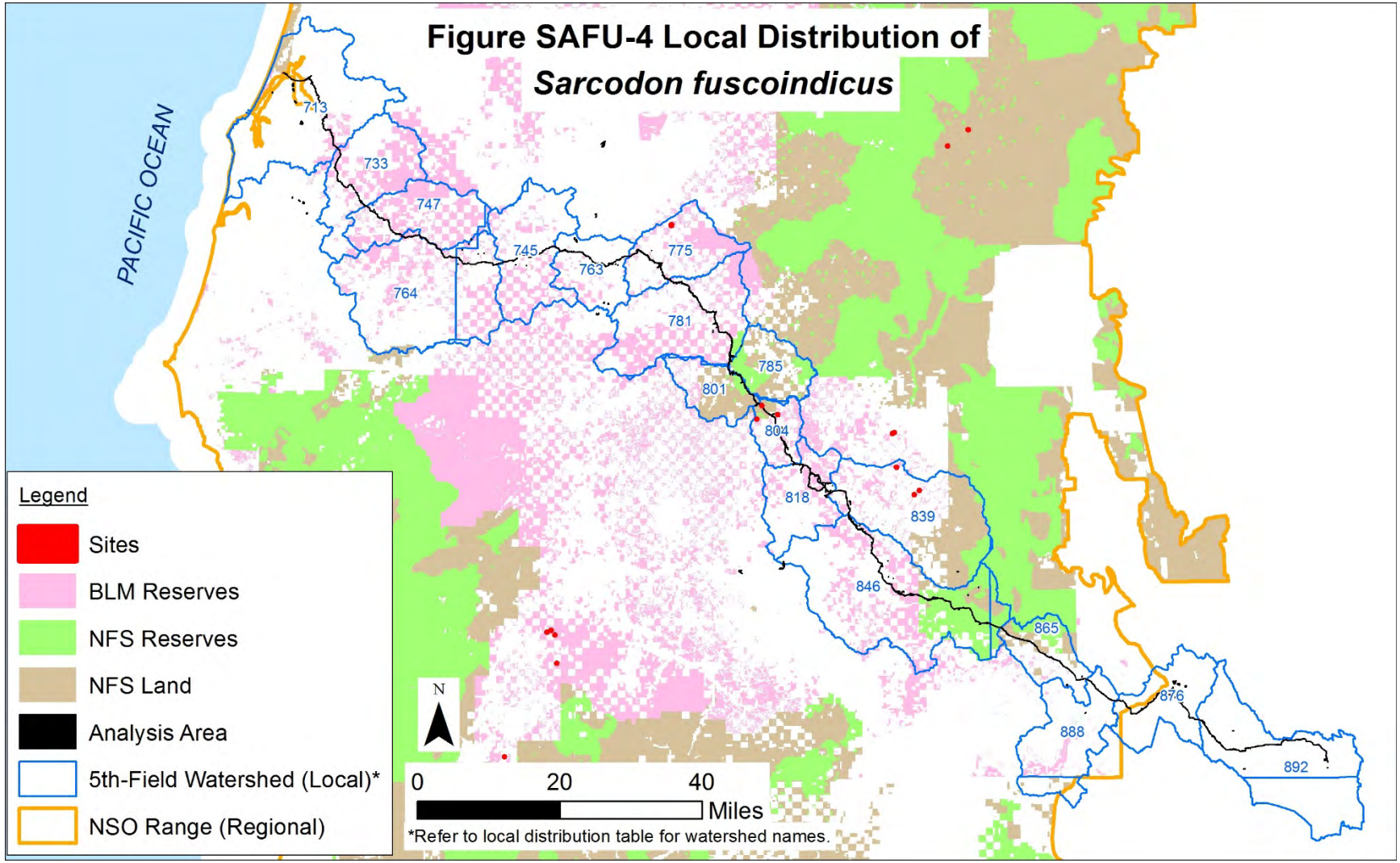


Figure SAFU-4 Local Distribution of
Sarcodon fuscoindicus
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis and project areas contain two sites of *S. fuscoindicus*, one of which is on NFS land in the Umpqua National Forest, and the other site is located on BLM land. The analysis area sites are located in the Trail Creek watershed. Many sites are located within the vicinity of the analysis area (see Local Distribution discussion above), including several on BLM lands within 20 miles. The site on NFS land in the analysis area is located on lands designated as Other (Matrix) while the site on BLM land is located in reserves (LSRs and Riparian Reserves).

Surveys for the PCGP Project resulted in two total observations of the species in one location in or near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These recorded observations comprise the one site in the analysis area. Within the project area, the site is at approximately MP 111.53.

Analysis

The PCGP Project would affect one out of 38 sites on NFS lands in the region, representing approximately 3 percent of the sites. Site impacts on other land ownerships include one site affected on BLM land. The total number of sites affected is two sites out of the 74 total sites on all lands. Table SAFU-6 provides an overview of the features of the PCGP Project that would affect the *S. fuscoindicus* site on NFS lands. The construction corridor and associated work and storage areas would affect approximately 1.2 acres within the site (about 30 percent of the site) and the construction corridor would cross through the eastern half of the site (see Figure SAFU-5). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *S. fuscoindicus* in and near the project area.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect the site persistence.

TABLE SAFU-6

Impacts to *Sarcodon fuscoindicus* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	1	0.8 ac
Temporary Extra Work Area (TEWA)	-	-
Uncleared Storage Area (UCSA)	1	0.4 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres

Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

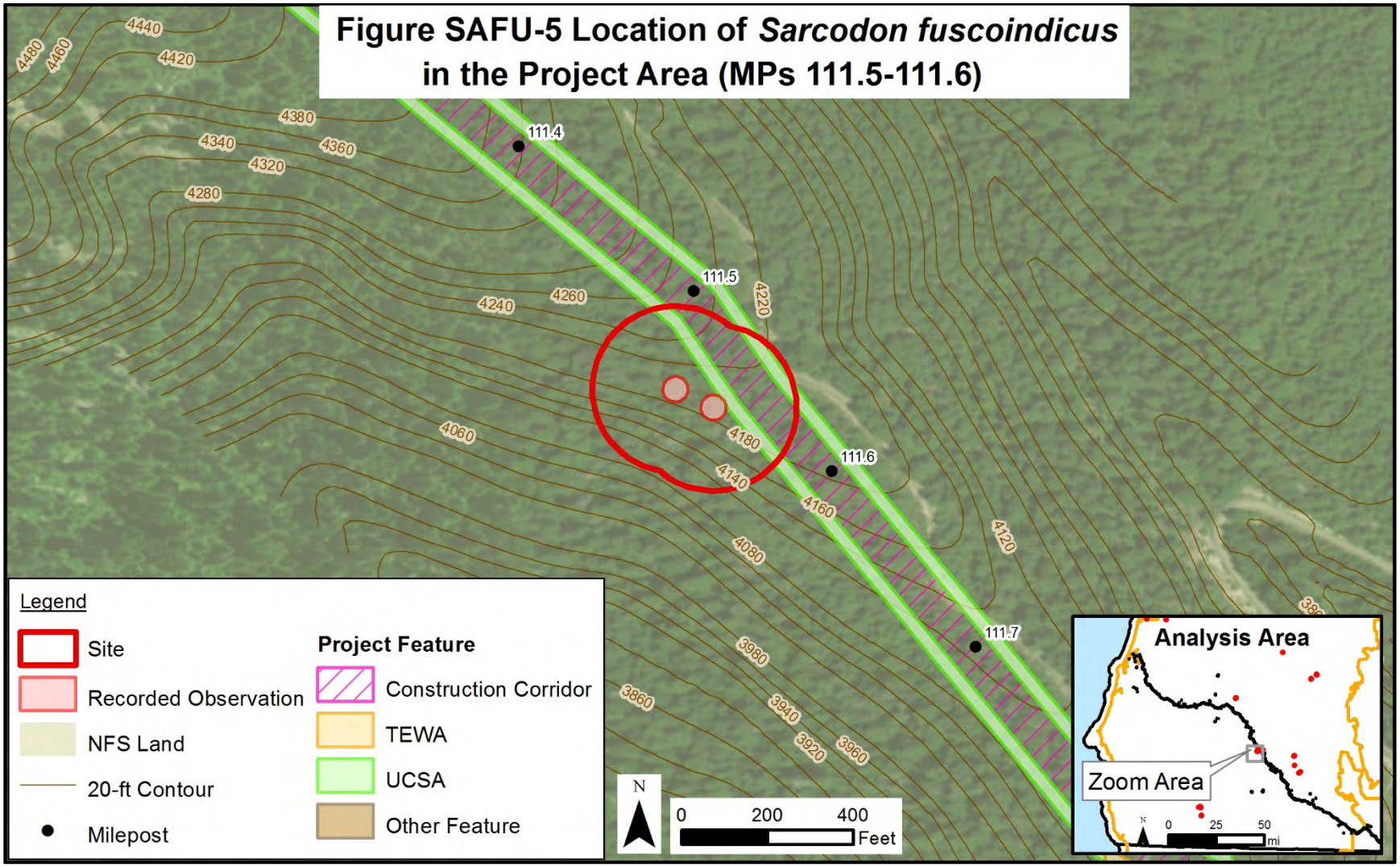


Figure SAFU-5 Location of *Sarcodon fuscoindicus* in the Project Area (MPs 111.5-111.6)
111.4
111.5
111.6
111.7
4440
4460
4480
4420
4380
4340
4360
4320
4280
4260
4240
4220
4060
4180
4140
4160
4120
4080
3980
3860
3940
3920
3960
Legend
Site
Recorded Observation
NFS Land
20-ft Contour
Milepost
Project Feature
Construction Corridor
TEWA
UCSA
Other Feature
N
0
200
400
Feet
Analysis Area
Zoom Area
0
25
50
mi

The PCGP Project would result in ground disturbance and vegetation removal in the eastern half of the site near MP 111.5. The two recorded observations within the site may be avoided by activities within the corridor, but fruiting bodies, if present, could be disturbed in one of the observations during material storage within a UCSA (see Figure SAFU-5). The species would also be subject to indirect effects associated with the PCGP Project based on the proximity of project activities to the observations.

Establishment of the 95-foot wide construction corridor would disturb vegetation and soils within 75 feet of one of the recorded observations and within 105 feet of the other recorded observation within the site. The area within the site is mostly forested, and the establishment of the corridor could modify microclimate conditions around the recorded observations. The removal of forests and host trees and disturbance to soil could negatively affect *S. fuscoindicus* in adjacent areas by removing its habitat, disturbing soil or duff around trees or roots of trees, and affecting its mycorrhizal association with the trees, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat conditions within 100 feet of an observation as a result of the corridor could make habitat within the site no longer suitable for the species. Restored portions of the corridor would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Material storage within UCSAs could damage individuals and would disturb understory habitat within the site, which could modify microhabitats near individuals that are not removed or damaged, potential making the habitat no longer suitable for the species.

Based on this analysis of the site on NFS lands, *S. fuscoindicus* is not likely to persist following project implementation. The site is the only site on NFS lands in the local area and the nearest sites on NFS lands are approximately 45 miles to the northeast and 75 miles to the southwest. Assuming the site on BLM land in the analysis area would no longer persist, five sites would remain on BLM lands in the local area, including two sites entirely in reserves. Two additional sites are located entirely in BLM reserves approximately 10 miles north of the analysis area in the Cascade Range, while all other BLM sites are at least 40 miles from the analysis area. The sites in the vicinity of the analysis area may be important for dispersal of the species between other sites in the north in the Cascade Range and sites to the southwest in the Klamath Mountains in Oregon and California.

Across the project area, the PCGP Project would remove an estimated 988 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 4,500 feet msl, including 175 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *S. fuscoindicus*. Within this impact area, about 474 acres (about 48 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 195 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 4,500 feet msl. This loss of forests represents less than 1 percent of the total estimated area of all forest types below 4,500 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the single site on NFS lands as a result of the PCGP Project, no *S. fuscoindicus* sites would remain on NFS lands in the local area, and 37 sites, including 18 in reserves, would remain on NFS lands in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but they would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 18 sites in NFS reserves are assumed to have additional protections provided by the NWFP Standards and Guidelines in place for those land allocations. Based on these site counts, approximately 49 percent of the remaining *S. fuscoindicus* sites on NFS lands in the NSO range would be protected in reserves.

The PCGP project may also affect one site on BLM lands. Assuming persistence cannot be maintained at the single site, five sites would remain on BLM lands in the local area, including two entirely in reserves, and 14 sites, including eight entirely in reserves, would remain on BLM lands in the NSO range. While sites on BLM lands are not subject to S&M Standards and Guidelines protections, sites in reserves would likely receive some level of protection under BLM management.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Sarcodon fuscoindicus* is a Category B (rare) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category B species are likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information received since the species was listed in the 2001 ROD, however, indicates that the species appears to be more common than previously documented, as described below:

  - *Sarcodon fuscoindicus* has a somewhat wide distribution across 11 physiographic provinces and three states in the region and a moderate-high number of overall sites (38 on NFS lands, 74 on all lands). The species is the most abundant in the western Cascade Range in Oregon, but it not well distributed in any part of its range. The currently known number of sites on NFS and BLM lands has increased by 26 sites since 2007, with some sites documented during the PCGP Project surveys.

  - An estimated 51 percent of the sites (27 sites) are in reserves, which is an increase of about three sites in reserves since 2006 per Molina (2008).

- Coniferous, mixed hardwood-coniferous, and hardwood forests below 4,500 feet msl (general habitat for the species) are widely distributed across the NSO range and encompass approximately 14.6 million acres on BLM and NFS lands with an estimated 57 percent in reserves. Most of the forests are found in the Cascade Range, where most sites are documented, and in the Klamath Mountains, where some sites are documented.

- The PCGP Project would affect one of 38 sites of *S. fuscoindicus* on NFS lands, representing approximately three percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the single site, a low-moderate number of sites (37) would remain on NFS lands in the region and eight sites would remain entirely in BLM reserves in the region, with a wide distribution across Washington, Oregon, and California. While no sites would remain on NFS land in the local area, two sites would remain entirely in BLM reserves in the local area. The single site affected is fairly isolated, with the nearest sites on NFS land located 45 miles northeast and 75 miles southwest of the analysis area site. In addition to the two sites located entirely in BLM reserves in the local area, two sites are located entirely in BLM reserves just north of the local area in the Cascade Range. All other sites in BLM reserves are located at least 40 miles away from the analysis area. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project could be modified as a result of reduced dispersal opportunities and the low number of sites on NFS lands in southern Oregon.

- The PCGP Project would not affect any sites in reserves, and the percentage of sites in NFS reserves would be about the same (49 percent). Of the remaining sites, 14 are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and four are in Congressionally Reserved areas where management activities that may adversely affect *S. fuscoindicus* are unlikely. An additional eight sites would remain entirely in BLM reserves across the region, including LSRs where management actions are restricted to those activities that benefit LSOG forests, Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species, and District Designated Reserves where management activities that may adversely affect *S. fuscoindicus* are unlikely.

- The PCGP Project would result in a permanent loss of an estimated 195 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 4,500 feet msl (less than 1 percent of the total acreage in the NSO range). An estimated 8.4 million acres (57 percent) of coniferous, mixed hardwood-coniferous, and hardwood forests and 3.3 million acres (65 percent) of LSOG forests below 4,500 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *S. fuscoindicus*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Sarcodon fuscoindicus* is a Category B species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO, particularly in the Cascade Range and Klamath Mountains, that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

2.27.2 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *S. fuscoindicus* at one site on NFS lands and one site on BLM lands and could modify the distribution of the species within the range of the NSO. The remaining sites may not provide a reasonable assurance of species persistence because:

- With project implementation, 37 sites would remain on NFS lands across the region, but no sites would remain on NFS lands in the local area. An additional eight sites would remain entirely in BLM reserves across the region and two sites would remain entirely in BLM reserves in the local area. While it is assumed that sites entirely in BLM reserves would receive some degree of protection under BLM management, persistence of sites on BLM lands cannot be guaranteed. Although only one *S. fuscoindicus* site would be affected on NFS lands, the lack of nearby sites on NFS lands and the low number of protected sites on BLM lands in the vicinity indicates that the site may be important for dispersal opportunities in the local area and between sites in the Cascade Range and Klamath Mountains in Oregon and California. The species' distribution and range within the NSO range could be modified if site persistence is affected.

- The PCGP Project would remove approximately 988 acres of coniferous, mixed hardwood-coniferous, and hardwood forests and 175 acres of LSOG forests below 4,500 feet msl (a negligible amount of the forests). An estimated 48 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 8.4 million acres (57 percent) of coniferous, mixed hardwood-coniferous, and hardwood forests and 3.3 million acres (65 percent) of LSOG forests below 4,500 feet msl would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely in BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because sites are scattered across the region.

Based on these conclusions, the single *S. fuscoindicus* site on NFS land in the analysis area is necessary for the persistence of the species in the NSO range, and the PCGP Project must avoid impacts to the site. The construction corridor segment, along with associated UCSAs, should be moved at least 25 feet (8 meters) to the northeast of the currently proposed alignment, such that at least one of the two observations within the site is at least 100 feet from the project area (see Figure SAFU-5 for reference). With this project modification, the observation in the site that is closer to the project area may still incur indirect effects; however, the other observation would be located at least 100 feet from the project area where indirect effects are unlikely. Overall, the site would be expected to persist if the construction corridor is successfully moved. Amendments to the NFS land management plans that applies to the affected site would waive implementation of Management Recommendations for *S. fuscoindicus* sites affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

2.28 SEDECULA PULVINATA

Sedecula pulvinata is a sequestrate mushroom and false truffle species in the Sedeculaceae family and does not have a common name.

2.28.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *S. pulvinata* as a Category B (rare) species. ORBIC evaluated *S. pulvinata* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and again in its most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2016, the species was considered to be at moderate risk of extinction or elimination due to a restricted range, relatively few populations, recent and widespread declines, or other factors within its global range (G3). In Oregon, it was considered to be at very high risk of extinction due to extreme rarity, very steep declines, or other factors (S1). The species is on the ORBIC List 3. It is not considered a BLM or Forest Service Sensitive species in Oregon, but it is a Forest Service Strategic species.

2.28.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Relatively little is known about the autecology or reproductive biology of *S. pulvinata*. It may be ectomycorrhizal, forming symbiotic associations with conifer trees for translocation of minerals, water, and nutrients, although little research has been conducted on the species due to its rarity (Castellano and O'Dell 1997). As with other sequestrate fungi, spore dispersal is presumed to depend on mycophagy or consumption of fungi and spores by animals. The mushroom produces large fruiting bodies at or just under the surface of the soil (hypogeous) (ORBIC 2004). Fruiting has been documented from June through September (Castellano et al. 1999).

Range

Sedecula pulvinata has been found in disjunct populations in Colorado, Idaho, Lassen Volcanic National Park in California, and Mt. Shasta in California (Castellano and O'Dell 1997). It has only recently been found in Oregon as part of the surveys for the PCGP Project (Siskiyou BioSurvey LLC 2012a) and during surveys on the Fremont-Winema National Forest (Fremont-Winema National Forest 2010). Outside the Pacific Northwest, it has been reported in the Great Basin, Colorado, and three locations in California, including Lassen Volcanic National Park, Lassen National Forest, and Sierra National Forest (ORBIC 2004, Castellano and O'Dell 1997). It has also been documented in Arizona on the Coconino Plateau near Flagstaff and the Kaibab Plateau near Jacob Lake (States and Gaud 1997). The currently known range of the species within the NSO range based on 2017 data is presented below under the Species Distribution discussion.

Although information on the species' historical range is not known, its range was likely similar to the current range, with populations widely distributed across western North America. Local distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed under Threats below.

Population Status

ORBIC (2004) reported *S. pulvinata* from an estimated 12 element occurrences in western North America in 2004. Most of these occurrences were in the southwest, with only one reported occurrence in California (ORBIC 2004). In 2004, *S. pulvinata* was widely distributed across the western United States, but it had a patchy distribution and was very rare in the range of the NSO (ORBIC 2004). The species was not found during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented no new sites of *S. pulvinata* in the NSO range between 1998 and 2006, and only one site was documented by 2006, which was not in a reserve or protected area. Three occurrences were reported in Oregon on the Fremont-Winema National Forest outside of the NSO range during surveys in 2009 and 2010 (Fremont-Winema National Forest 2010). The 2007 Final SEIS reported no sites on all lands in the NSO range (USDA and USDI 2007).

Pre-disturbance surveys are not practical for Category B species. Instead, equivalent-effort surveys were conducted during the fall and spring from 2010 to 2016 in old-growth stands in the PCGP Project area and within 100 feet of habitat removal to comply with the Standards and Guidelines for Category B species where strategic surveys are not complete (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These surveys targeted all Category B species, including *S. pulvinata*, and resulted in three new observation of a population of *S. pulvinata*. Based on the low number of sites and the minimal increase in the number of sites since 1998 with increased surveys, this species appears to be truly rare in the NSO range. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Sedecula pulvinata appears to be restricted to relatively dry areas of coniferous forests at relatively high elevation ranges and with little annual rainfall (ORBIC 2004, Castellano and O'Dell 1997). It is typically associated with the roots of white fir, subalpine fir, California red fir, Engelmann spruce, and lodgepole pine (Castellano and O'Dell 1997). At mid to high elevations, it has been found in association with mountain hemlock (Holthausen et al. 1994). Based on data available in 1994, *S. pulvinata* was primarily associated with LSOG forests and may require abundant coarse woody debris along the forest floor. Based on available information, *S. pulvinata* is presumed to be restricted to specific microclimate conditions of LSOG coniferous forests at mid to high elevations.

Threats

Threats to *S. pulvinata* are actions that affect its potential host tree and disturb the soil, such as road and trail construction, logging, fire management activities, and recreational activities (Castellano and O'Dell 1997). Other specific threats to the species are not currently known.

Management Recommendations

As a Category B S&M species, the direction under the 2001 ROD is to manage all known sites and reduce the inadvertent loss of undiscovered sites (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. Management recommendations were developed for *S. pulvinata* with several other species (Group 12 of Castellano and O'Dell 1997). The primary

guidance for *S. pulvinata* is to identify potential habitat on federal lands and protect the habitat until populations are found during survey efforts. Known locations should be managed to protect an area large enough to maintain the habitat and microclimate conditions of the population. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *S. pulvinata*:

- As a mycorrhizal species, *S. pulvinata* forms symbiotic associations with the fine root systems of plants, growing out into the soil matrix. To provide a reasonable assurance of the continued persistence of occupied sites consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.28.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *S. pulvinata* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table SEPU-1 shows the total number of known sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated five observations from BLM and the Forest Service geodatabases were converted into three sites in the NSO range (region). Table SEPU-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table SEPU-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure SEPU-1 displays the regional distribution of the species across NFS lands, Figure SEPU-2 displays the extent of known sites located in protected areas (NFS lands and NFS reserves), and Figure SEPU-3 displays the species' regional distribution as well as the extent of coniferous and LSOG coniferous forests above 4,500 feet msl on BLM and NFS lands across the NSO range.

TABLE SEPU-1

Number of *Sedecula pulvinata* Sites (2017)

Location*	Number of Sites
Regional Area	3
Local Area	1
Analysis Area (Project Area)	1 (1)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE SEPU-2

Distribution of *Sedecula pulvinata* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	3	1	1
BLM	-	-	-
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	-	-	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE SEPU-3

Distribution of *Sedecula pulvinata* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	-	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	-	-	-
Congressionally Reserved (CR)	**-**	**-**	**-**
Late Successional Reserve (LSR)	**2**	**1**	**1**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**-**	**-**	**-**
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	1	-	-
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	**-**	**-**	**-**
District Designated Reserve	**-**	**-**	**-**
Harvest Land Base	-	-	-
Late Successional Reserve	**-**	**-**	**-**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**-**	**-**	**-**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Sedecula pulvinata has a limited distribution in two physiographic provinces in Oregon (Cascades West), and California (Cascades) (see Figure SEPU-1). The sites are on the Rogue River-Siskiyou and Shasta-Trinity National Forests. Two sites are located in LSRs and the third site is located on land designated as Other (Matrix) (see Figure SEPU-2). Other sites have been recorded in agency databases in Lake County, Oregon, and Tehama County, California, but these are outside the NSO range. *Sedecula pulvinata* is not well distributed within its range in the NSO range.

Two of the three known *S. pulvinata* sites are in LSOG coniferous forests. Coniferous forests above 4,500 feet msl in the Cascade Range in Oregon could provide habitat for *S. pulvinata* and support additional sites. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous forests above 4,500 feet msl, including the LSOG component of these forests, across the NSO range could

provide habitat for *S. pulvinata* and support additional sites. Coniferous forests above 4,500 feet encompass an estimated 5.5 million acres on BLM and NFS lands in the NSO range, including an estimated 3.6 million acres in reserve land allocations (65 percent of the forests; Table SEPU-4). Of this acreage, an estimated 1.1 million acres are LSOG (see Figure SEPU-3), including 742,436 acres in reserve land allocations (68 percent of the forests).

TABLE SEPU-4

Extent of Forests That Could Provide Habitat for *Sedecula pulvinata* on NFS and BLM Lands a/

Location	Coniferous Forests above 4,500 feet		LSOG Forests above 4,500 feet	
	Total	**Reserves**	**Total**	**Reserves**
Regional Area	5,596,488	3,655,735	1,092,711	742,436
Local Area	111,277	64,604	33,179	21,364
Project Area	308	206	98	72

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011

Note: Areas are presented in acres.

a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

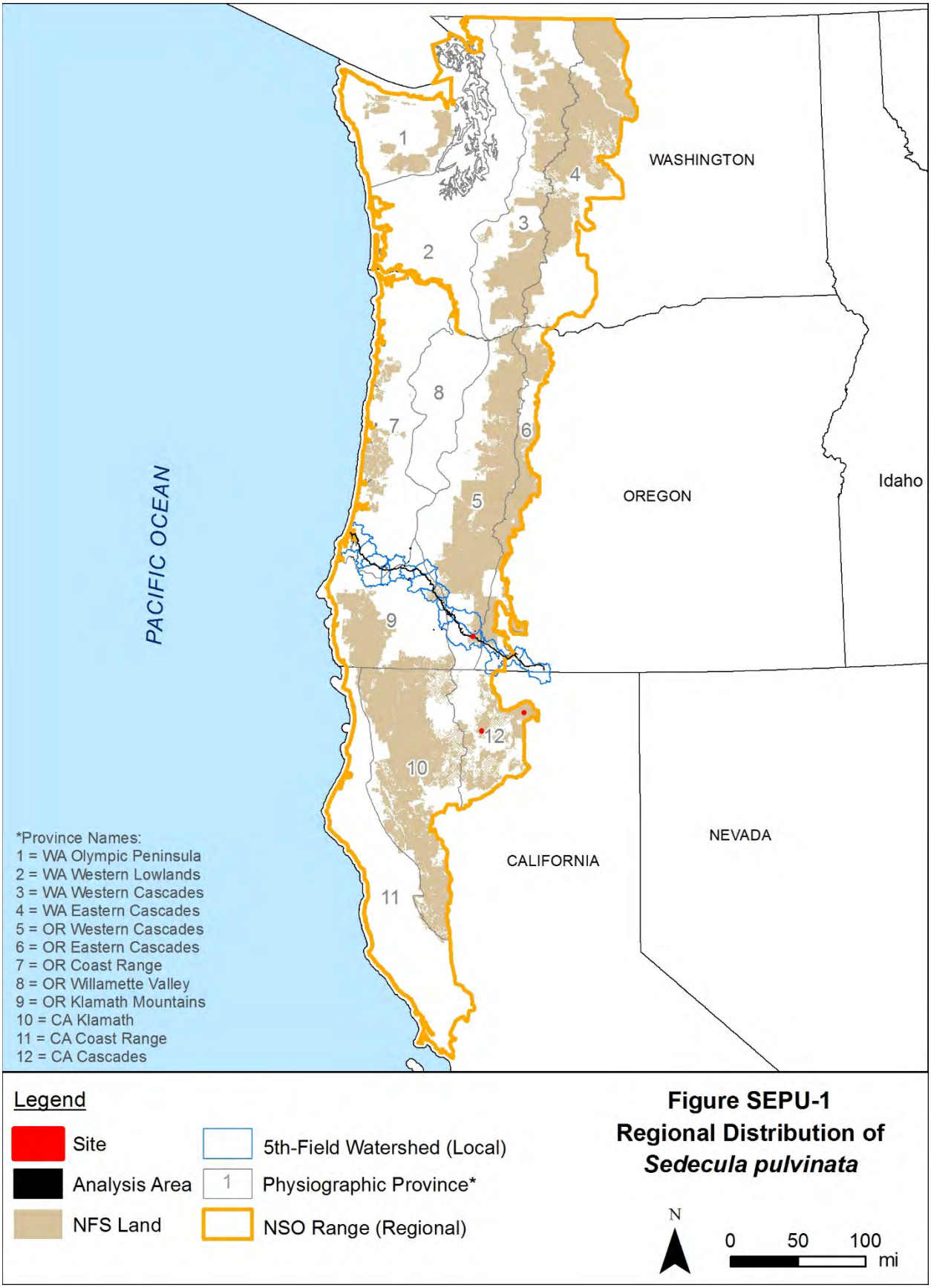


Figure SEPU-1
Regional Distribution of *Sedecula pulvinata*

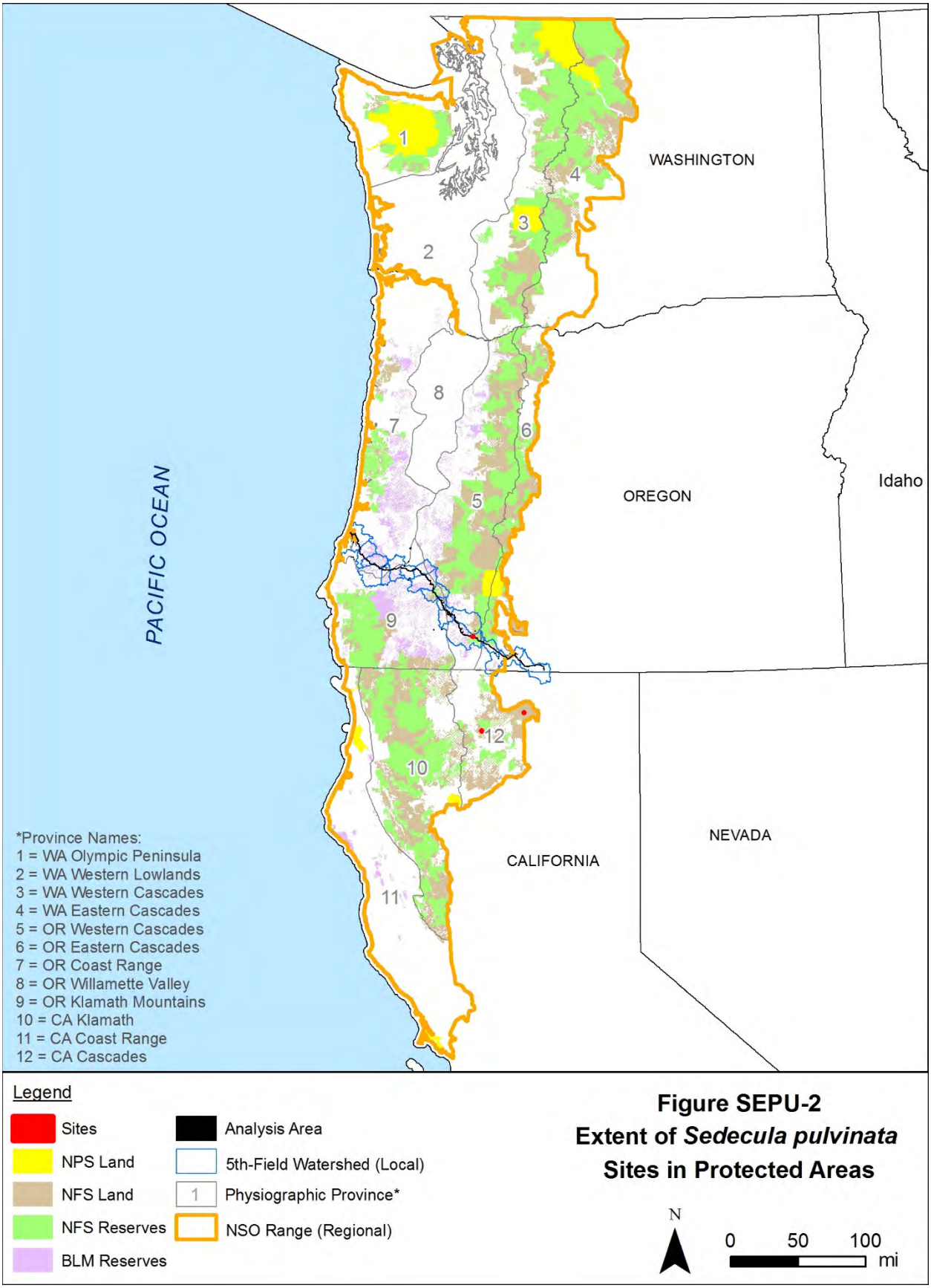


Figure SEPU-2
Extent of *Sedecula pulvinata* Sites in Protected Areas

Figure SEPU-3
Potential Habitat For
Sedecula pulvinata

Local Distribution

Sedecula pulvinata is found in one 5th-field watershed (Little Butte Creek) that overlaps the project area (see Table SEPU-5). The site is located on the Rogue River-Siskiyou National Forest on lands designated as an LSR. The single site in the local area is isolated, with the remaining two sites in the region located 70 miles south of the site in the Cascade Range in California.

TABLE SEPU-5

Distribution of *Sedecula pulvinata* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	-	-	-
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	1	1	-
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	-	-	-
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	-	-	-
Spencer Creek (865)	-	-	-
Trail Creek (804)	-	-	-
Upper Cow Creek (801)	-	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.

Coniferous forests above 4,500 feet msl encompass approximately 111,277 acres on BLM and NFS lands in the NSO range in the local area, with 64,604 acres in reserve land allocations (58 percent of the forests). Of this acreage, an estimated 33,179 acres are LSOG, including 21,364 acres in reserve land allocations (64 percent of the forests).

Analysis/Project Area Distribution

The analysis and project areas contain one site of *S. pulvinata*. This is the same site described in the Local Distribution discussion above.

Surveys for the PCGP Project resulted in three observations of *S. pulvinata* in one location in the survey area during 2010–2011 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These recorded observations were between MPs 158.1 and 158.2 and comprise the single site in the analysis area.

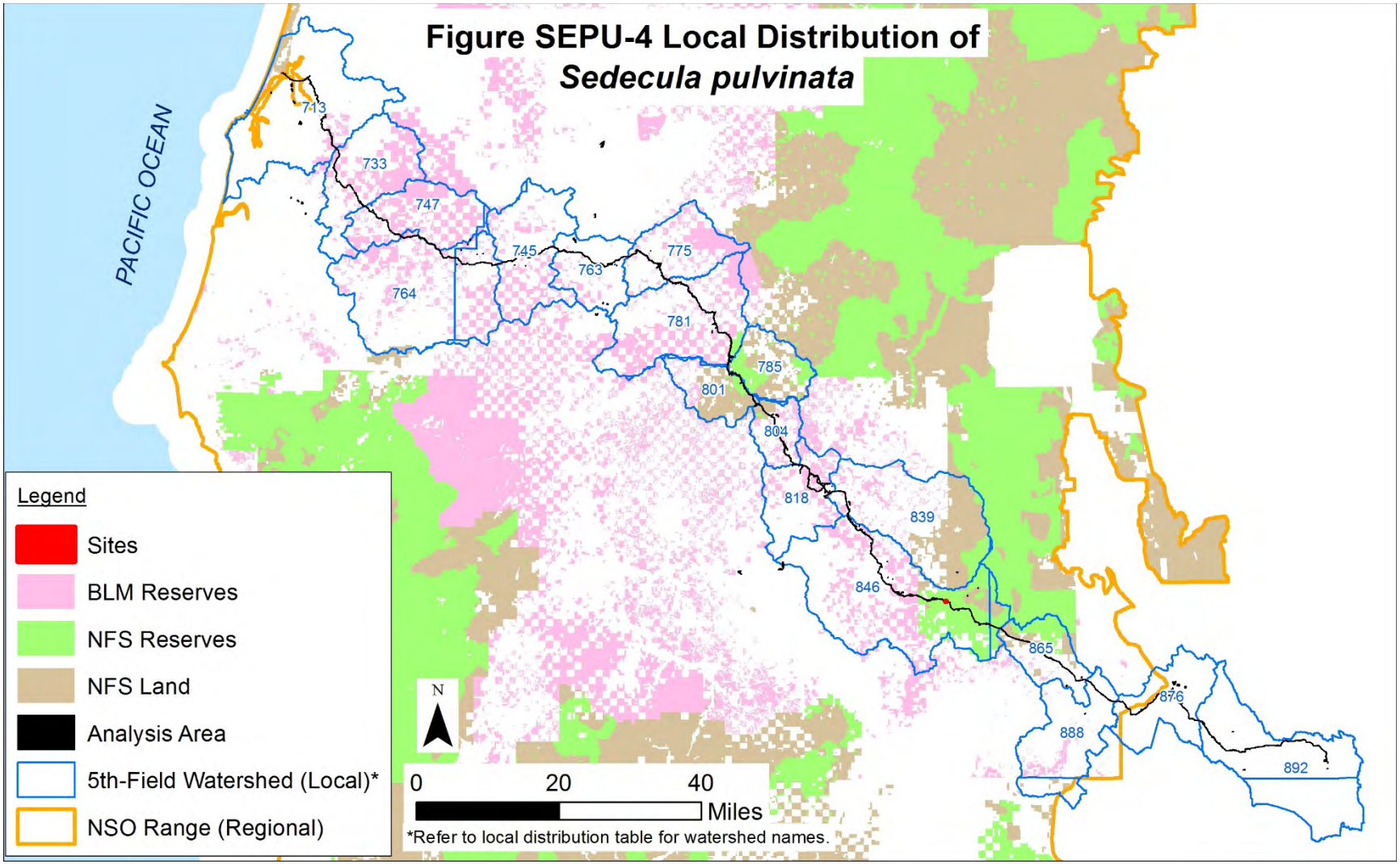


Figure SEPU-4 Local Distribution of
Sedecula pulvinata
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

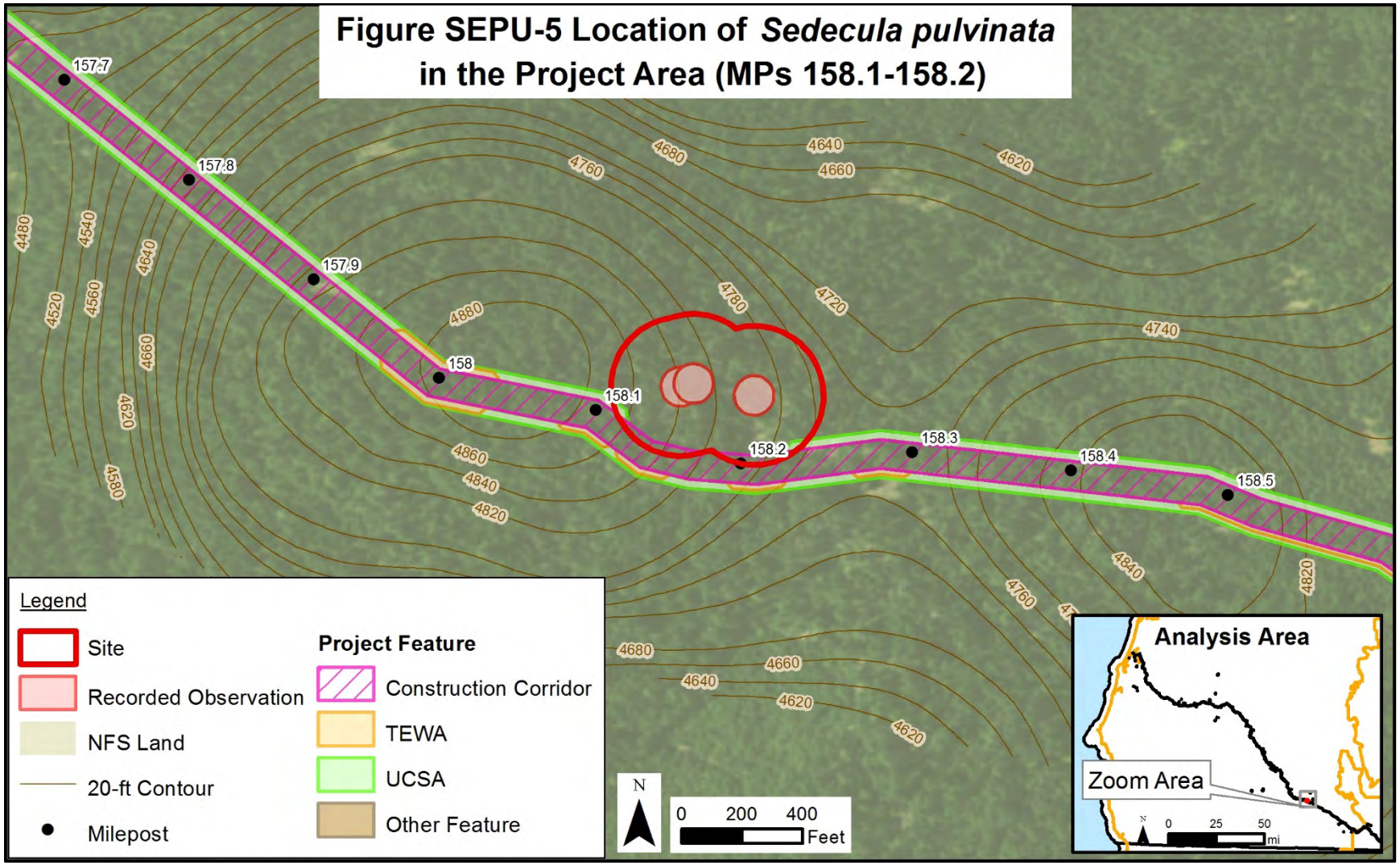


Figure SEPU-5 Location of *Sedecula pulvinata* in the Project Area (MPs 158.1-158.2)
157.7
157.8
157.9
158
158.1
158.2
158.3
158.4
158.5
4760
4680
4640
4660
4620
4480
4540
4640
4520
4560
4660
4620
4580
4880
4780
4720
4740
4860
4840
4820
Legend
Site
Recorded Observation
NFS Land
20-ft Contour
Milepost
Project Feature
Construction Corridor
TEWA
UCSA
Other Feature
N
0 200 400
Feet
Analysis Area
Zoom Area
0 25 50
mi

Project Impacts

Analysis

The PCGP Project would affect one out of three sites of *S. pulvinata* in the region. Table SEPU-6 presents an overview of the features of the PCGP Project that would affect the *S. pulvinata* site. The construction corridor and associated storage areas would affect approximately 0.4 acre (6 percent) of the site (the site is approximately 6.3 acres), and the corridor would cross through the southern portion of the site (see Figure SEPU-4). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *S. pulvinata* in and near the project area. Because the species is only known from three occurrences in the region, and the project would affect the only site in Oregon, the effects on the site could restrict the distribution of the species in the NSO range if site persistence is affected.

The following discussion provides an overview of the types of impacts that would be expected at the site based on the features of the PCGP Project that could affect site persistence.

TABLE SEPU-6

Impacts to *Sedecula pulvinata* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	1	0.3 ac
Temporary Extra Work Area (TEWA)	-	-
Uncleared Storage Area (UCSA)	1	0.07 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

The PCGP Project would result in ground disturbance and vegetation removal in the southern portion of the site between MPs 158.1-158.2. The three recorded observations of the species within the site are all located approximately 130 feet north of the project area where direct effects would not occur and indirect effects are unlikely (see Figure SEPU-5).

Due to conclusions made in previous persistence analyses (North State Resources 2014), the PCGP Project alignment was moved approximately 105 feet south to avoid direct impacts to the single site in the analysis area. Establishment of the 95-foot wide construction corridor would disturb vegetation and soils about 130 feet from observations within the site. The area within the site is forested on an east-facing slope and is near the top of a hill. The establishment of the corridor is not likely to modify microclimate conditions around the recorded observations. The removal of forests and host trees and disturbance to soil would negatively affect *S. pulvinata* by removing its habitat, disturbing soil or duff around trees or roots of trees, and affecting its mycorrhizal association with the trees; however, due to the distance away from the species' occurrences, indirect effects are not likely and individuals are likely to persist. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Measures outline in Chapter 1 would be implemented to minimize vegetation disturbance in and near the project area and restore areas

following construction, which would minimize adverse impacts on *S. pulvinata* near the project area.

Based on this analysis, *S. pulvinata* is likely to persist at the site following project implementation. This site is the only site in the local area and is the only site in Oregon. It may be important for dispersal of the species between Oregon and sites to the south in the Cascade Range in California. Despite impact to habitat near the site, *S. pulvinata* would still be found in the Cascade Range in Oregon, and dispersal into the southern portion of the NSO range would still be possible.

Across the project area, the PCGP Project would remove an estimated 268 acres of coniferous forests above 4,500 feet msl. These impacts would result in a reduction of habitat that may be suitable for *S. pulvinata*. Within this impact area, about 154 acres (57 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, but these areas would not return to previous conditions for more than 80 years and would not likely provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area and would not provide habitat for the species. The permanent loss of coniferous forests above 4,500 feet msl represents less than 1 percent of the total estimated area of these forests in the NSO range.

Discussion

Given site persistence would be maintained at the one site in the analysis area, one site of *S. pulvinata* would remain in an LSR on NFS lands in the local area, and three sites, including two sites in LSRs, would remain on NFS lands in the NSO range. The sites could be affected by natural hazards (e.g., fire, drought), but they would be subject to the protections of the S&M Standards and Guidelines and management recommendations for the species with regard to agency-related actions. The sites in reserves are also assumed to have additional protects by the NWFP Standards and Guidelines in place for those land allocations. Based on these site counts, approximately 67 percent of the *S. pulvinata* sites on NFS lands in the NSO range would be protected in reserves.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Sedecula pulvinata* is a Category B (rare) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category B species are likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. More information is available on the distribution of *S. pulvinata* since the species was listed in the 2001 ROD, as described below:

    - *Sedecula pulvinata* has a limited distribution in two physiographic provinces and two states in the region and a low total number of sites (three sites, all on NFS lands). The species is not well distributed within its range. However, the sites are newly recorded since 2007, with one as a result of the PCGP Project surveys.

  - Two sites are in reserves, which is an increase in the number of sites in reserves since 2006 per Molina (2008).

- Coniferous forests above 4,500 feet msl (general habitat for the species) are somewhat limited and encompass approximately 5.5 million acres on BLM and NFS lands with an estimated 65 percent in reserves. *Sedecula pulvinata* is likely restricted to a subcomponent of coniferous forests based on available information on its habitat and life history requirements.

- The PCGP Project would affect one of three Forest Service-managed sites of *S. pulvinata*, representing approximately 33 percent of the sites on NFS lands in the NSO range (no sites are on BLM lands). However, the species is expected to persist at the site based on this analysis. Previous to this analysis, the proposed project alignment was moved 105 feet south to avoid direct impacts to the site. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be the same as the currently documented distribution and range.

- Since the site in the analysis area is expected to persist, the PCGP Project would not affect any sites in reserves. Two sites are in LSRs where management actions are restricted to those activities that benefit LSOG forests.

- The PCGP Project would result in a permanent loss of less than 1 percent of the total acreage of coniferous forests above 4,500 feet msl in the NSO range. Suitable habitat for *S. pulvinata* includes a subcomponent of these forests, which may be limited based on the limited distribution of the species.

- The remaining forests could support additional populations of *S. pulvinata*, although the potential for the habitat to be occupied is based on the species' specific habitat requirements. This is a Category B species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites may exist in the range of the NSO that have not been discovered based on the increased number of sites documented during recent surveys, including surveys associated with the PCGP Project.

2.28.4 Conclusions

If implemented as proposed, the PCGP Project would not likely affect site persistence of *S. pulvinata* at one site on NFS lands in the analysis area. The remaining sites would provide a reasonable assurance of species persistence because:

- With project implementation, the number of sites across the region would not change. Although the PCGP Project may affect microhabitat conditions near one *S. pulvinata* site, site persistence is not expected to be affected. The species' distribution and range within the NSO range would be the same as its currently known distribution and range.

- The PCGP Project would remove approximately 268 acres of LSOG coniferous forests above 4,500 feet msl (a negligible amount of the forests). An estimated 57 percent of the forests would be restored following project implementation, but a 30-foot wide early-successional corridor would remain across the project area. Other sites may be located in

unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 1998.

- The single site of *S. pulvinata* in the analysis area may incur indirect impacts as a result of habitat modification near the site; however, the site is expected to persist following project implementation. Previous to this analysis, the proposed project alignment was moved 105 feet south to avoid direct impacts to the site. Based on the above conclusions, *S. pulvinata* is sufficiently avoided by the PCGP project. Amendments to the NFS land management plan that applies to the affected site would waive implementation of Management Recommendations for the *S. pulvinata* site affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the site and adjacent habitat over the long term. The monitoring plan shall be approved by the Forest Service.

2.29 SPARASSIS CRISPA

Sparassis crispa is a cauliflower mushroom species in the Sparassidaceae family and is commonly known as cauliflower mushroom or curly sparassis.

2.29.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *S. crispa* as a Category D (uncommon) species. ORBIC evaluated *S. crispa* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004), but it was not included in the most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2004, the species was considered to be uncommon but not rare with some cause for long-term concern due to declines or other factors within its global range and in Oregon (G4, S4, respectively). The species is not currently on the ORBIC lists. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.29.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Little is known about the autecology or reproductive biology of *S. crispa*. It grows solitary and is believed to be parasitic on conifers (The Fungi of California 2010). Some individuals grow quite large and can be the size of a bushel basket. It is a root parasite and may cause rootrot, although it rarely kills its host tree (Holthausen et al. 1994). Fruiting has been documented mostly in fall, although it can be identified in nearly every season in the Pacific Northwest (Castellano et al. 2003). The mushroom fruits annually at the base of the same tree and may continue to fruit following forest management activities, except if the stand is clear-cut (Holthausen et al. 1994).

Range

Sparassis. crispa is widespread in Europe and North America (Castellano et al. 2003) and has been found in Japan (ORBIC 2004). In Europe, it is primarily known from Scandinavia and northern countries. In North America, it has been found in British Columbia and eastern and western states, including Arizona, Massachusetts, New Hampshire, Pennsylvania, Virginia, California, Oregon, and Washington. In the range of the NSO, *S. crispa* is widely distributed from Marin County, California to the Cascade Range and Olympic Peninsula in Washington (Castellano et al. 2003). In 2004, most populations in the Pacific Northwest were in Oregon in the Cascade and Coast ranges (ORBIC 2004). The currently known range of the species within the NSO range based on 2017 data is discussed below under the Species Distribution.

Although information on the species' historical range is not known, it was likely similar to the current range, with populations widely distributed across coniferous forests in Europe, Asia, and North America. Local and regional distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported *S. crispa* from more than 300 element occurrences worldwide in 2004. An estimated 38 of these occurrences were in Oregon, with fewer in California (10) and Washington (11) (ORBIC 2004). In 2004, population trends of *S. crispa* were considered relatively stable over the long term, and the species was apparently common across its range, despite being locally uncommon in some areas (ORBIC 2004). The species was found in one location during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented 53 new sites of *S. crispa* in the NSO range between 1998 and 2006, and 86 total sites were documented by 2006, including 21 in reserves or protected areas. The 2007 Final SEIS reported 77 sites on NFS and BLM lands and 79 total sites on all lands in the NSO range (USDA and USDI 2007). Observations of the species may not always be reported or recorded in agency databases.

Equivalent-effort surveys for Category B species were conducted during the fall and spring from 2010 to 2016 in old-growth stands in the PCGP Project area and within 100 feet of habitat removal to comply with the Standards and Guidelines for Category B species where strategic surveys are not complete (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). Incidental sightings of Category D species were recorded during these surveys and resulted in one new observation of *S. crispa*. Based on the increased number of sites since 1998 as a result of the increased number of surveys (a two fold increase between 1998 and 2006 per Molina 2008 records), additional surveys would be expected to locate additional populations within the NSO range. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Sparassis crispa has been primarily found in low-elevation coniferous forests in association with very large conifer trees (Holthausen et al. 1994). In the Pacific Northwest, it is typically found within 6 feet of the base of a living conifer tree, such as Douglas-fir, Bishop pine (*Pinus muricata*), and Monterey pine (*P. radiata*) (Castellano et al. 2003, The Fungi of California 2010). *Sparassis*

crispa may prefer specific microclimate conditions of LSOG forests, but it may not be restricted to these conditions.

Threats

Threats to *S. crispa* are those activities that affect its host conifer tree, such as logging, road and trail construction, and similar activities (ORBIC 2004). Other specific threats to the species are not currently known.

Management Recommendations

As a Category D S&M species, the direction under the 2001 ROD is to manage high-priority sites to provide a reasonable assurance of species persistence (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *S. crispa*:

- As a wood saprobe, *S. crispa* individuals probably do not extend beyond the available substrate (log, stump, etc.). Retention of habitat patches across a landscape could provide possible areas of refugia and potential areas for colonization. Consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.29.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *S. crispa* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table SPCR-1 shows the total number of known sites in the regional (NSO range), local (18 5th field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 116 observations from BLM and Forest Service geodatabases were converted into 106 sites in the NSO range (region). Table SPCR-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table SPCR-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure SPCR-1 displays the regional distribution of the species across NFS lands, Figure SPCR-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure SPCR-3 displays the species' regional distribution as well as the extent of coniferous and mixed hardwood-coniferous forests and LSOG forests below 6,000 feet msl on BLM and NFS lands.

TABLE SPCR-1

Number of *Sparassis crispa* Sites (2017)

Location*	Number of Sites
Regional Area	106
Local Area	19
Analysis Area (Project Area)	2 (2)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE SPCR-2

Distribution of *Sparassis crispa* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	51	4	1
BLM	40	16	1
NPS	4	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	21	3	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE SPCR-3

Distribution of *Sparassis crispa* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	5	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	2	-	-
Congressionally Reserved (CR)	**1**	**-**	**-**
Late Successional Reserve (LSR)	**8**	**-**	**-**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**-**	**-**	**-**
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	37	4	1
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	**-**	**-**	**-**
District Designated Reserve	**4**	**3**	**-**
Harvest Land Base	10	4	-
Late Successional Reserve	**29**	**15**	**1**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**25**	**9**	**-**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Sparassis crispa is widely distributed across 10 physiographic provinces in Washington (Western Lowlands, Olympic Peninsula, and Eastern and Western Cascades), Oregon (Coast Range, Cascades East and West, and Klamath Mountain), and California (Coast and Klamath) (see Figure SPCR-1). Most sites are found along the western Cascade Range, where the sites tend to be clustered or relatively close to one another in groups. Several clusters of sites are located in the

Coast Range in Oregon, but sites in other areas are more scattered. *Sparassis crispa* is less abundant outside the Cascade Range and Coast Range based on current site locations, but sites are widespread across the region. *Sparassis crispa* appears to be well distributed in the western Cascade Range in Oregon based on the relative abundance of sites, proximity of sites to one another, and distribution of sites across forests that may provide suitable habitat in the mountain range.

Twenty-one of 106 known sites are at least partially located on private, state, or other lands; four sites are on NPS lands (Mount Rainier and Olympic National Parks); 40 sites are at least partially located on BLM lands; and 51 sites area at least partially on NFS lands across the region. Sites included on the National Forests that encompass the project area include three sites on the Rogue River-Siskiyou National Forest and 21 sites on the Umpqua National Forest. The remaining sites on NFS lands are on the Deschutes, Gifford Pinchot, Mt. Baker-Snoqualmie, Mt. Hood, Olympic, Okanogan-Wenatchee, Six Rivers, and Willamette National Forests.

Across the NSO range, nine sites are at least partially located in reserve lands managed by the Forest Service, including eight in LSRs and one in a Congressionally Reserved area. This represents 18 percent of the total NFS-managed sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 29 sites are located entirely in BLM reserves, which represents 73 percent of the total number of BLM-managed sites in the region. While the 29 sites in BLM reserves and the four NPS sites are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management and National Park management.

Sparassis crispa is more commonly found in LSOG forests based on available data (87 of 106 total sites are in LSOG), but it is also somewhat common in non-LSOG forests. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous forests below about 5,600 feet msl and has been documented in most of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve lands, both land ownerships are included in this potential habitat discussion. Coniferous and mixed hardwood-coniferous forests below 6,000 feet msl, including the LSOG component of these forests, across the NSO range could provide habitat for *S. crispa* and support additional sites. These forests encompass an estimated 18.1 million acres on BLM and NFS lands in the NSO range, including an estimated 10.7 million acres in reserve land allocations (59 percent of the forests; Table SPCR-4). Of this acreage, an estimated 5.9 million acres are LSOG (see Figure SPCR-2), including 3.9 million acres in reserve land allocations (66 percent of the forests). Although coniferous and mixed hardwood-coniferous forests below 6,000 feet msl are widespread across the region, LSOG forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

TABLE SPCR-4

Extent of Forests that Could Provide Habitat for *Sparassis crispa* on BLM and NFS Lands*

Location	Coniferous and Mixed Forests below 6,000 feet		LSOG Forests below 6,000 feet	
	Total	**Reserves**	**Total**	**Reserves**
Regional Area	18,055,593	10,707,574	5,908,944	3,894,277
Local Area	568,307	369,371	181,349	133,178
Project Area	1,419	982	323	230

Data Source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
*The acreage estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

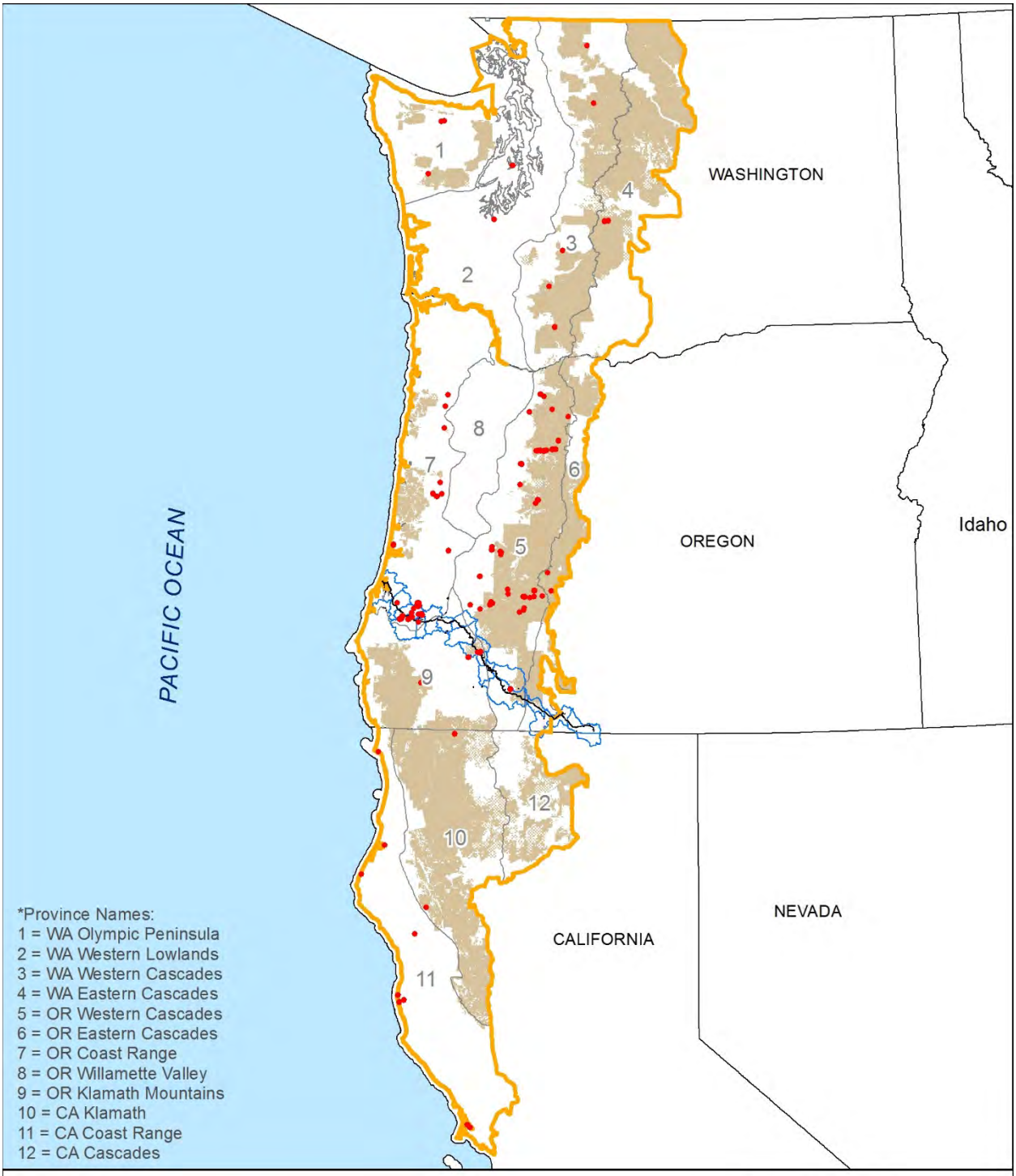


Figure SPCR-1
Regional Distribution of *Sparassis crispa*

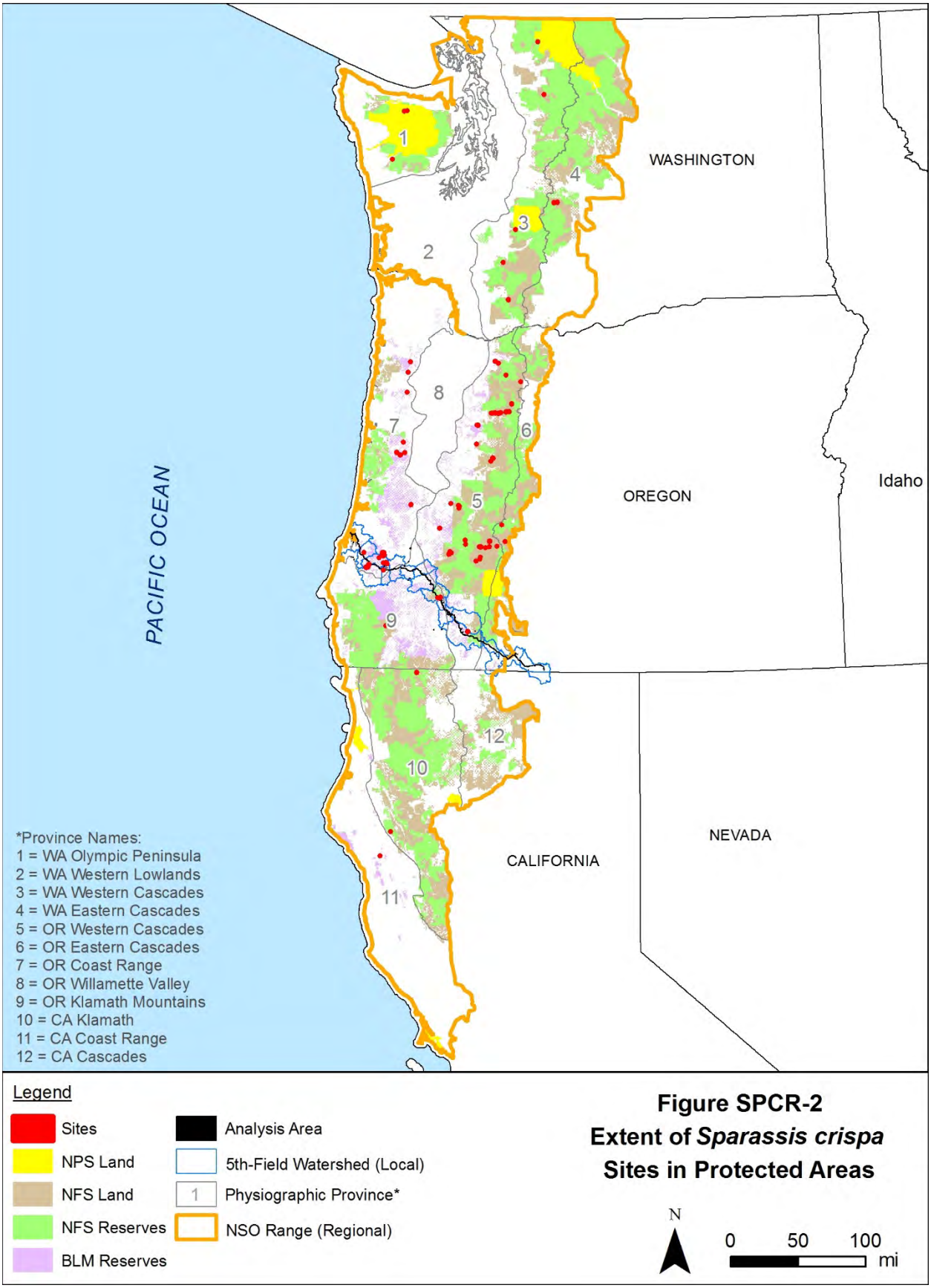


Figure SPCR-2
Extent of *Sparassis crispa* Sites in Protected Areas

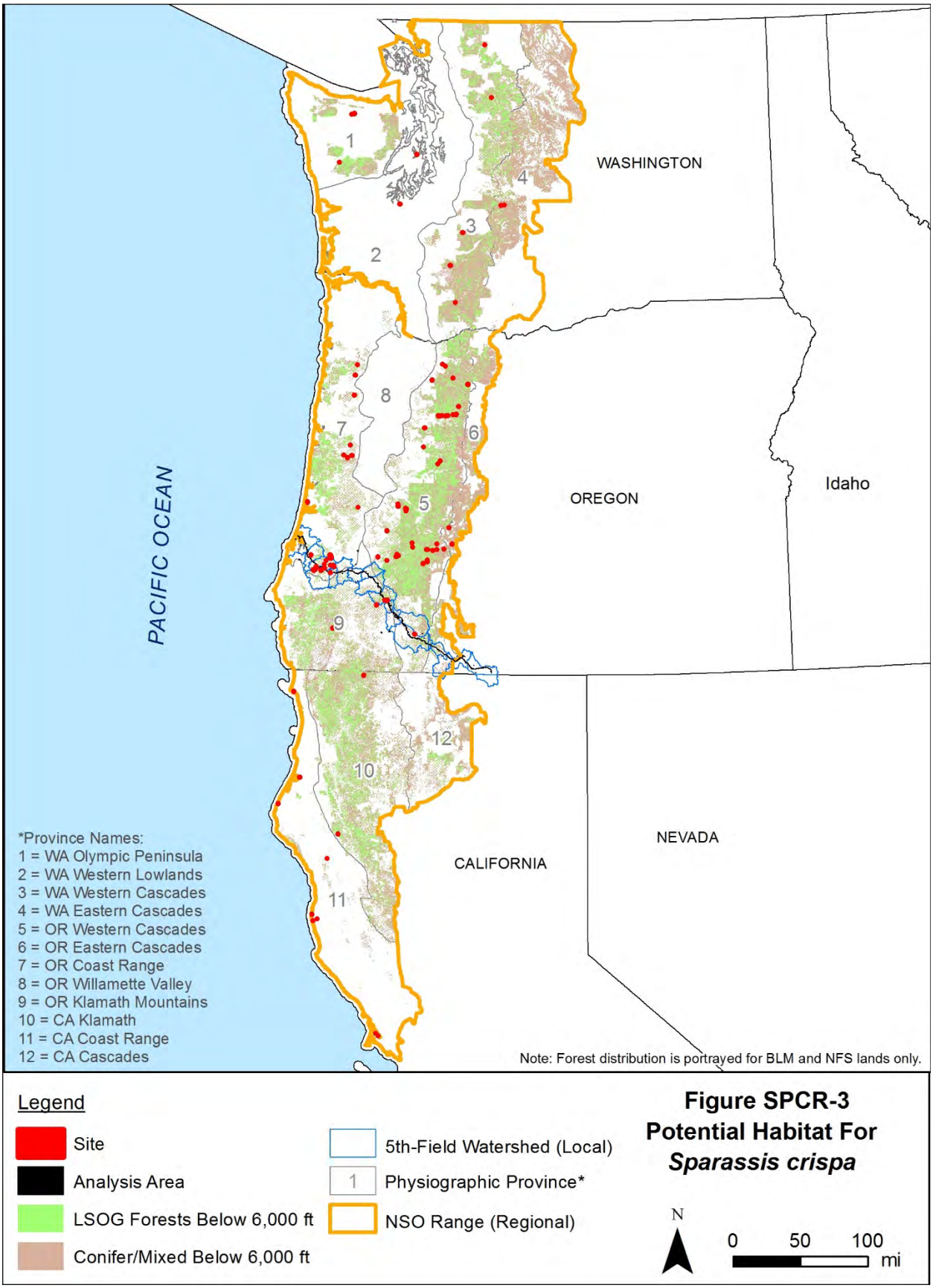


Figure SPCR-3
Potential Habitat For
Sparassis crispa

Local Distribution

Within the local area, *S. crispa* is distributed across seven 5th-field watersheds that overlap the project area (see Table SPCR-5 and Figure SPCR-4). A large group of sites is located in the East Fork, Middle Fork Coquille River, and North Fork Coquille River watersheds in the Coast Range. A large cluster of sites located entirely in BLM reserves is located about 5 miles to the north of the coastal sites. A small group of sites is located in the Elk Creek-South Umpqua, Trail Creek, and Upper Cow Creek watersheds in the Klamath Mountains. Several sites are located within about 35 miles to the north and south of these sites, of which a majority are on NFS lands. Two sites are found in the Little Butte Creek watershed in the Cascade Range; these sites are somewhat isolated from other sites in the local area, as well as other sites in the region.

Four of the 19 sites in the local area are located at least partially on NFS lands (Rogue River-Siskiyou and Umpqua National Forests). These sites occur on land designated as Other (Matrix). 16 sites are at least partially located on BLM lands, of which, 12 are located entirely in reserves. The total number of sites in reserves represent 63 percent of the BLM and NFS-managed sites in the local area.

TABLE SPCR-5

Distribution of *Sparassis crispa* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	-	-	-
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	9	-	9
Elk Creek-South Umpqua (785)	1	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	2	-	2
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	4	-	4
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	-	-	-
North Fork Coquille River (733)	1	-	1
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	-	-	-
Spencer Creek (865)	-	-	-
Trail Creek (804)	1	-	-
Upper Cow Creek (801)	1	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.

Coniferous and mixed hardwood-coniferous forests below 6,000 feet msl encompass approximately 568,307 acres on BLM and NFS lands in the local area, with 369,371 acres in reserve land allocations (65 percent of the forests). Of this acreage, an estimated 181,349 acres are LSOG, including 133,178 acres in reserves (73 percent of the forests). Other sites may also exist in the local area where surveys have not been completed, based on the number and distribution of sites in the region and the extent of forests that may provide suitable habitat (see Figures SPCR-3 and SPCR-4).

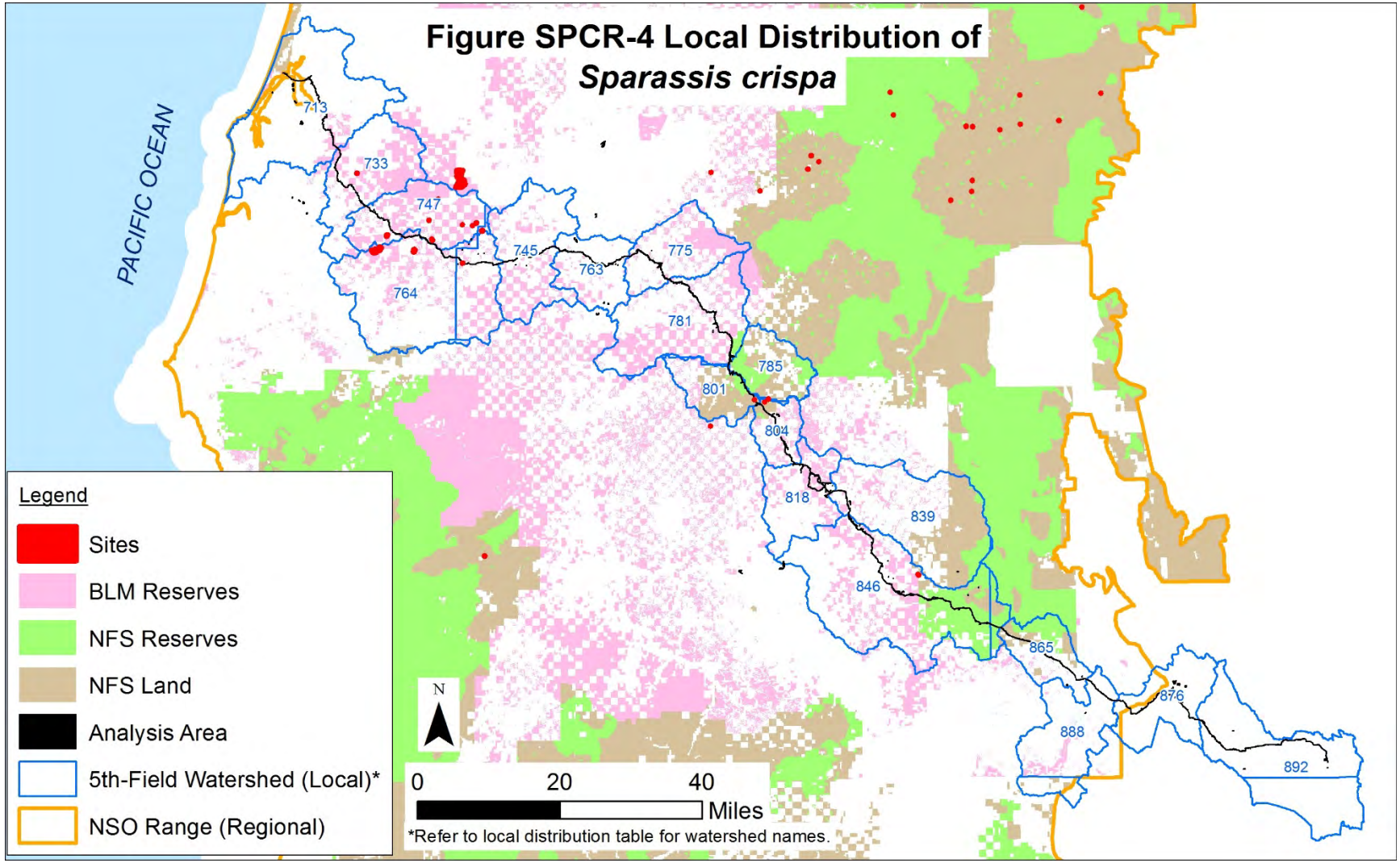


Figure SPCR-4 Local Distribution of
Sparassis crispa
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis and project areas contain two sites of *S. crispa*. The sites are in the Upper Cow Creek and Middle Fork Coquille River watersheds in the Klamath Mountains and the Coast Range in the central to western portion of the analysis area. The site in the Middle Fork Coquille River watershed is located in an LSR on BLM-managed land, while the site in the Upper Cow Creek watershed is located in land designated as Other (Matrix) and on NFS land (Umpqua National Forest). Several other sites are located in the immediate vicinity of the sites (see Local Distribution discussion above).

Surveys for the PCGP Project resulted in one observation of the species near MP 109.7 just outside the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). This recorded observation comprises the one site of this species in the analysis area.

Project Impacts

Analysis

The PCGP Project would affect one site out of the 51 sites on NFS-managed lands in the region, representing approximately 2 percent of the sites. Site impacts on other land ownerships include one site affected on BLM lands. The total number of sites affected is two sites ou t of the 106 total sites on all lands. Table SPCR-6 provides an overview of the features of the PCGP Project that would affect the *S. crispa* site on NFS land. The construction corridor and associated work areas would affect approximately 0.8 acre within the site (about 35 percent of the site). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *S. crispa* in and near the project area.

TABLE SPCR-6

Impacts to *Sparassis crispa* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	1	0.7 ac
Temporary Extra Work Area (TEWA)	1	0.1 ac
Uncleared Storage Area (UCSA)	-	-
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

This discussion presents an overview of the types of impacts that would be expected in the site based on the features of the PCGP Project that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 0.7 acre of vegetation and soils within the site and could remove individuals of *S. crispa*. Disturbance in a TEWA would result in similar impacts on about 0.1 acre within the site. The establishment of the corridor could modify microclimate conditions in the site after the corridor is established. The removal of forests and soil and ground disturbance could negatively affect *S. crispa* in adjacent areas by removing its habitat, disturbing soil or woody debris around trees or roots of trees, and affecting its association with the roots, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat

conditions as a result of the corridor and TEWAs could make habitat within the site no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project.

Across the project area, the PCGP Project would remove an estimated 1,142 acres of coniferous and mixed hardwood-coniferous forests below 6,000 feet msl, including 249 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *S. crispa*. Within this impact area, about 567 acres (about 50 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 246 acres of coniferous and mixed hardwood-coniferous forests below 6,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous and mixed forests below 6,000 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the site on NFS land as a result of the PCGP Project, three sites of *S. crispa* would remain on NFS lands in the local area (none in reserves), and 50 sites, including nine at least partially in reserves, would remain on NFS lands in the NSO range. Additionally, 11 sites would remain entirely in BLM reserves in the local area and 28 sites would remain entirely in BLM reserves in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but the sites on NFS lands would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The nine sites in NFS reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. While sites on BLM lands are not subject to S&M Standards and Guidelines protections, sites in reserves would likely receive some protection under the BLM 2016 RMPs. Based on these site counts, approximately 44 percent of the remaining *S. crispa* sites on BLM and NFS lands in the NSO range would be protected in reserves.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Sparassis crispa* is a Category D (uncommon) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category D species are not likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information since the species was listed in the 2001 ROD indicates that the species appears to be more common than previously documented, as noted below:

  - *Sparassis crispa* has a wide distribution across 10 physiographic provinces and three states in the region and a moderate-high number of overall sites (51 on NFS lands, 106 on all lands). The species appears to be well distributed in western Cascade Range in Oregon, but has a scattered distribution in other parts of its range in the NSO range. The currently known number of sites on BLM and NFS lands is an increase of 13 sites on BLM and NFS lands since 2007, with one site documented during the PCGP Project surveys.

  - An estimated 42 percent of the sites (38 sites) are in reserves, which is an increase of 17 sites in reserves since 2006 per Molina (2008).

- Coniferous and mixed hardwood-coniferous forests below 6,000 feet msl (general habitat for the species) are widely distributed across the region and encompass approximately 10.7 million acres on BLM and NFS lands with an estimated 59 percent in reserves. Most of the forests are found in the Cascade Range, where most sites are documented, and in the Klamath Mountains, where some sites are documented. The Coast Range and other areas also contain coniferous and mixed hardwood-coniferous forests, and many sites are located in the Coast Range. A subcomponent of these forests likely provides habitat for *S. crispa*.

- The PCGP Project would affect one of 51 Forest Service-managed sites of *S. crispa*, representing approximately 2 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the site, a moderate-high number of sites (50) would continue to be documented on NFS lands in the region with a wide distribution across Washington, Oregon, and California. Several sites (three sites) would remain in the local vicinity of the analysis area. An additional 29 sites would remain entirely in BLM reserves in the region and 11 sites would remain entirely in BLM reserves in the local area. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would not affect any sites in NFS reserves, and the percentage of sites in reserves would remain about the same. Of the remaining sites on NFS lands, eight are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and one is in a Congressionally Reserved area where management activities that may adversely affect *S. crispa* are unlikely. Twenty-eight sites would remain entirely in BLM reserves, including LSRs where management actions are restricted to those activities that benefit LSOG forests, District Designated Reserves where management activities that may adversely affect *S. crispa* are unlikely, and Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species.

- The PCGP Project would result in a permanent loss of an estimated 246 acres of coniferous and mixed hardwood-coniferous forests below 6,000 feet msl (less than 1 percent of the total regional acreage). An estimated 10.7 million acres (59 percent) of coniferous and mixed forests and 3.9 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *S. crispa*, although the potential for the habitat to be occupied varies based on the distribution of sites and habitat. This is a Category D species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

2.29.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *S. crispa* at one site on NFS lands and one site on BLM lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 50 sites would remain on NFS lands across the region, and three sites would remain on NFS lands in the local area. Additionally, 28 sites would remain entirely in BLM reserves across the region and 11 sites would remain entirely in BLM reserves in the local area. Although the PCGP Project would affect site persistence of *S. crispa* at one site on NFS land, this site is part of a small group of sites in the Klamath Mountains in Oregon. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Sparassis crispa* would persist in the region without considering the site as part of the population.

- The PCGP Project would remove approximately 1,142 acres of coniferous and mixed hardwood-coniferous forests and 249 acres of LSOG coniferous and mixed forests below 6,000 feet msl (a negligible amount of the forests). An estimated 50 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 10.7 million acres (59 percent) of coniferous and mixed forests and 3.9 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 1998.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely in BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is widely distributed.

The PCGP Project would not be able to avoid the *S. crispa* site on NFS land in the analysis area, although some individuals within the site may persist following project implementation. Based on the above conclusions, avoidance of the *S. crispa* site is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plan that applies to the affected site would waive implementation of Management Recommendations for the *S. crispa* site affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific

protocols to monitor the species and adjacent habitat near the affected site over the long term. The monitoring plan shall be approved by the Forest Service.

2.30 SPATHULARIA FLAVIDA

Spathularia flavida is a cup or club mushroom species in the Cudoniaceae family (formerly in the Geoglossaceae family) and is commonly known as fairy fan or yellow fairy fan.

2.30.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *S. flavida* as a Category B (rare) species. ORBIC evaluated *S. flavida* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004), but it was not re-evaluated in the most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2004, the species was considered to be between not rare and apparently secure, but with cause for long-term concern; and widespread, abundant, and secure within its global range (G4G5) and was considered to be at moderate risk of extinction or elimination due to a restricted range, relatively few populations, recent and widespread declines, or other factors in Oregon (S3). The species is not currently on the ORBIC lists. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.30.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Relatively little is known about the autecology or reproductive biology of *S. flavida*. It has been reported to develop asexual spores on or within the fruiting bodies, which maybe an adaptation to local environmental stress (Ge et al. 2014). Members of this species complex occur in a wide variety of habitats, although fruiting bodies tend to be associated with forested areas (ORBIC 2004). Fruiting typically occurs in summer and fall in the NSO range (Castellano et al. 2003), but is more common between October and December in Oregon (Trappe, pers. comm. 2013).

Range

Spathularia flavida is widely distributed across the northern hemisphere, including North America and Europe, and has been reported from Japan (ORBIC 2004). In North America, the species occurs in the Pacific Northwest from British Columbia south into Arizona, across southern Canada, the Great Lakes region, and on the east coast from Nova Scotia to Massachusetts. Within the range of the NSO, it has been reported from Marin County, California to northern Washington (Castellano et al. 2003). Based on data available in 2003, the species was found in Oregon in scattered populations from the California border to Mt. Hood National Forest. The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historic range is not known, it was likely similar to the current range, with populations widely distributed across Europe, Asia, and North America. Local and regional distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC reported *S. flavida* from an estimated 43 element occurrences in the Pacific Northwest in 2004. An estimated 20 of these occurrences were in Oregon, with fewer in California (7) and Washington (16) (ORBIC 2004). In 2004, *S. flavida* population trends were unknown, but it was considered widespread and relatively abundant (ORBIC 2004). The species was found in nine locations during Random Multi-Species surveys across the NSO range between 2001and 2004 (USDA and USDI 2007). Molina (2008) documented 26 new sites of *S. flavida* in the NSO range between 1998 and 2006, and 50 total sites were documented by 2006, including 22 in reserves or protected areas. The 2007 Final SEIS reported 29 sites on NFS and BLM lands and 43 total sites on all lands in the NSO range (USDA and USDI 2007).

Pre-disturbance surveys are not practical for Category B species. Instead, equivalent-effort surveys were conducted between 2010 and 2012 in old-growth stands in the PCGP Project area and within 100 feet of the project area to comply with the Standards and Guidelines for Category B species where strategic surveys are not complete (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These equivalent-effort surveys targeted all Category B species, including *S. flavida*, and resulted in five new observations of individuals or populations of *S. flavida*. Additional surveys for other species in LSRs in nearby areas resulted in one additional incidental observation of the species. Based on the increased number of sites since 1998 with increased surveys (a two-fold increase between 1998 and 2006 per Molina 2008 records), more survey effort would be expected to locate additional populations within the NSO range. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Spathularia flavida is found in a variety of forest types, ranging from coniferous to hardwood forests (ORBIC 2004). It grows in clusters or fairy rings on litter or woody debris (Castellano et al. 2003). It has been found in open canopy forests associated with campgrounds and in young closed canopy plantations with very little needle litter (Trappe, pers. comm. 2013). Based on data available in 2007, it was found up to about 5,500 feet msl (Cushman and Huff 2007). *S. flavida* may prefer specific microclimate conditions of LSOG forests, but it may not be as restricted to these conditions.

Threats

Threats to *S. flavida* are presumably those actions that disrupt stand conditions necessary for its survival and result in changes in humidity at the soil level, alterations of species diversity, and modifications to light patterns, particularly in arid regions (ORBIC 2004). Other specific threats to the species are not currently known.

Management Recommendations

As a Category B S&M species, the direction under the 2001 ROD is to manage all known sites and reduce the inadvertent loss of undiscovered sites (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *S. flavida*:

- As a litter saprobe, *S. flavida* may be associated with forest litter, duff or debris. Consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.30.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *S. flavida* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table SPFL-1 shows the total number of known sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 218 observations from BLM and Forest Service geodatabases were converted into 194 sites in the NSO range (region). Table SPFL-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table SPFL-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure SPFL-1 displays the regional distribution of the species across NFS lands, Figure SPFL-2 displays the extent known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure SPFL-3 displays the species' regional distribution as well as the extent of all forests and LSOG forests below 6,000 feet msl on BLM and NFS lands.

TABLE SPFL-1

Number of *Spathularia flavida* Sites (2017)

Location*	Number of Sites
Regional Area	194
Local Area	47
Analysis Area (Project Area)	5 (5)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE SPFL-2

Distribution of *Spathularia flavida* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	81	6	5
BLM	97	40	-
NPS	4	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	39	13	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE SPFL-3

Distribution of *Spathularia flavida* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	5	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	2	-	-
Congressionally Reserved (CR)	**3**	**-**	**-**
Late Successional Reserve (LSR)	**49**	**5**	**4**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**-**	**-**	**-**
Managed Late Successional Area (MLSA)	1	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	28	1	1
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	**-**	**-**	**-**
District Designated Reserve	**44**	**22**	**-**
Harvest Land Base	60	32	-
Late Successional Reserve	**49**	**19**	**-**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**39**	**38**	**-**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Spathularia flavida is widely distributed across all physiographic provinces in Washington (Olympic Peninsula, Western Lowlands, and Western and Eastern Cascades), Oregon (Coast Range, Willamette Valley, Cascades West and East, and Klamath Mountain), and California (Coast, Klamath, and Cascade) (see Figure SPFL-1). Although sites are widespread across the region, they have a scattered distribution, with few clusters or groups of sites. The species is most abundant along the Cascade Range and is less abundant in other areas. Based on the distribution of sites across the species' currently known range, *S. flavida* appears to be well distributed within the western Cascade Range in Oregon.

Thirty-nine of 194 known sites are at least partially located on private or other lands; four sites are on NPS land (Olympic, North Cascades, and Mount Rainier National Parks); 97 sites are at least partially on BLM lands; and 81 sites are at least partially on NFS lands across the region. Sites

included on National Forests that encompass the project area include eleven sites on the Rogue River-Siskiyou National Forest and seven sites on the Umpqua National Forest. The remaining NFS sites are located on the Gifford Pinchot, Klamath, Lassen, Mendocino, Mt. Baker-Snoqualmie, Mt. Hood, Shasta-Trinity, Siuslaw, Six Rivers, Olympic, Okanogan-Wenatchee, and Willamette National Forests.

Across the NSO range, 52 sites are at least partially located in NFS reserve lands, including 49 in LSRs and three in Congressionally Reserved areas (see Figure SPFL-2). This represents 64 percent of the total NFS-managed sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 37 sites are located entirely in BLM reserves, representing 38 percent of the BLM-managed sites in the region. While the 37 sites in BLM reserves and the four NPS sites are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management and National Park Management.

Spathularia flavida is more commonly found in LSOG forests based on available data (153 of 194 total sites are in LSOG), but it is somewhat common in non-LSOG forests and has also been found in tree plantations and campground settings. Based on current site locations, the species is found in all forest types below about 6,000 feet msl and has been documented in most of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous, mixed hardwood-coniferous, and hardwood forests, including the LSOG component of these forests, within the NSO range could provide habitat for *S. flavida* and support additional sites. These forests encompass an estimated 19.2 million acres on BLM and NFS lands in the region, including an estimated 11.3 million acres in reserve land allocations (59 percent of the forests; Table SPFL-4). Of this acreage, an estimated 6.1 million acres are LSOG (see Figure SPFL-3), including 4 million acres in reserve land allocations (66 percent of the forests). Although coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl are widespread, LSOG forests are less common and are primarily found along the Cascade Range and Klamath Mountains.

TABLE SPFL-4

Extent of Forests That Could Provide Habitat for *Spathularia flavida* on NFS and BLM Lands a/

Location	All Forests below 6,000 feet		LSOG Forests below 6,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	19,183,086	11,264,423	6,088,524	3,998,501
Local Area	608,824	403,947	184,099	135,653
Project Area	1,536	1,069	326	233

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011

Note: Areas are presented in acres.

a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

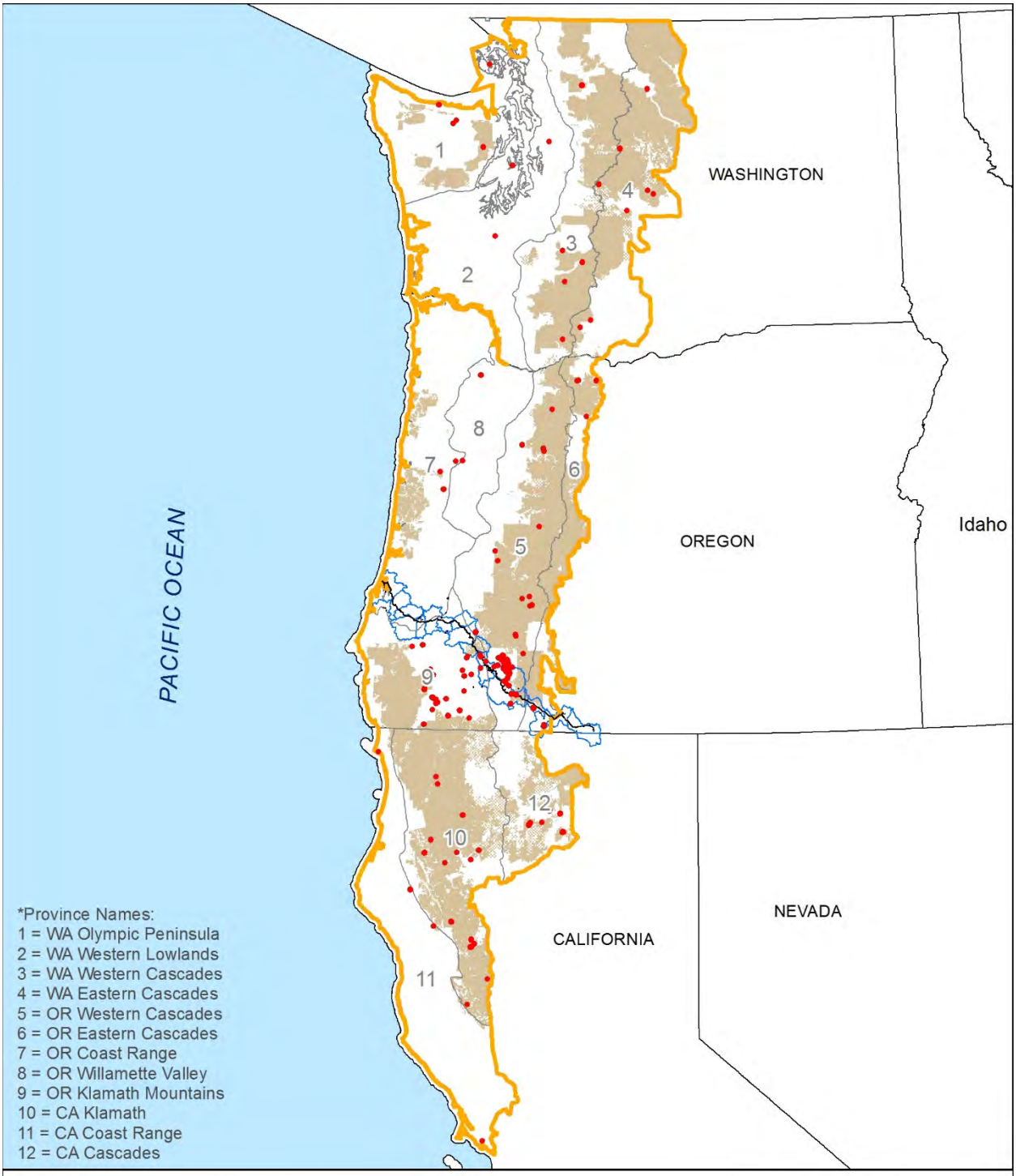


Figure SPFL-1
Regional Distribution of *Spathularia flavida*

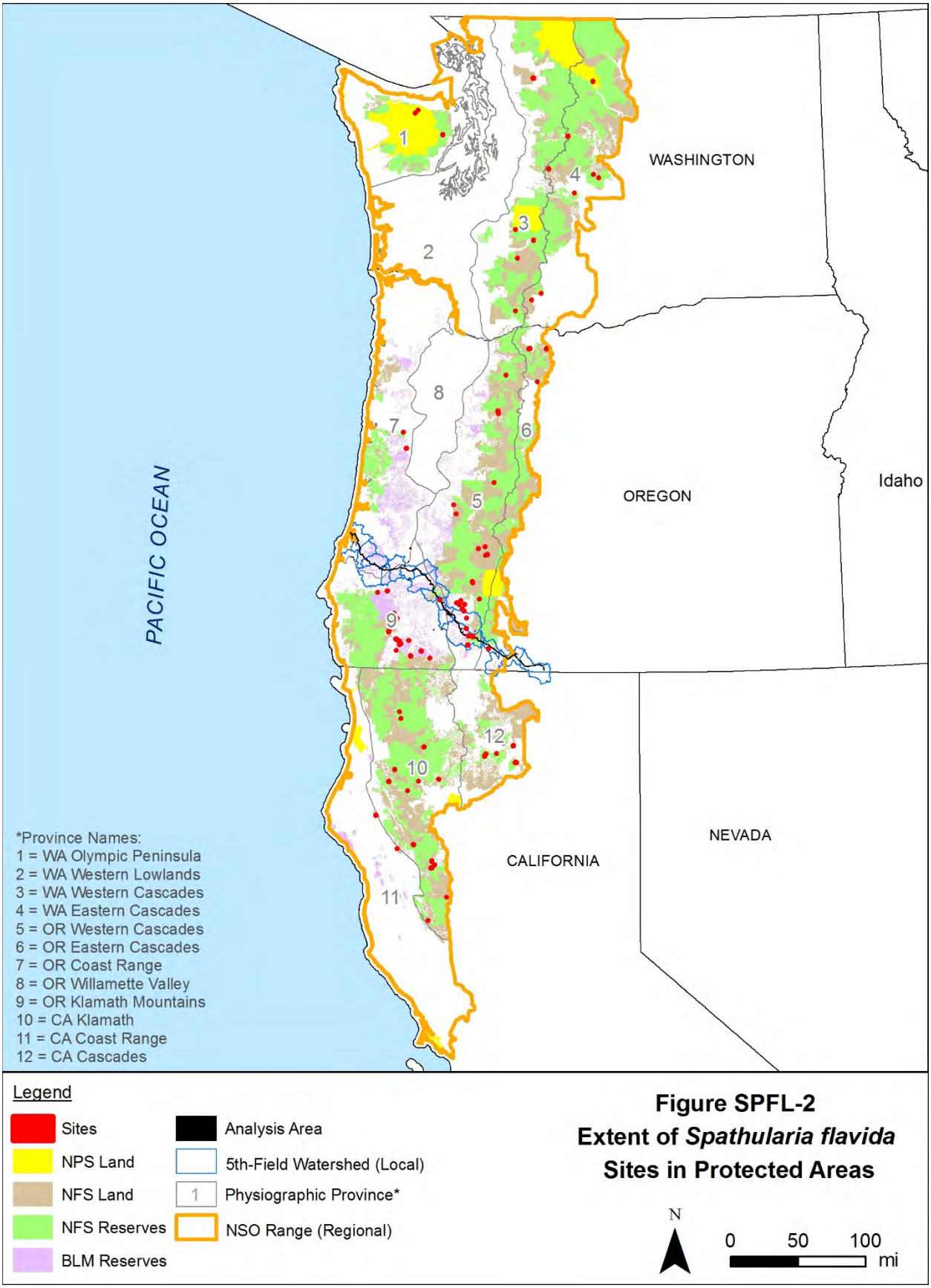


Figure SPFL-2
Extent of *Spathularia flavida* Sites in Protected Areas

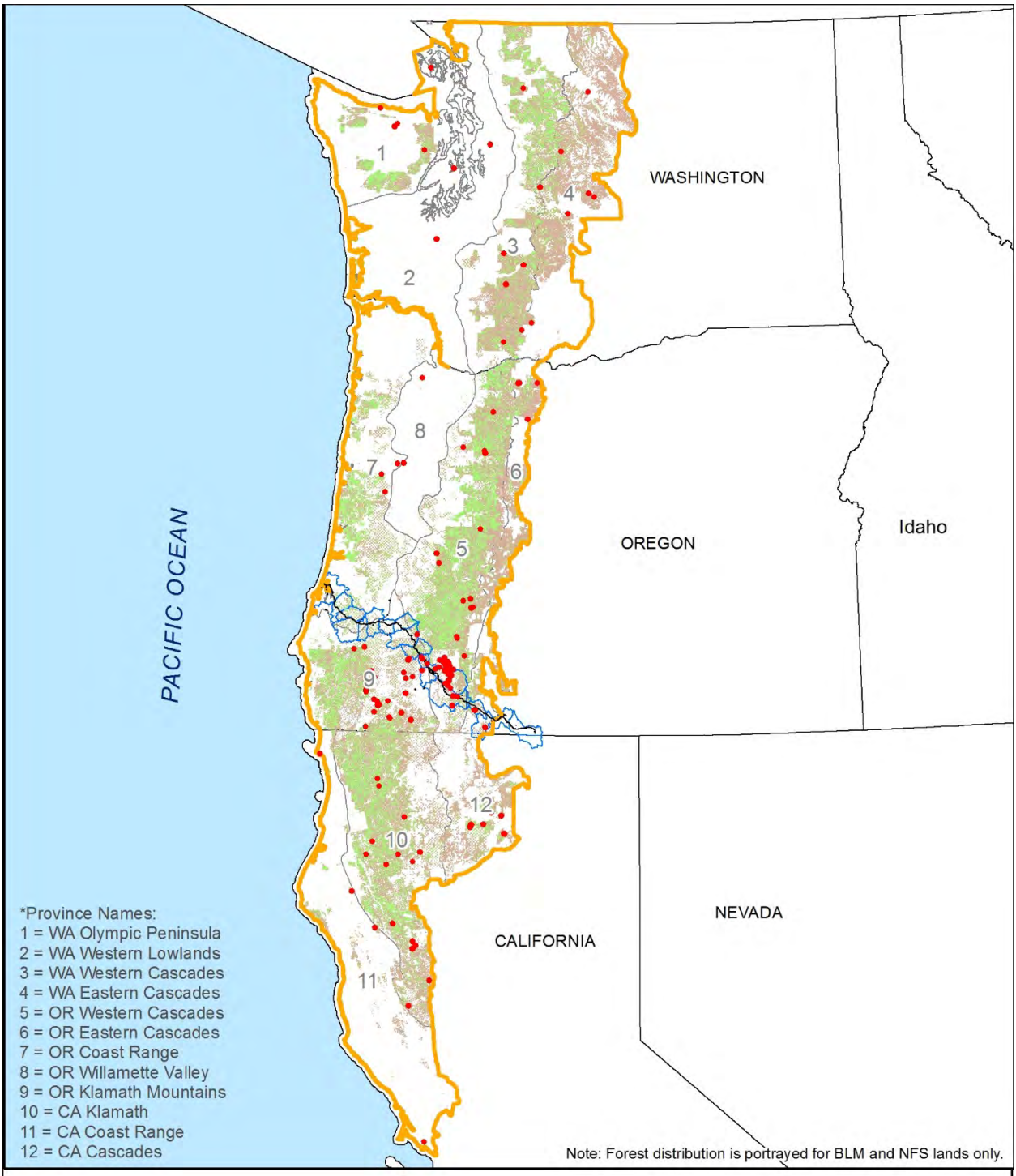


Figure SPFL-3
Potential Habitat For
Spathularia flavida

Local Distribution

Within the local area, *S. flavida* is distributed across seven 5th-field watersheds that overlap the project area (see Figure SPFL-4 and Table SPFL-5.) The sites are scattered across the watersheds in the Klamath Mountains and Cascade Range in the eastern half of the local area. Many sites are located entirely in BLM reserves within 10 miles to the northeast of the local area in the Cascade Range and within 30 miles to the southwest in the Klamath Mountains. Across these watersheds, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous, mixed, and hardwood forests, and opportunities for dispersal exist within the local area and to nearby regional areas.

Of the 47 sites in the local area, six sites are located on NFS lands. These sites are located on lands designated as LSR and Other (Matrix). Thirteen sites are partially on private lands and 40 sites are at least partially on BLM lands. Of the sites in the local area, five sites are at least partially in NFS reserve lands and eight sites are entirely within BLM reserve lands, representing 28 percent of the NFS- and BLM-managed sites in the local area.

TABLE SPFL-5

Distribution of *Spathularia flavida* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	24	-	23
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	2	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	11	5	6
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	-	-	-
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	2	-	2
South Umpqua River (781)	1	-	1
Spencer Creek (865)	4	-	4
Trail Creek (804)	3	-	2
Upper Cow Creek (801)	-	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.

Coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl encompass approximately 608,824 acres on BLM and NFS lands in the local area, including 403,947 acres in reserve land allocations (66 percent of the forests). Of this acreage, an estimated 184,099 acres are LSOG, including 135,653 acres in reserve land allocations (74 percent of the forests). Sites may also exist in the local area where surveys have not been completed, based on the distribution of sites in the local and regional areas and the extent of forests that may provide suitable habitat (see Figures SPFL-3 and SPFL-4).

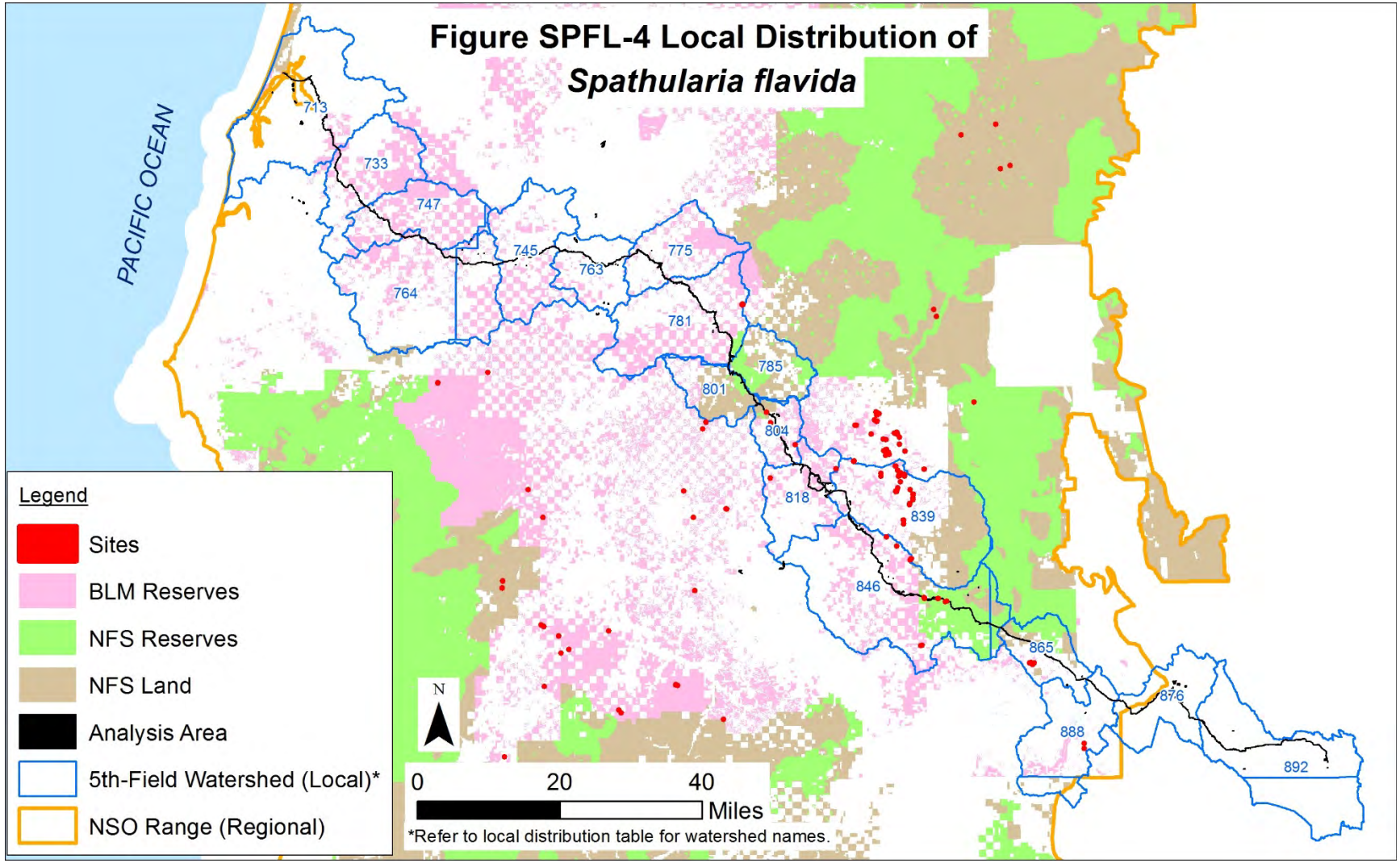


Figure SPFL-4 Local Distribution of
Spathularia flavida
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis and project areas contain five sites of *S. flavida*. These sites are located on NFS lands; four sites are in LSRs and one site is on land designated as Other (Matrix). Four of the sites are near one another in the Little Butte Creek watershed and one site is located in the Trail Creek watershed. Several sites are located nearby and are distributed across the Cascade Range and Klamath Mountains in the region (see Local and Regional Distribution discussions above).

Surveys for the PCGP Project resulted in six total observations of the species in four locations in or near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). Four of these recorded observations along with data from other agency databases comprise the five sites in the analysis area; the other observations are in a site outside the analysis area. Within the project area, one site is at approximately MP 112.7 and the other three are between MPs 154.7 and 158.1.

Project Impacts

Analysis

The PCGP Project would affect five out of the 81 sites on NFS lands in the region, representing approximately 6 percent of the sites (or five out of 194 total sites on all lands in the NSO range). Table SPFL-6 presents an overview of the features of the PCGP Project that would affect the *S. flavida* sites. The construction corridor and associated work and storage areas would affect approximately 5.4 acres within the sites (about 30 percent of the sites) (see Figure SPFL-4). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *S. flavida* in and near the project area.

TABLE SPFL-6

Impacts to *Spathularia flavida* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	5	3.6 ac
Temporary Extra Work Area (TEWA)	3	0.6 ac
Uncleared Storage Area (UCSA)	4	1.2 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 3.6 acres of vegetation and soil within five sites and could result in the removal of *S. flavida* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about 0.6 acre within three sites. The establishment of the corridor could modify microclimate conditions around populations or individuals adjacent to the corridor. The removal of forests, litter, and woody debris and disturbance to soil could negatively affect *S. flavida* in adjacent areas by removing its habitat and affecting its association with litter or woody debris, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat conditions as a result of the corridor and TEWAs could make habitat

within the sites no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Material storage within UCSAs would disturb about 1.2 acres of understory habitat in four sites, which could modify microhabitats near extant populations or individuals, potentially making the habitat no longer suitable for the species.

Across the project area, the PCGP Project would remove an estimated 1,236 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl, including 251acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *S. flavida*. Within this impact area, about 609 acres (about 49 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 261 acres of coniferous, mixed, and hardwood forests below 6,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of all forests below 6,000 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the five sites as a result of the PCGP Project, one site of *S. flavida* would remain in reserves on NFS lands in the local area, and 76 sites, including 48 in reserves, would remain on NFS lands in the NSO range. An additional eight sites would remain entirely in BLM reserves in the local area and 37 sites would remain entirely in BLM reserves in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but the sites on NFS lands would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 48 sites in NFS reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. While the sites on BLM lands are not subject to S&M Standards and Guidelines protections, the sites entirely in reserves would likely receive some level of protection under BLM management. Based on these site counts, approximately 48 percent of the remaining *S. flavida* sites on BLM and NFS lands in the NSO range would be protected in reserves.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Spathularia flavida* is a Category B (rare) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category B species are likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information since the species was listed in the 2001 ROD, however, indicates that the species appears to be more common than previously documented, as noted below:

  - *Spathularia flavida* has a wide, but scattered, distribution across 12 physiographic provinces and three states in the NSO range and a moderate-high number of overall sites (81 on NFS lands, 194 sites on all lands). The species has a scattered distribution across the region and is most abundant in the Cascade Range. The currently known number of sites on BLM and NFS lands is an increase of 148 sites since 2007, with some sites documented during the PCGP Project surveys.

  - An estimated 46 percent of the sites (89 sites) are in reserves, which is an increase of about 67 sites in reserves since 2006 per Molina (2008).

- Coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl (general habitat for the species) are widely distributed across the region and encompass approximately 19.2 million acres on BLM and NFS lands with an estimated 59 percent in reserves. Most of the forests are found in the Cascade Range and Klamath Mountains, where most sites are documented. The Coast Range and other areas also contain coniferous, mixed hardwood-coniferous, and hardwood forests, but sites are less abundant in these areas. A subcomponent of these forests likely provides habitat for *S. flavida*.

- The PCGP Project would affect five of 81 Forest Service-managed sites of *S. flavida,* representing approximately 6 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the sites, a moderate-high number of sites (76) would continue to be documented on NFS lands in the region with a wide, but scattered, distribution across Washington, Oregon, and California. One site would remain on NFS lands in the local vicinity of the analysis area. An additional 40 sites would remain on BLM lands in the local area, including eight sites entirely in reserves. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would affect site persistence at four sites in LSRs, and the percentage of sites in NFS reserves would be about the same (65 percent). Of the remaining sites on NFS lands, 45 are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, and three are at least partially in Congressionally Reserved areas where management activities that may adversely affect *S. flavida* are unlikely. Thirty-seven sites would remain entirely in BLM reserves, including LSRs where management actions are restricted to those activities that benefit LSOG forests, District Designated Reserves where management activities that may adversely affect *S. flavida* are unlikely, and Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species.

- The PCGP Project would result in a permanent loss of an estimated 261 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl (less than 1 percent of the total regional acreage). An estimated 11.3 million acres (59 percent) of coniferous, mixed hardwood-coniferous, and hardwood forests and 4 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *S. flavida*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. This is a Category B species for which pre-

disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

2.30.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *S. flavida* at five sites on NFS lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 76 sites would remain on NFS lands across the region, and one site would remain on NFS lands in the local area. An additional 37 sites would remain entirely in BLM reserves across the region and eight sites would remain entirely in reserves in the local area. A large proportion of sites on NFS lands in the local area would be affected, with only one site remaining on NFS land in the local area; however, many sites are located on BLM lands in the local area (40) and the species is expected to remain locally abundant in the Cascade Range in southern Oregon. Although the PCGP Project would affect site persistence of *S. flavida* at five sites, these sites are part of many sites scattered across the Cascade Range and Klamath Mountains. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Spathularia flavida* would persist in the region without considering the five sites as part of the population.

- The PCGP Project would remove approximately 1,236 acres of coniferous, mixed hardwood-coniferous, and hardwood forests and 251 acres of LSOG forests below 6,000 feet msl (a negligible amount of the forests). An estimated 49 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 11.3 million acres (59 percent) of coniferous, mixed, and hardwood forests and 4 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 1998.

- The remaining sites on NFS land are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely in BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is widely distributed.

The PCGP Project would not be able to avoid impacts to the *S. flavida* sites in the analysis area, although some individuals within the site may persist following project implementation. Based on the above conclusions, avoidance of the five *S. flavida* sites is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plans that apply to the affected sites would waive implementation of Management Recommendations for the *S. flavida* sites affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific

protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

2.31 TREMISCUS HELVELLOIDES

Tremiscus helvelloides is a jelly mushroom species in the Auriculariaceae family (formerly in the Hydnaceae family) and is commonly known as apricot jelly or red jelly fungus. Its name was recently changed to *Guepinia helvelloide*s, but the 2001 ROD and 2003 ASR refers to the species by its former name, which is used in this report. The species has also been known as *Phlogiotis helvelloides*.

2.31.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications, identifies *T. helvelloides* as a Category D (uncommon) species. ORBIC evaluated *T. helvelloides* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004), but it was not included in the most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2004, the species was considered to be between not rare and apparently secure, but with cause for long-term concern; and widespread, abundant, and secure within its global range within its global range (G4G5) and was considered to be not rare and apparently secure, but with cause for long-term concern, in Oregon (S4). The species is not currently on the ORBIC lists. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.31.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g, recent survey data) specifically used for the persistence evaluation.

Life History

Little is known about the autecology or reproductive biology of *T. helvelloides*. It is a saprobe that grows on soil or buried woody debris (Holthausen et al. 1994) and is found solitary or in fairy rings in duff, soil, or rotten wood under conifer trees (Castellano et al. 2003). It has been reported to fruit in late summer and fall and occasionally in spring (Castellano et al. 2003), but it has also been observed fruiting in winter and appears to thrive in cool, moist weather (Trappe, pers. comm. 2013). Fruiting may take place in the same location for two or more years, but information on the mycelium's lifespan is unknown (ORBIC 2004).

Range

Tremiscus helvelloides is widespread, but locally rare, in cool coniferous forests of north temperate regions, including North America, Europe, and Japan. In North America, it has been reported from Alaska south to California and east to Idaho (ORBIC 2004), as well as in Canada and south to Puerto Rico and Mexico (Trappe, pers. comm. 2013). Based on data available in 2003, it was widely distributed in the NSO range from northern California to Washington, with particularly dense clusters of populations in Douglas and Jackson counties in Oregon (Castellano et al. 2003).

In Oregon, *T. helvelloides* has primarily been found in the Cascade and Coast Ranges and Siskiyou Mountains (ORBIC 2004). The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, it was likely similar to the current range, with populations widely distributed in Europe, Asia, and North America. Local and regional distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported *T. helvelloides* from more than 300 element occurrences worldwide in 2004. An estimated 112 of these occurrences were in California, Oregon, and Washington, with the majority (estimated 80) found in Oregon and fewer in Washington (15) and California (17) (ORBIC 2004). In 2004, population trends of *T. helvelloides* were unknown, but its populations in Oregon appeared to be secure (ORBIC 2004). The species was found in three locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented 70 new sites of *T. helvelloides* in the NSO range between 1998 and 2006, and 110 total sites were documented by 2006, including 32 in reserves or protected areas. The 2007 Final SEIS reported 86 sites on NFS and BLM lands and 112 total sites on all lands in the NSO range (USDA and USDI 2007).

Equivalent-effort surveys were conducted for Category B species during the fall and spring from 2010 to 2016 in old-growth stands in the PCGP Project area and within 100 feet of habitat removal to comply with the Standards and Guidelines for Category B species where strategic surveys are not complete (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished]). As a Category D species, *T. helvelloides* was not specifically targeted during the surveys, although incidental sightings of Category D species were recorded and resulted in 28 new observations of individuals or populations of *T. helvelloides*. Additional surveys for other species in LSRs in nearby areas resulted in nine additional incidental observations of the species. Based on the relatively high number of sites and the increased number of sites since 1998 with increased number of surveys (a two-fold increase between 1998 and 2006 per Molina 2008 records), it is likely that this species is more abundant than previously known, and additional surveys would be expected to locate additional populations within the NSO range. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Based on data available in 2004, *T. helvelloides* has typically been found in mesic coniferous forests where the humidity is high and the moss layer is well-developed (ORBIC 2004). In northern England it has been reported growing in mature conifer plantations (Atherden 1992). Holthausen et al. (1994) indicated that the mushroom was commonly found in riparian zones in the Pacific Northwest, including along perennial and intermittent streams and seasonal streams with narrow channels (i.e., in riparian reserves). The mushroom has also been found along trail sides in younger coniferous forests and is more commonly found in closed canopy forests (Trappe, pers. comm. 2013). In the Pacific Northwest, it has been found in forest litter or humus in a variety of coniferous habitats at elevations between about 800–4,000 feet msl (Forest Service and BLM

2002). *Tremiscus helvelloides* may prefer specific microclimates of LSOG forests, but it may not be as restricted to these conditions.

Threats

Threats to *T. helvelloides* are actions that remove coniferous forests, such as logging, development, and related activities (ORBIC 2004). Extensive habitat alteration could affect the species such that it needs decades to recover and be able to fruit. Clear-cutting across seasonal streams and in riparian areas may also threaten the species (Holthausen et al. 1994). Other specific threats to the species are not currently known.

Management Recommendations

As a Category D S&M species, the direction from the 2001 ROD is to manage high priority sites to provide a reasonable assurance of species persistence (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *T. helvelloides*:

- As a litter saprobe, *T. helvelloides* may be associated with forest litter, duff or debris. To provide a reasonable assurance of the continued persistence of occupied sites consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.31.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *T. helvelloides* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table TRHE-1 shows the total number of known sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 383 observations from BLM and Forest Service geodatabases were converted into 318 sites in the NSO range (region). Table TRHE-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table TRHE-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure TRHE-1 displays the regional distribution of the species across NFS lands, Figure TRHE-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure TRHE-3 displays the species' regional distribution as well as the extent of coniferous and mixed hardwood-coniferous forests and LSOG forests below 6,500 feet msl on BLM and NFS lands.

TABLE TRHE-1

Number of *Tremiscus helvelloides* Sites (2017)

Location*	Number of Sites
Regional Area	318
Local Area	155
Analysis Area (Project Area)	8 (8)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE TRHE-2

Distribution of *Tremiscus helvelloides* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	62	4	1
BLM	239	153	7
NPS	3	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	62	27	2

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE TRHE-3

Distribution of *Tremiscus helvlloides* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	4	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	3	-	-
Congressionally Reserved (CR)	**11**	**-**	**-**
Late Successional Reserve (LSR)	**22**	**1**	**1**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**2**	**-**	**-**
Managed Late Successional Area (MLSA)	2	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	23	3	-
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	1	-	-
Congressional Reserve	**-**	**-**	**-**
District Designated Reserve	**79**	**52**	**4**
Harvest Land Base	139	98	5
Late Successional Reserve	**116**	**71**	**6**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**110**	**66**	**2**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Tremiscus helvelloides is widely distributed across 11 physiographic provinces in Washington (Olympic Peninsula, and Western and Eastern Cascades), Oregon (Coast Range, Willamette Valley, Cascades East and West, and Klamath Mountain), and California (Coast, Cascades, and Klamath). Most sites are found along the Cascade Range and Klamath Mountains, where the sites tend to be clustered or relatively close to one another in groups in Oregon, and the species appears to be locally abundant in parts of southern Oregon. Sites are scattered in the Coast Range and

other outlying areas. Although *T. helvelloides* appears to be widespread, its distribution is scattered across the region with few clusters of sites in the Cascade Range despite the widespread distribution of forests that may provide suitable habitat, and the species does not appear to be well distributed within its range in the NSO range.

Sixty-two of 318 known sites are at least partially located on private, state, or other lands; three sites are on NPS lands (Mount Rainier, Redwood, and Olympic National Parks); 239 sites are at least partially located on BLM lands; and 62 sites are at least partially located on NFS lands across the region. Sites included on the National Forests that encompass the project area include 14 sites on the Umpqua National Forest and six sites on the Rogue River-Siskiyou National Forest. The remainder of the sites on NFS lands are on the Deschutes, Gifford Pinchot, Klamath, Mendocino, Mt. Baker-Snoqualmie, Mt. Hood, Olympic, Shasta-Trinity, Six Rivers, Okanogan-Wenatchee, and Willamette National Forests.

Across the NSO range, 34 sites are at least partially located in reserve lands managed by the Forest Service, including 22 in LSRs, two in Known Owl Activity Centers, and 11 in Congressionally Reserved areas. This represents 55 percent of the total NFS sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 99 sites are entirely in BLM reserve lands in the region, representing 41 percent of the total number of BLM sites in the region. While the 99 sites in BLM reserves and the three NPS sites are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management and National Park Management.

Tremiscus helvelloides is more commonly found in LSOG forests based on available data (262 of 318 total sites are in LSOG), but it is relatively common in non-LSOG forests and has also been found in younger forests along trail sides. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous forests below about 6,300 feet msl and has been documented in most of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous and mixed hardwood-coniferous forests below 6,500 feet msl, including the LSOG component of these forests, across the NSO range could provide habitat for *T. helvelloides* and support additional sites. These forests encompass an estimated 18.8 million acres on BLM and NFS lands in the region, including an estimated 11.2 million acres in reserve land allocations (60 percent of the forests; Table TRHE-4). Of this acreage, an estimated 6 million acres are LSOG (see Figure TRHE-3), including 4 million acres in reserve land allocations (66 percent of the forests). Although coniferous and mixed hardwood-coniferous forests below 6,500 feet msl are widespread across the region, LSOG forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

TABLE TRHE-4

Extent of Forests That Could Provide Habitat for *Tremiscus helvelloides* on NFS and BLM Lands a/

Location	Coniferous and Mixed Forests below 6,500 feet		LSOG Forests below 6,500 feet	
	Total	**Reserves**	**Total**	**Reserves**
Regional Area	18,755,938	11,200,037	6,005,893	3,960,825
Local Area	575,628	373,751	182,829	134,355
Project Area	1,419	982	324	231

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

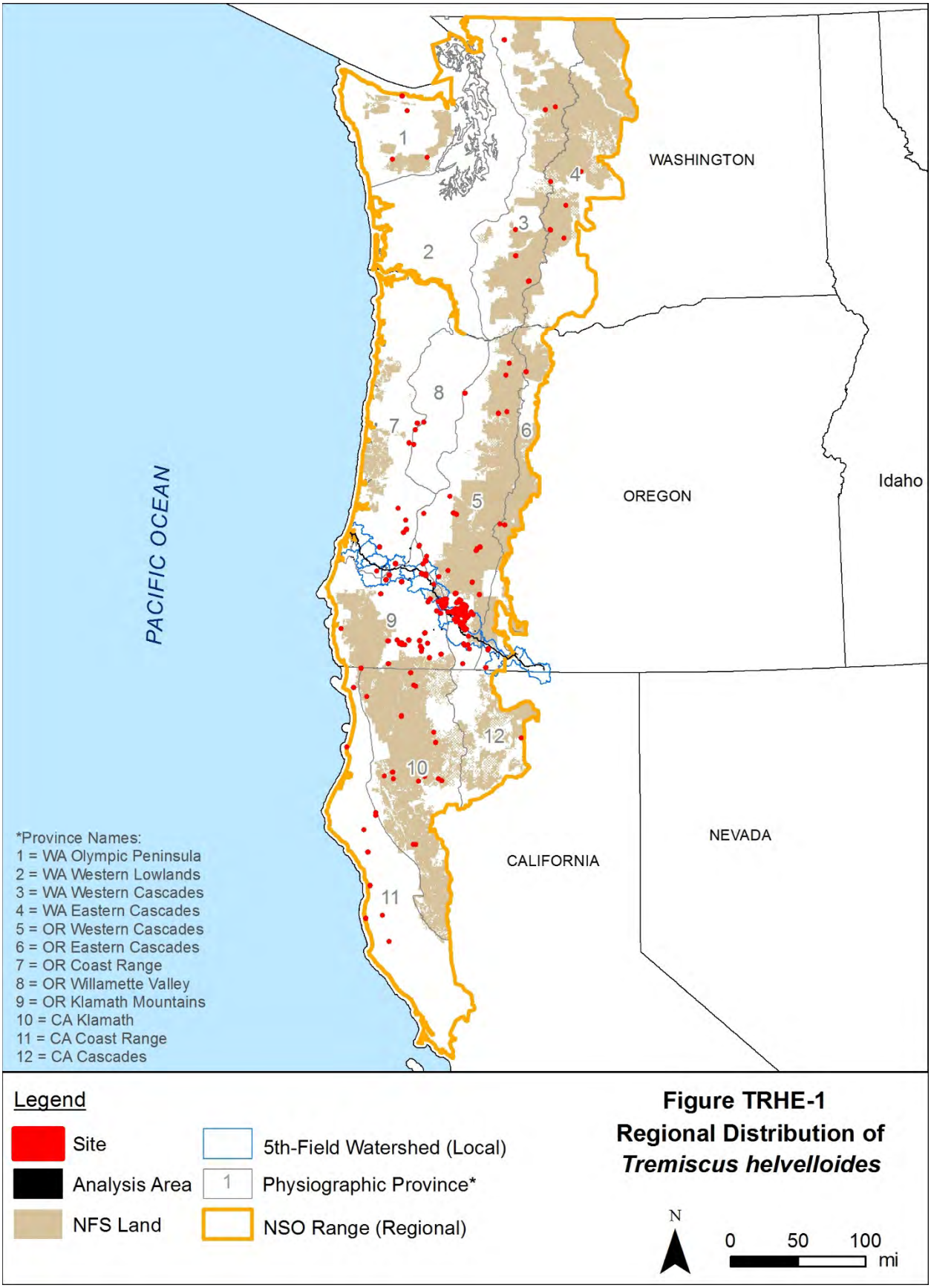


Figure TRHE-1
Regional Distribution of *Tremiscus helvelloides*

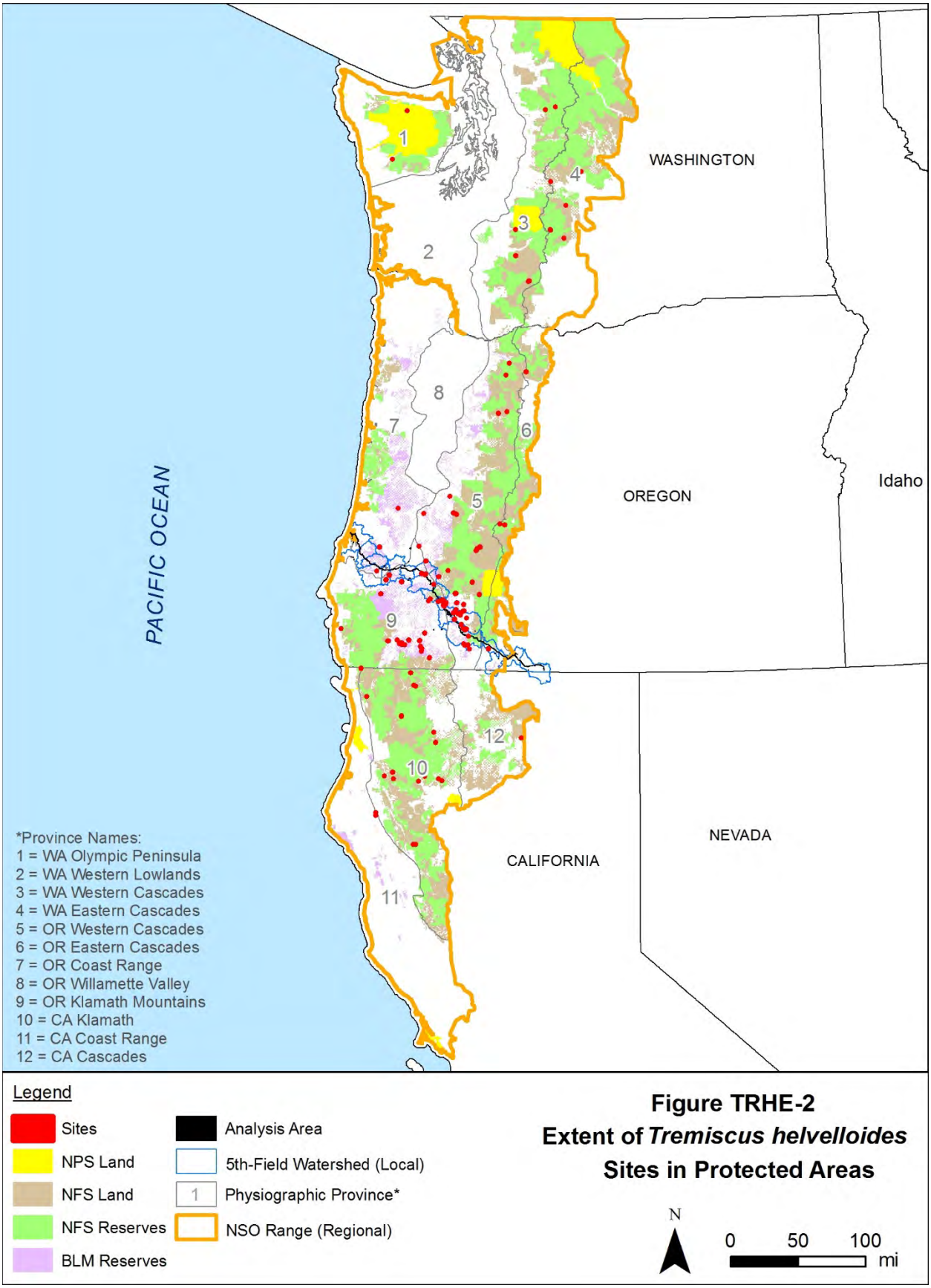


Figure TRHE-2
Extent of *Tremiscus helvelloides* Sites in Protected Areas

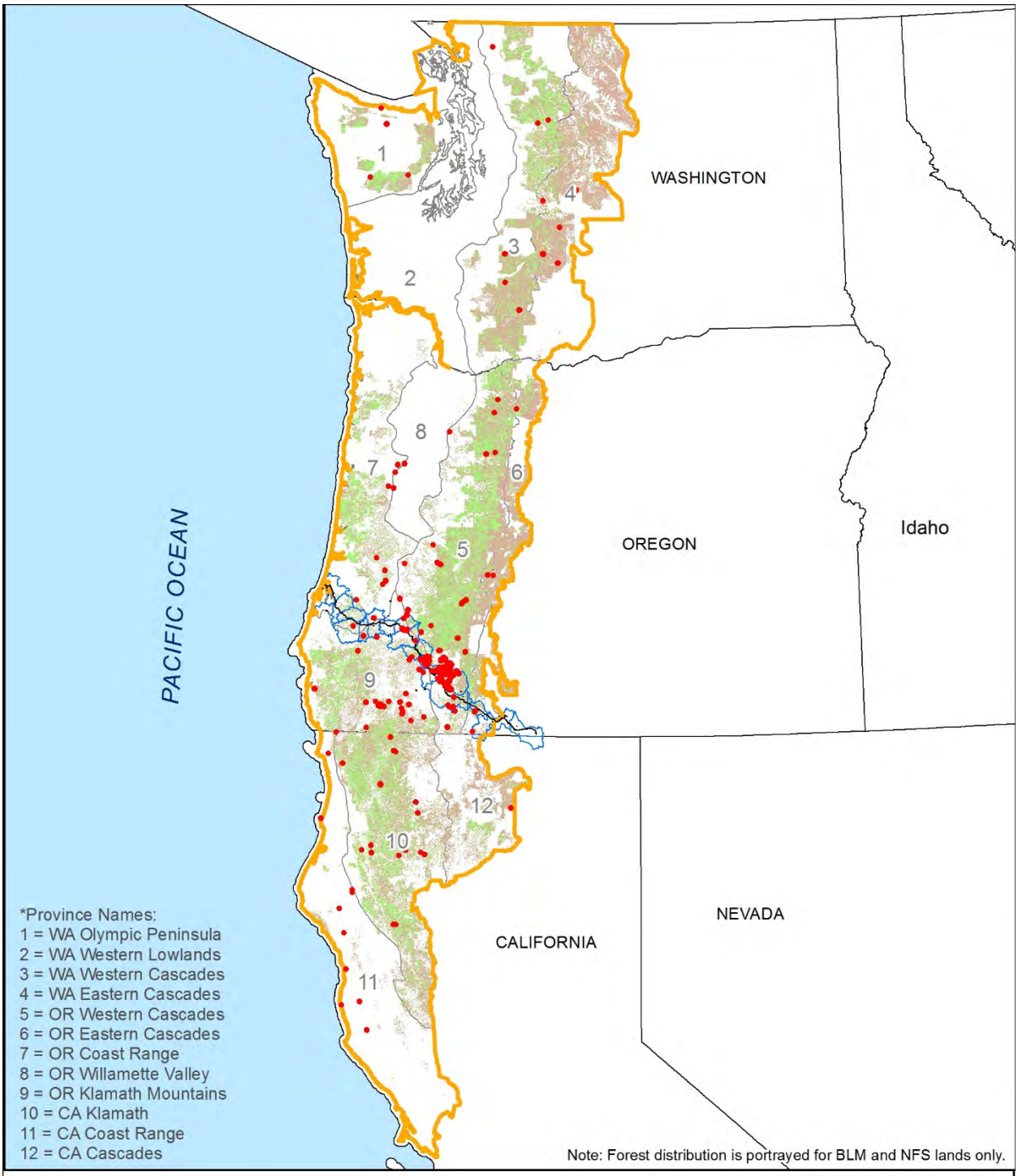


Figure TRHE-3
Potential Habitat For
Tremiscus helvelloides

Local Distribution

Within the local area, *T. helvelloides* is distributed across 10 5th-field watersheds that overlap the project area (see Table TRHE-5 and Figure TRHE-3). Some sites appear more scattered than others, while multiple clusters of sites are found in the Myrtle Creek, South Umpqua River, Big Butte Creek, and Little Butte Creek watersheds. Across these watersheds, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous and mixed hardwood-coniferous forests, and opportunities for dispersal exist within the local area and to nearby regional areas. Many regional sites are located entirely in BLM reserves or on NFS lands within 20 miles to the north in the Coast Range and to the south in the Klamath Mountains. A large group of sites, mainly entirely in BLM reserves, is located within 10 miles to the north in the Cascade Range.

TABLE TRHE-5

Distribution of *Tremiscus helvelloides* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	70	-	49
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	27	1	25
Lower Coquille River (743)	-	-	-
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	4	-	4
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	10 a/	-	10
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	1	-	1
Rogue River-Shady Cove (818)	4	-	4
South Umpqua River (781)	7 a/	-	7
Spencer Creek (865)	2	-	1
Trail Creek (804)	29	-	26
Upper Cow Creek (801)	3	-	1

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.
Site counts are not additive because some sites occur in multiple watersheds and the counts overlap, as noted below:
a/ Two sites are on both Myrtle Creek and South Umpqua River watersheds.

Of the 155 sites in the local area, four are on NFS lands. One of these sites is located on an LSR and the other three are on lands designated as Other (Matrix). Twenty-seven sites are located partially on private lands and 153 sites are at least partially located on BLM lands. Of the sites in the local area, one site is entirely in an NFS reserve (LSR) and 55 sites are located entirely in BLM reserves (LSRs, Riparian Reserves, and District Designated Reserves), representing 36 percent of the NFS and BLM sites in the local area.

Coniferous and mixed hardwood-coniferous forests encompass approximately 575,628 acres on BLM and NFS lands in the local area, with 373,751 acres in reserve land allocations (65 percent of the forests). Of this acreage, an estimated 182,829 acres are LSOG, including 134,355 acres in reserves (73 percent of the forests). Other sites may also exist in the local area where surveys have not been completed, based on the number of sites in the local area, distribution of those sites, and the extent of forests that may provide suitable habitat (see Figures TRHE-3 and TRHE-4).

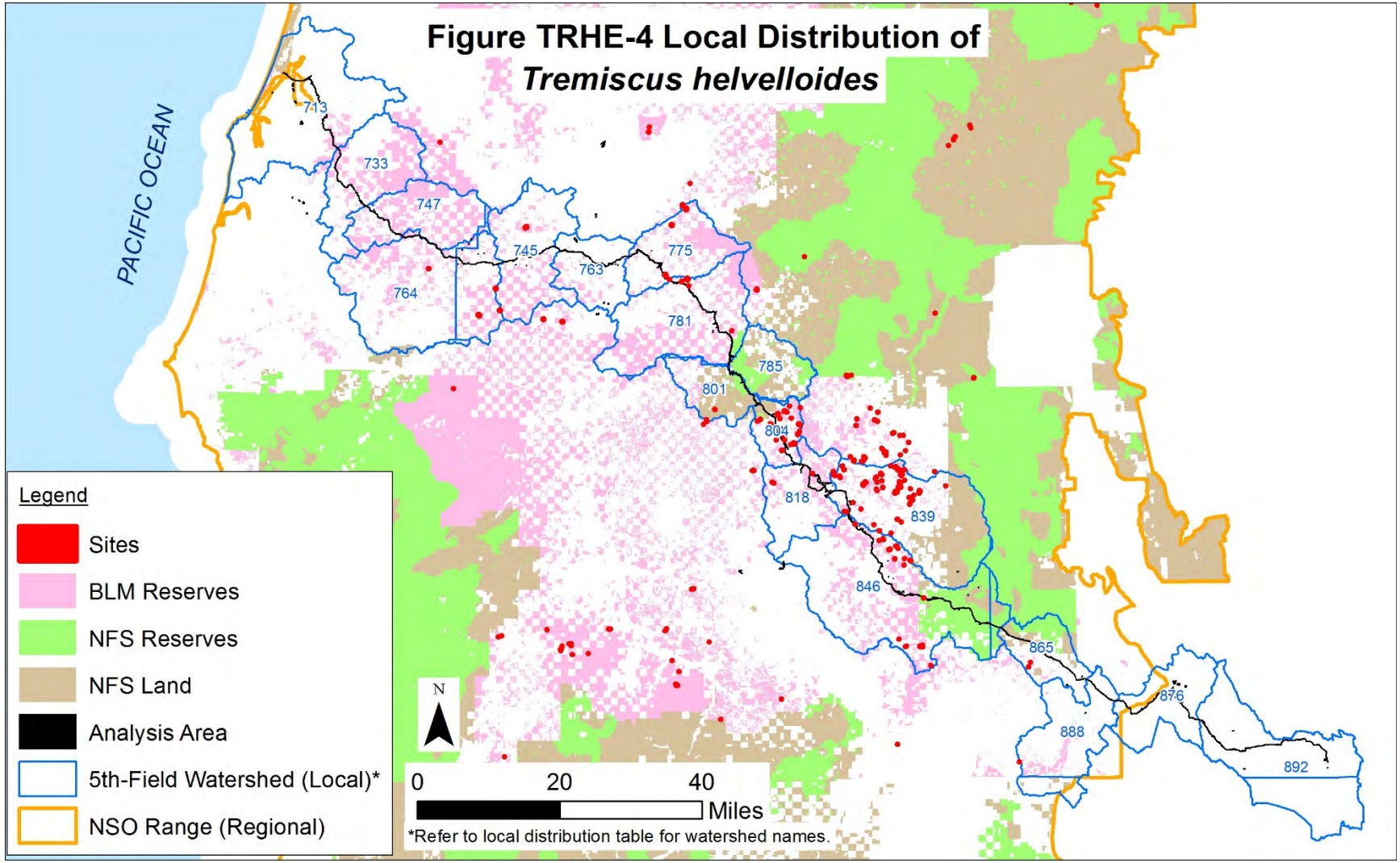


Figure TRHE-4 Local Distribution of
Tremiscus helvelloides
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis and project areas contain eight sites of *T. helvelloides*. The sites are found in five 5th-field watersheds (Little Butte Creek, Myrtle Creek, Rogue River-Shady Cove, South Umpqua River, and Trail Creek watersheds). Several sites are located within the immediate vicinity of the analysis area (see Local Distribution discussion above).

The site on NFS land in the analysis area is on an LSR. Two sites are at least partially located on private land, and seven sites are at least partially located on BLM land, two of which are located entirely in reserves.

Surveys for the PCGP Project resulted in 37 total observations of the species in 28 locations in or near the project area during 2010–2011 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These recorded observations along with data from other agency databases comprise the eight sites in the analysis area. Within the project area, three sites are between MPs 82.8 and 86.8, one site is near MP 125.2, one site is near MP 136.8, and one sites is near MP 154.6. The remaining two sites are located along proposed access routes between MPs 113.5 and 114 and are the result of data from other agency databases.

Project Impacts

Analysis

The PCGP Project would affect one site out of the 62 sites on NFS lands in the region, representing approximately 2 percent of the sites. Impacts on sites on other land ownerships include seven sites affected on BLM lands. The total number of sites affected is eight sites out of the 318 total sites on all lands. Table TRHE-6 presents an overview of the features of the PCGP Project that would affect the *T. helvelloides* site on NFS lands. The construction corridor and associated work and storage areas would affect approximately 1.1 acres within one site (about 29 percent of the site). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *T. helvelloides* in and near the project area.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 0.8 acre of vegetation and soil within one site and could result in the removal of *T. helvelloides* populations or individuals. The establishment of the corridor could modify microclimate conditions around populations or individuals adjacent to the corridor. The removal of forests and woody debris and disturbance to soil could negatively affect *T. helvelloides* in adjacent areas by removing its habitat, disturbing soil or duff around trees, and affecting its association with woody debris, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat conditions as a result of the corridor and TEWAs could make habitat within the site no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Material

storage within UCSAs would disturb about 0.4 acre of understory habitat in one site, which could modify microhabitats near extant populations or individuals, potentially making the habitat no longer suitable for the species

TABLE TRHE-6

Impacts to *Tremiscus helvelloides* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	1	0.8 ac
Temporary Extra Work Area (TEWA)	-	-
Uncleared Storage Area (UCSA)	1	0.4 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

Across the project area, the PCGP Project would remove an estimated 1,142 acres of coniferous and mixed hardwood-coniferous forests below 6,500 feet msl, including 249 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *T. helvelloides*. Within this impact area, about 567 acres (about 50 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of an estimated 246 acres of coniferous and mixed hardwood-coniferous forests below 6,500 feet msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous and mixed forests below 6,500 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the single site on NFS lands as a result of the PCGP Project, three sites of *T. helvelloides* would remain on NFS lands in the local area (none in reserves), and 61 sites, including 33 in reserves, would remain on NFS lands in the NSO range. An additional 53 sites would remain entirely in BLM reserves in the local area and 97 sites would remain entirely in reserves in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but the sites on NFS lands would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 33 sites in NFS reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. While the sites on BLM lands are not subject to S&M Standards and Guidelines protections, the remaining 53 sites entirely in reserves would likely receive some level of protection under BLM management. Based on these site counts, approximately 45 percent of the remaining *T. helvelloides* sites on BLM and NFS lands in the NSO range would be protected in reserves.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states “instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision” (Standards and Guidelines, pg. 4). The Forest Service has embraced this

approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Tremiscus helvelloides* is a Category D (uncommon) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category D species are not likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information since the species was listed in the 2001 ROD indicates that the species appears to be more common than previously documented, as noted below:

  - *Tremiscus helvelloides* has a wide distribution across 11 physiographic provinces and three states in the region and a moderate-high number of overall sites (62 on NFS lands, 318 on all lands). The species has a scattered distribution across its range in the NSO range. The currently known number of sites on BLM and NFS lands is an increase of 212 sites since 2007, with many sites documented during the PCGP Project surveys.

  - An estimated 45 percent of the sites (133 sites) are in reserves, which is an increase of about 101 sites in reserves since 2006 per Molina (2008).

- Coniferous and mixed hardwood-coniferous forests below 6,500 feet msl (general habitat for the species) are widespread across the region and encompass approximately 18.8 million acres on BLM and NFS lands with an estimated 60 percent in reserves. Most of the forests are found in the Cascade Range and Klamath Mountains, where most sites are documented. The Coast Range and other areas also contain coniferous and mixed forests, but sites are more scattered in these areas. A subcomponent of these forests likely provides habitat for *T. helvelloides*.

- The PCGP Project would affect one of 62 Forest Service-managed sites of *T. helvelloides*, representing approximately 2 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the single site, a moderate-high number of sites (61) would continue to be documented on NFS lands in the region with a wide distribution across Washington, Oregon, and California. Three sites would remain on NFS lands in the local vicinity of the analysis area. An additional 97 sites would remain entirely in BLM reserves in the NSO range and 53 sites would remain entirely in BLM reserves in the local area. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would affect site persistence at one site in LSRs, but the percentage of sites in NFS reserves would be about the same (55 percent). Of the remaining sites, 24 are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and 11 sites are in Congressionally Reserved areas where management activities that may adversely affect *T. helvelloides* are unlikely. A total of 97 sites would remain entirely within BLM reserves across the region, including LSRs where management actions are restricted to those activities that benefit LSOG forests, District Designated Reserves where management activities that may adversely affect *T. helvelloides* are unlikely, and Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species.

- The PCGP Project would result in a permanent loss of an estimated 246 acres of coniferous and mixed hardwood-coniferous forests below 6,500 feet msl (less than 1 percent of the total regional acreage). An estimated 11.2 million acres (60 percent) of coniferous and mixed forests and 4 million acres (66 percent) of LSOG forests below 6,500 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *T. helvelloides*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. This is a Category D species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

2.31.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *T. helvelloides* at one site on NFS lands and seven sites on BLM lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 61 sites would remain on NFS lands across the region, and three sites would remain on NFS lands in the local area. An additional 97 sites would remain entirely in BLM reserves across the region and 53 sites would remain entirely in BLM reserves in the local area. Although the PCGP Project would affect site persistence of *T. helvelloides* at one site on NFS lands, this site is a part of the many sites in the northern Klamath Mountains and southern Cascade Range in Oregon where the species is locally abundant. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Tremiscus helvelloides* would persist in the region without considering the single NFS site as part of the population.

- The PCGP Project would remove approximately 1,142 acres of coniferous and mixed forests and 249 acres of LSOG forests below 6,500 feet msl (a negligible amount of the forests). An estimated 50 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 11.2 million acres (60 percent) of coniferous and mixed forests and 4 million acres (66 percent) of LSOG forests below 6,500 feet msl would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 1998.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under the current land management plan for the foreseeable future. Additionally, the remaining sites that are entirely in BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is widely distributed.

The PCGP Project would not be able to avoid impacts to all *T. helvelloides* sites in the analysis area, although some individuals or populations within the sites may persist following project implementation. Based on the above conclusions, avoidance of the single *T. helvelloides* site on NFS lands is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plan that applies to the affected site would waive implementation of Management Recommendations for the *T. helvelloides* site affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

3.0 LICHEN SPECIES

3.1 CHAENOTHECA SUBROSCIDA

Chaenotheca subroscida is an epiphytic pin lichen in the Coniocybaceae family and is commonly known as lemondrop whiskers or needle lichen.

3.1.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *C. subroscida* as a Category E (rare) species. ORBIC evaluated *C. subroscida* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and in the 2010 *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2010). In 2010, the species was considered to be between at moderate risk of extinction due to a restricted range, relatively few populations, recent and widespread declines; and uncommon but not rare with some cause for long-term concern due to declines within its global range (G3G4). In Oregon, it was considered to be at moderate risk of extinction due to a restricted range, relatively few populations, and recent and widespread declines (S3). In 2013, the species was considered too common and was removed from the ORBIC lists. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon (it was removed from the Forest Service Sensitive species list in 2011).

3.1.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Little is known about the autecology and reproductive biology of *C. subroscida*, which is thought to grow slowly, reproduce infrequently, and have such low fecundity that reduced populations recover very slowly (Huff 2010a). Despite its slow growth rate, *C. subroscida* appears to be able to disperse and colonize suitable substrates, including isolated locations, once they become available. Dispersal mechanisms may include bird and insect vectors (ORBIC 2004). Calicioid lichens, such as *C. subroscida*, have a crustose thallus and minute stalked fruiting bodies resembling the head of a pin, hence the common name of pin lichen (Huff 2010a).

Range

Chaenotheca subroscida is widespread in cool temperate areas of western North America and northern Europe, including eastern Norway, northern and central Sweden, and Finland (Huff 2010a, ORBIC 2004). It occurs in the Pacific Northwest from California to British Columbia and inland to the Rocky Mountains (Huff 2010a). The species' known range in Oregon based on data available in 2004 was restricted to the NSO range (ORBIC 2004). The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, it was likely similar to the current range, with populations widely distributed across western North America and northern Europe. Local and regional distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported *C. subroscida* from more than 100 element occurrences worldwide and approximately 60 element occurrences in North America in 2004. In the Pacific Northwest, British Columbia had the highest number of occurrences at more than 25, and California, Oregon, and Washington had less than 10 occurrences each (ORBIC 2004). Based on information available in 2004, the species had experienced a population decline across its range since pre-industrial times, correlating to the reduction of old-growth forests. In 2004, *C. subroscida* was considered to be highly vulnerable, primarily because of its slow reproductive process, few documented occurrences, and presumed close association with old-growth forests. It was also considered to be at some risk of extirpation or extinction, based on data available in 2004. The species was found in four locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). The 2007 Final SEIS reported 19 sites on NFS and BLM lands and 19 total sites on all lands in the NSO range (USDA and USDI 2007).

Surveys for S&M lichens were conducted between 2007 and 2016 in the PCGP Project area and within 100 feet of habitat removal (Siskiyou BioSurvey LLC 2008a, 2011a, 2016a [unpublished data]). These surveys targeted Category A, B, and C lichens and other special-status lichens, including *C. subroscida*, and resulted in 14 observations of individuals or populations of *C. subroscida*. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Chaenotheca subroscida is primarily found on conifer bark and occasionally wood in old-growth forests at low to middle elevations, generally less than 6,000 feet msl (Huff 2010a). The lichen is typically found on the bark of *Picea* and *Thuja* species, with less frequent occurrences on the bark of *Abies*, *Pinus*, *Quercus*, and *Betula* species. In the Pacific Northwest, *C. subroscida* has been mostly found on conifers more than 200 years old and occasionally on younger trees (about 150 years old), with occurrences on Douglas-fir, grand fir, and Engelmann spruce. The species prefers substrate away from edge habitat and microclimates with higher humidity and more shade, but protected from direct rainfall (Moen and Jonsson 2003). It is rarely found on decorticated twigs of spruce close to the base. It often occurs in colonies covering only a few square centimeters on a single tree trunk within a stand and then again several hundred meters away (ORBIC 2004). Based on available information, *C. subroscida* is presumed to be restricted to specific microclimate conditions of LSOG coniferous and mixed hardwood-coniferous forests below about 6,000 feet msl.

Threats

Due to the apparent association with old-growth stands and shady, humid microclimate, loss of habitat through timber harvest and stand replacement fire are the principle threats to this species (Huff 2010a). Like other calicioid lichens, the removal of old-growth forests, particularly from

logging practices, has been the principal cause for the species' decline worldwide and in the Pacific Northwest (ORBIC 2004). Removal of old-growth forests has undoubtedly had severe impacts on the number and sizes of populations and on the average dispersal distance necessary to colonize new substrates. Because of its relationship to older forests and its life history, populations can require several years to recover from disturbance. Additionally, logging practices that create small islands of forest are increasing the forest edge effect and negatively impacting *C. subroscida* (Moen and Jonsson 2003).

With the establishment of LSRs and the reduction of logging in old-growth forests in the Pacific Northwest, *C. subroscida* has the potential to recover in the region because of its ability to disperse to appropriate substrates once they are available, even when those substrates are rather isolated (ORBIC 2004). Although little is known about the reproductive and dispersal biology of the species, the species may be able to overcome some habitat fragmentation, presuming habitat is available, and populations may increase as LSRs continue to function and LSOG forests are maintained and enhanced across the Pacific Northwest.

Management Recommendations

For Category E S&M species, the direction under the 2001 ROD is to manage all known sites until a determination can be made regarding which S&M category, if any, the species should be assigned to (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. No specific management recommendations have been developed for *C. subroscida*.

3.1.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *C. subroscida* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table CHSU-1 shows the total number of known sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 487 observations from BLM and Forest Service geodatabases were converted into 396 sites in the NSO range (region). Table CHSU-2 presents the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table CHSU-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure CHSU-1 displays the regional distribution of the species across NFS lands, Figure CHSU-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure CHSU-3 displays the species' regional

distribution as well as the extent of coniferous and mixed hardwood-coniferous forests and LSOG forests below 6,000 feet msl on BLM and NFS lands.

TABLE CHSU-1

Number of *Chaenotheca subroscida* Sites (2017)

Location*	Number of Sites
Regional Area	396
Local Area	126
Analysis Area (Project Area)	14 (14)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE CHSU-2

Distribution of *Chaenotheca subroscida* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	110	7	6
BLM	286	119	8
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	60	22	3

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE CHSU-3

Distribution of *Chaenotheca subroscida* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	1	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	5	-	-
Congressionally Reserved (CR)	**18**	**-**	**-**
Late Successional Reserve (LSR)	**55**	**5**	**4**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**2**	**-**	**-**
Managed Late Successional Area (MLSA)	1	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	40	3	2
Riparian Reserve	**1**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	5	-	-
Congressional Reserve	**-**	**-**	**-**
District Designated Reserve	**96**	**53**	**5**
Harvest Land Base	175	84	5
Late Successional Reserve	**142**	**53**	**2**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**119**	**60**	**3**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Chaenotheca subroscida is widely distributed across seven physiographic provinces in Washington (Western and Eastern Cascades), Oregon (Coast Range, Cascades West and East, and

Klamath Mountains), and California (Klamath) (see Figure CHSU-1). Most sites are found along the Klamath Mountains and Cascade Range in southern Oregon, where sites tend to be clustered and near other sites. Sites in California are found in a small group in the Klamath Mountains, but sites in northern Oregon and Washington are scattered across the Cascade Range. Many opportunities for dispersal between sites appear to exist, particularly in the Klamath Mountains and Cascade Range, based on the proximity of sites to one another and the extent of LSOG forests in the mountain ranges. The species appears to be well distributed in the Klamath Mountains in Oregon based on the abundance and size of sites, proximity of sites to one another, and distribution of sites across forests that may provide suitable habitat in the mountain range.

Sixty of 396 known sites are at least partially located on private lands; 286 sites are at least partially located on BLM lands; and 110 sites are at least partially located on NFS lands in the NSO range. Sites included on the National Forests that encompass the project area include five sites on the Fremont-Winema National Forest, six sites on the Rogue River-Siskiyou National Forest, and one site on the Umpqua National Forest. The remaining sites on NFS lands are on the Deschutes, Gifford Pinchot, Mt. Hood, Six Rivers, Okanogan-Wenatchee, and Willamette National Forests.

Across the NSO range, 73 sites are at least partially located in reserve lands managed by the Forest Service, including 55 in LSRs, two in Known Owl Activity Centers, and 18 in Congressionally Reserved areas (see Figure CHSU-2). This represents 66 percent of the total NFS sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 106 sites are located entirely in reserve lands managed by BLM, which represents 37 percent of the total number of BLM-managed sites in the region. While the 106 sites in BLM reserves are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management.

Chaenotheca subroscida is primarily found in LSOG forests based on available data (318 of 396 total sites are in LSOG), and the lichen is presumed to be restricted to certain subcomponents of LSOG forests based on available life history and habitat information. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous forests below about 5,600 feet msl and has been documented in most of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. LSOG coniferous and mixed hardwood-coniferous forests below 6,000 feet msl across the NSO range could provide habitat for *C. subroscida* and support additional sites. These forests encompass an estimated 5.9 million acres, including 3.9 million acres in reserve land allocations (66 percent of the forests). LSOG coniferous and mixed hardwood-coniferous forests below 6,000 feet msl have a somewhat limited distribution in the region and are primarily found in the Cascade and Coast Ranges and Klamath Mountains. Younger coniferous and mixed forests may provide habitat for the species as they mature and develop suitable habitat conditions over time, and these forests are more widespread across the region (see Figure CHSU-3 and Table CHSU-4).

TABLE CHSU-4

Extent of Forests That Could Provide Habitat for *Chaenotheca subroscida* on NFS and BLM Lands a/

Location	Coniferous and Mixed Forests below 6,000 feet		LSOG Forests below 6,000 feet	
	Total	**Reserves**	**Total**	**Reserves**
Regional Area	18,055,593	10,707,574	5,908,944	3,894,277
Local Area	568,307	369,371	181,349	133,178
Project Area	1,419	982	323	230

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

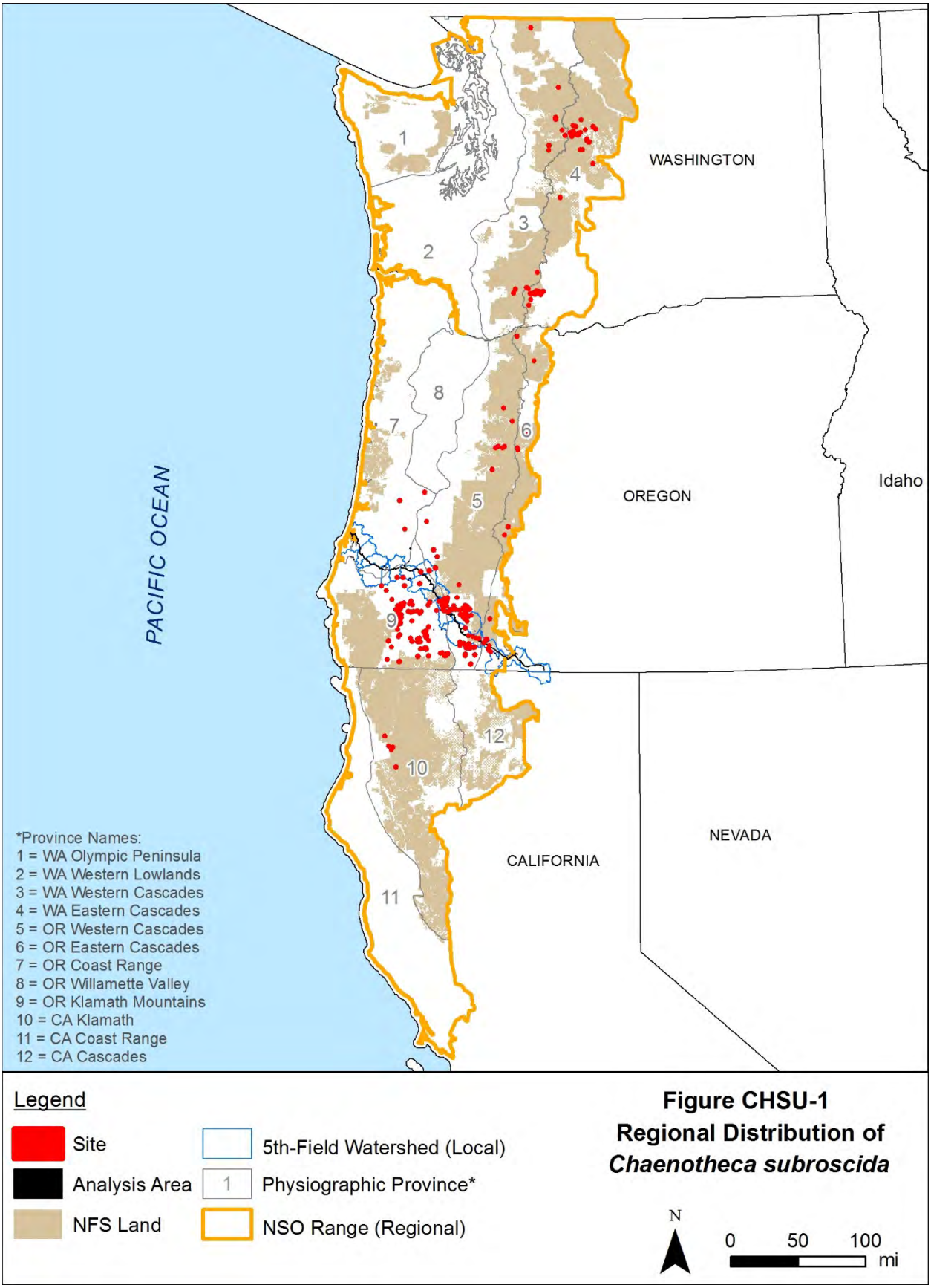


Figure CHSU-1
Regional Distribution of
Chaenotheca subroscida

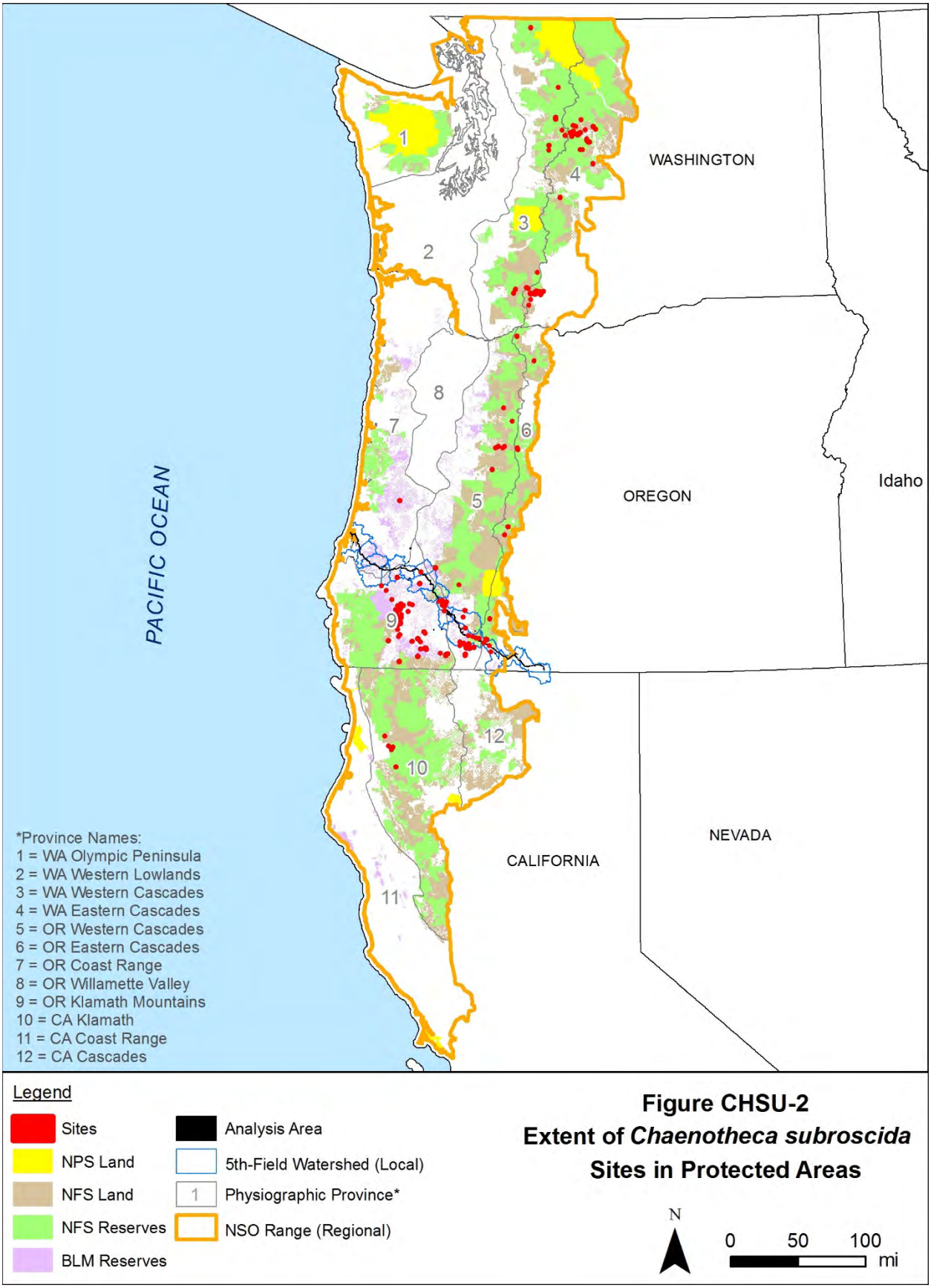
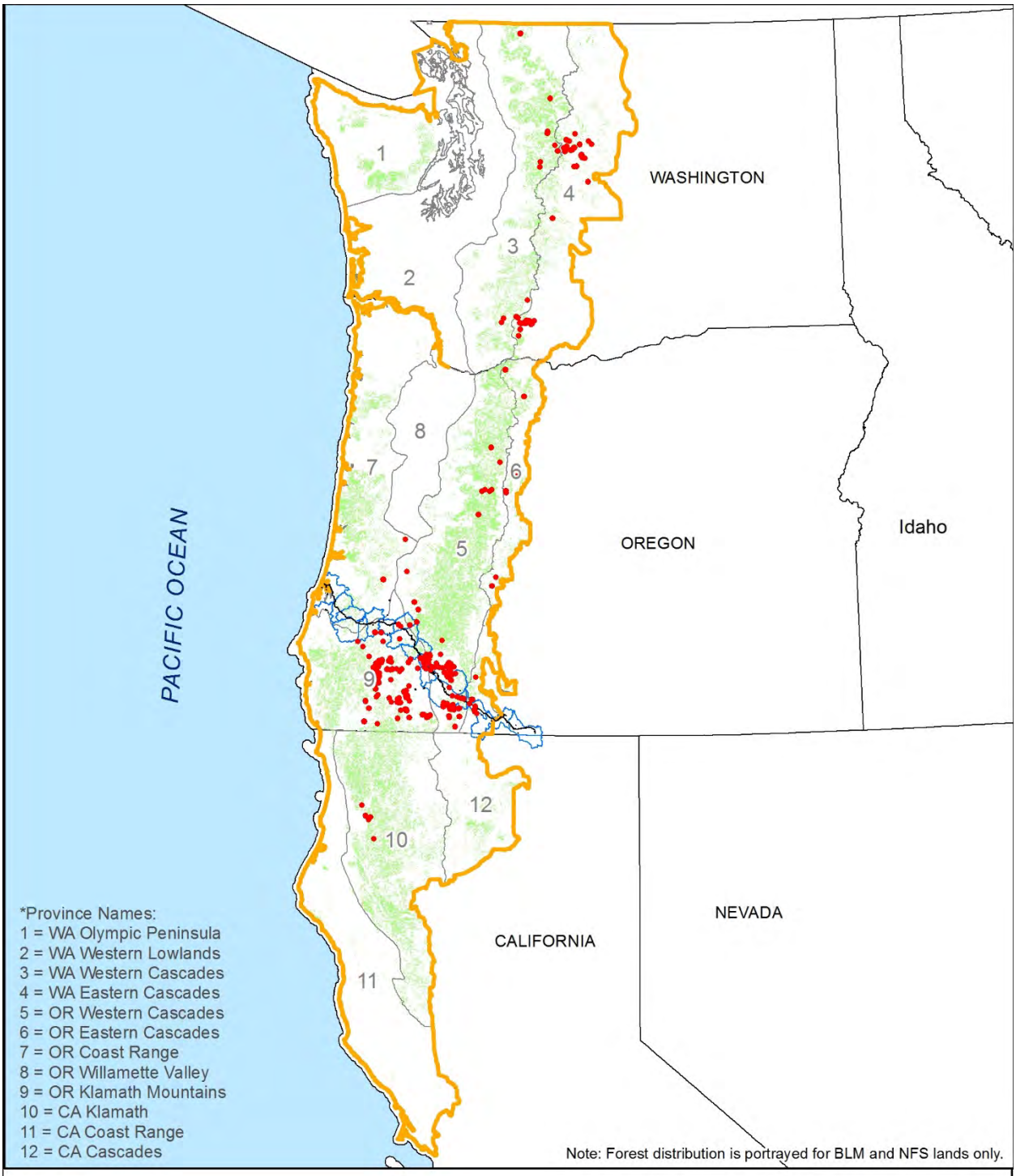


Figure CHSU-2
Extent of *Chaenotheca subroscida* Sites in Protected Areas



Legend

- Site
- Analysis Area
- LSOG Forests Below 6,000 ft
- 5th-Field Watershed (Local)
- 1 Physiographic Province*
- NSO Range (Regional)

Figure CHSU-3
Potential Habitat For
Chaenotheca subroscida

N

0 50 100 mi

Local Distribution

Within the local area, *C. subroscida* is distributed across nine 5th-field watersheds that overlap the project area (see Table CHSU-5 and Figure CHSU-3). The sites in Big Butte Creek, Little Butte Creek, and Trail Creek watersheds are more clustered than sites in the other watersheds. All of the sites appear to have some level of connectivity between them and others in the regional area, with multiple opportunities for dispersal, based on the extent of LSOG coniferous and mixed hardwood-coniferous forests in the watersheds and region. Many sites are located within 15 miles of the local area to the north in the Cascade Range and within 30 miles to the southwest in the Klamath Mountains. While a large proportion of the nearby sites are on BLM lands, several sites are located entirely in BLM reserves.

TABLE CHSU-5

Distribution of *Chaenotheca subroscida* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	40	-	29
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	25	5	20
Lower Coquille River (743)	-	-	-
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	1	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	7	-	7
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	2	-	2
Rogue River-Shady Cove (818)	5	-	4
South Umpqua River (781)	1	-	1
Spencer Creek (865)	7	-	4
Trail Creek (804)	38	-	35
Upper Cow Creek (801)	-	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.

Of the 126 sites in the local area, seven are on NFS lands. These sites are located on lands designated as Other (Matrix) and LSR. Twenty-two sites are partially on private land and 119 sites are at least partially on BLM lands. Of the sites in the local area, five sites are entirely in NFS reserves and 35 sites are entirely in BLM reserves, representing 32 percent of the NFS and BLM sites.

LSOG coniferous and mixed hardwood-coniferous forests below 6,000 feet msl encompass approximately 181,349 acres on NFS and BLM lands in the local area are LSOG, including 133,178 acres in reserves (73 percent of the forests). Other sites may also exist in the local area where surveys have not been completed, based on the distribution of sites in the local area, proximity of other sites in the region, and the extent of forests that may provide suitable habitat (see Figures CHSU-3 and CHSU-4).

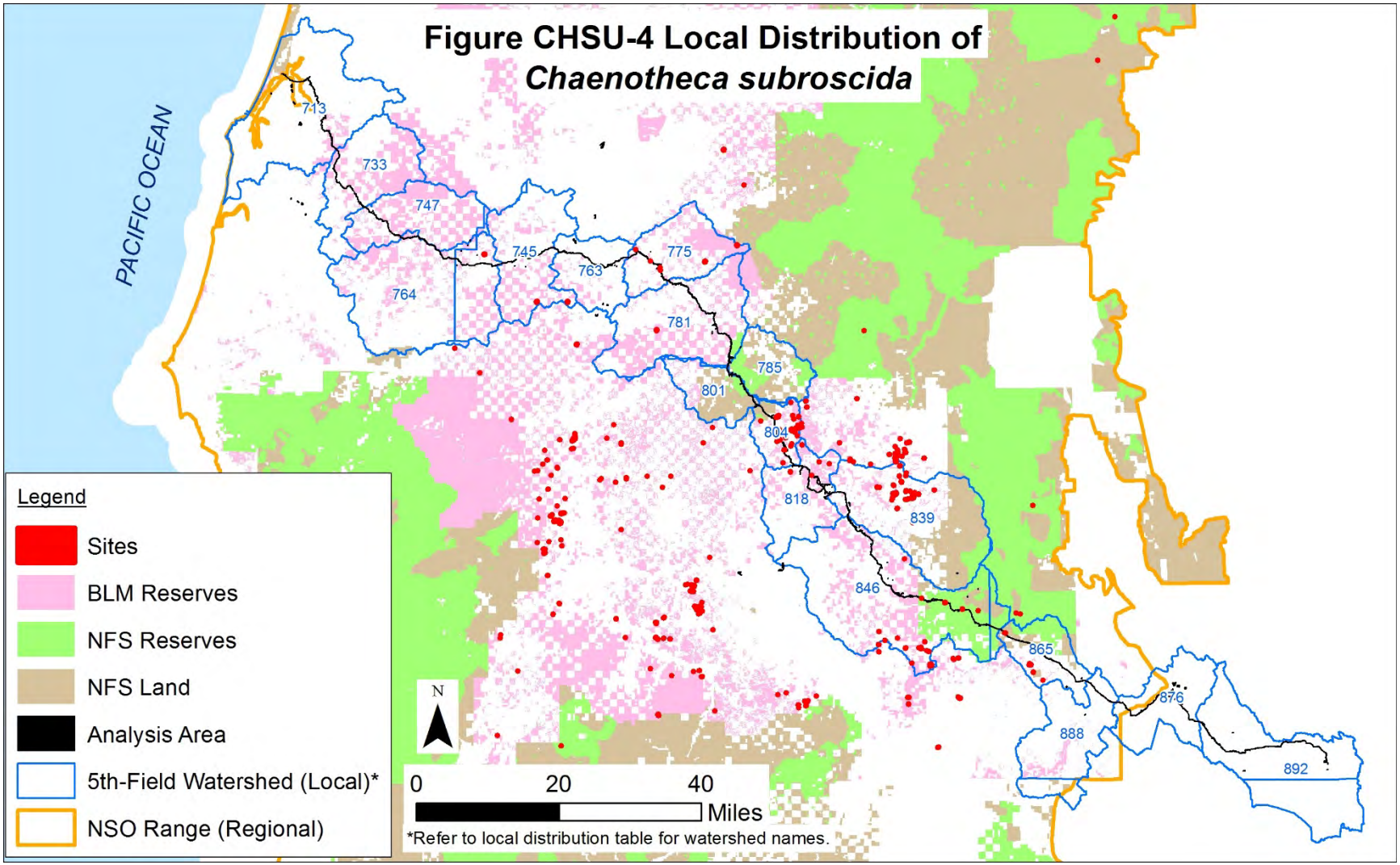


Figure CHSU-4 Local Distribution of
Chaenotheca subroscida
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis and project areas contain 14 sites of *C. subroscida*, six of which are at least partially on NFS lands, on the Fremont-Winema and Rogue River-Siskiyou National Forests. Three sites are partially on private lands and eight sites are at least partially on BLM lands. The analysis area sites are distributed across five 5th-field watersheds near the center of the project area, including the Little Butte Creek, Myrtle Creek, Rogue River-Shady Cove, Spencer Creek, and Trail Creek watersheds. Several sites are located in the immediate vicinity of the analysis area (see Local Distribution discussion above).

The sites on NFS lands in the analysis area are located on lands designated as Other (Matrix) and LSRs. Of the six NFS sites in the analysis area, four sites are entirely in reserve lands. Three of the eight sites on BLM lands in the analysis area are entirely in reserve lands (District Designated Reserves, LSRs, and Riparian Reserves).

Surveys for the PCGP Project resulted in 29 observations of the species in 14 locations (Siskiyou BioSurvey LLC 2008a, 2011a, 2016a [unpublished data]). Nineteen of these recorded observations comprise the 14 sites in the analysis area; the other observations are in sites outside the analysis area.

Project Impacts

Analysis

The PCGP Project would affect six sites out of the 110 sites on NFS lands in the region, representing approximately 5 percent of the sites. Site impacts on other land ownerships include eight sites affected on BLM lands. The total number of sites affected is 14 out of the 396 total sites on all lands. Table CHSU-6 provides an overview of the features of the PCGP Project that would affect the *C. subroscida* sites on NFS lands. The construction corridor and associated work and storage areas would affect approximately 7.7 acres within the sites (about 28 percent of the sites). Measures outlined in Chapter 1 would be implemented to minimize vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *C. subroscida* in and near the project area.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 5.5 acres of vegetation and soils within six sites and could result in the removal of *C. subroscida* populations or individuals on trees that are removed. Disturbance in the TEWAs would result in similar impacts on about 0.9 acre within four sites. The establishment of the corridor could modify microclimate conditions around populations or individuals adjacent to the corridor. The removal of forests and host trees could negatively affect *C. subroscida* in adjacent areas by removing its habitat and potential host trees, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat conditions as a result of the corridor and TEWAs could make habitat within the sites no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project.

Material storage within UCSAs would disturb about 1.3 acres of understory habitat in four sites, which could modify microhabitats near extant populations or individuals, potentially making the habitat unsuitable for the species, but individuals on trees are not likely to be removed or disturbed.

TABLE CHSU-6

Impacts to *Chaenotheca subroscida* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	6	5.5 ac
Temporary Extra Work Area (TEWA)	4	0.9 ac
Uncleared Storage Area (UCSA)	4	1.3 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

Across the project area, the PCGP Project would remove an estimated 125 acres of LSOG coniferous and mixed hardwood-coniferous forests below 6,000 feet msl. These impacts would result in a reduction of habitat that may be suitable for *C. subroscida*. Within this impact area, about 65 acres (about 52 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, but these areas would not return to LSOG conditions for more than 80 years and would not likely provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area and would not provide habitat for the species. The permanent loss of LSOG coniferous and mixed hardwood-coniferous forests below 6,000 feet msl represents less than 1 percent of the total estimated area of these forests across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the six NFS sites as a result of the PCGP Project, one site of *C. subroscida* would remain in reserves on NFS lands in the local area, and 104 sites, including 67 at least partially in reserves, would remain on NFS lands in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but they would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The sites in reserves or portions of sites in reserves are assumed to have additional protections provided by the NWFP Standards and Guidelines in place for those land allocations. Based on these site counts, approximately 60 percent of the remaining *C. subroscida* on NFS lands in the NSO range would be protected in reserves.

The PCGP project may also affect eight sites on BLM lands. Assuming persistence cannot be maintained at these eight sites, 111 sites would remain on BLM lands in the local area, including 32 entirely in reserves, and 278 sites, including 103 entirely in reserves would remain on BLM lands in the NSO range. While sites on BLM lands are not subject to S&M Standards and Guidelines protections, sites in reserves would likely receive some level of protection under BLM management.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead,

common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Chaenotheca subroscida* is a Category E (rare) S&M species throughout the NSO range. Per the 2001 ROD, information on Category E species is insufficient to determine what level of management is needed for reasonable assurance of species persistence. New information received since the species was listed in the 2001 ROD, however, indicates that the species appears to be more common than previously documented, as described below:

  - *Chaenotheca subroscida* has a wide distribution across seven physiographic provinces and three states in the region and a moderate-high number of overall sites (110 on NFS lands, 396 on all lands). The species appears to be well distributed in the Klamath Mountains in Oregon. The currently known number of sites on BLM and NFS lands has increased about 377 sites since 2007, with several sites documented during the PCGP Project surveys.

  - An estimated 45 percent of the sites (179 sites) on federal lands are at least partially in reserves.

- LSOG coniferous and mixed hardwood-coniferous forests below 6,000 feet msl (general habitat for the species) have a somewhat limited distribution across the region and encompass approximately 5.9 million acres on BLM and NFS lands with an estimated 66 percent in reserves. Most of the forests are found in the Cascade Range and Klamath Mountains, where most sites are documented. The Coast Range and other areas also contain LSOG forests, but fewer sites are located in the Coast Range. *Chaenotheca subroscida* is likely restricted to a subcomponent of LSOG coniferous and mixed forests based on available information on its habitat and life history requirements.

- The PCGP Project would affect six of 110 NFS sites of *C. subroscida*, representing approximately 5 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the six sites, a moderate-high number of sites (104) would continue to be documented NFS lands in the region with a wide distribution across Washington, Oregon, and California. One site would remain in the local vicinity of the analysis area with many other sites in the nearby Klamath Mountains. An additional 103 sites would remain entirely in BLM reserves across the region and 33 sites would remain entirely in BLM reserves in the local area. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would affect site persistence at four sites in NFS LSRs, and the percentage of sites in reserves would decrease from 66 to 63 percent. Of the remaining sites on NFS lands, 51 are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and 18 are in Congressionally Reserved areas where management activities that may adversely affect *C. subroscida* are unlikely. A total of 103 sites would remain entirely in BLM reserves, including LSRs where management actions are restricted to those activities that benefit LSOG forests, District Designated Reserves

where management activities that may adversely affect *C. subroscida* are unlikely, and Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian associated species.

- The PCGP Project would result in a permanent loss of an estimated 125 acres of LSOG coniferous and mixed hardwood-coniferous forests below 6,000 feet msl (less than 1 percent of the total regional acreage). An estimated 3.9 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *C. subroscida*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Chaenotheca subroscida* is a Category E species for which pre-disturbance surveys are not applicable and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

3.1.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *C. subroscida* at six sites on NFS lands and eight sites on BLM lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 104 sites would remain on NFS lands across the region, including 69 sites at least partially in reserves, and one site would remain in a reserve on NFS lands in the local area. Additionally, 278 sites would remain on BLM lands across the region, including 103 sites entirely in reserves, and 111 sites would remain on BLM lands in the local area, including 32 sites entirely in reserves. The PCGP project would affect a large proportion of sites on NFS lands in the local area, with six sites affected and only one remaining in the local area. Sites on BLM lands are much more abundant in the vicinity of the analysis area, with many sites located in the Cascade Range and Klamath Mountains in southern Oregon. It is expected that BLM management would enable the majority of the sites in reserves to persist. Due to the significant number of sites remaining on BLM lands in the local area (111 sites), with a moderate proportion located entirely in reserves (33 sites), it can be assumed that many sites would be protected and the species would remain locally abundant. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Chaenotheca subroscida* would persist in the region without considering the 14 sites as part of the population.

- The PCGP Project would remove approximately 125 acres of LSOG coniferous and mixed forests below 6,000 feet msl (a negligible amount of the forests). An estimated 52 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide corridor would be maintained in low-growing vegetation across the project area. An estimated 3.9 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 2007.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely in BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is widely distributed.

The PCGP Project would not be able to avoid impacts to all *C. subroscida* sites in the analysis area, although some individuals or populations within the sites may persist following project implementation. Based on the above conclusions, avoidance of the six *C. subroscida* sites on NFS lands is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plans that apply to affected sites would waive implementation of Management Recommendations for *C. subroscida* sites affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

3.2 LEPTOGIUM TERETIUSCULUM

Leptogium teretiusculum is an epiphytic lichen in the Collemataceae family and is commonly known as shrubby vinyl or terete skin lichen.

3.2.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *L. teretiusculum* as a Category E (rare) species. ORBIC evaluated *L. teretiusculum* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004), and again in the 2010 *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2010). In 2010, the species was considered to be between not rare and apparently secure, but with cause for long-term concer; and widespread, abundant, and secure within its global range (G4G5?) and was considered to be at high risk of extinction due to a restricted range, relatively few populations, recent and widespread declines, or other factors in Oregon (S2?), although the rankings were uncertain. In 2013, the species was considered too common and was removed from the ORBIC lists. It is not considered a BLM or Forest Service Sensitive species in Oregon, but it is a Strategic species under both managements.

3.2.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Relatively little is known about the autecology or reproductive biology of *L. teretiusculum*. It grows as tiny thalli or tufts on the bark of hardwood trees (Huff 2010b). Dispersal is assumed to

be by fragments of isidia on the thalli carried by birds, snails, slugs, wind, and rain. The lichen occurs as epiphytes on trees within riparian areas (Holthausen et al. 1994).

Range

L. teretiusculum has been found across the northern hemisphere in Europe, North America, and Russia (ORBIC 2004). In North America, *L. teretiusculum* occurs in northern states and provinces in the west and east. The species is likely more widespread than currently documented, particularly in the Pacific Northwest, because it is small and inconspicuous, making it difficult to locate. The currently known range of the species within the NSO range based on 2017 data is presented below under Species Distribution.

Although information on the species' historical range is not known, its range was likely similar to the current range, with populations widely distributed across the northern hemisphere. Local and regional distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported *L. teretiusculum* from less than 100 element occurrences in North America in 2004. In the Pacific Northwest, Oregon had the most occurrences (10), and California had two occurrences (ORBIC 2004). In 2004, *L. teretiusculum* was considered to be moderately vulnerable, although it was presumed to be able to recover from disturbance. The species was found in three locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). The 2007 Final SEIS reported 29 sites on NFS and BLM lands and 30 total sites on all lands in the NSO range (USDA and USDI 2007).

For the PCGP Project, surveys for S&M lichens were conducted between 2007 and 2016 in the PCGP Project area and within 100 feet of habitat removal (Siskiyou BioSurvey LLC 2008a, 2011a, 2016a [unpublished data]). These surveys targeted Category A, B, and C lichens and other special-status lichens, and incidental observations of other lichens were documented, although no observations of *L. teretiusculum* were reported. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

L. teretiusculum is found in hardwood stands in riparian areas, particularly in shaded areas where humidity is high (ORBIC 2004, Holthausen et al. 1994). It is more abundant on hardwoods compared to conifers and prefers larger, older trees (Holthausen et al. 1994). It may be associated with mixed conifer and hardwood stands that include a hardwood basal area of 51–70 percent (Martin et al. 2002). East of the Cascade Range, the lichen is found in floodplains with black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), particularly within suboceanic climates. West of the Cascade Range, it is more common on oak (*Quercus* spp.) trees and other hardwoods at low- to mid-elevations. *Leptogium teretiusculum* may prefer specific microclimate conditions of LSOG forests, but it may not be as restricted to these conditions as much as it is restricted to high humidity habitats.

Threats

Disturbance to large, old trees is the primary threat to *L. teretiusculum* (ORBIC 2004). Fire and logging alter shade and moisture regimes in riparian forests and can affect the species (Huff 2010b). The species may recover from disturbance over a period of several years based on its presumed moderate age of maturity, frequency of reproduction, and/or fecundity (ORBIC 2004).

Management Recommendations

For Category E S&M species, the direction under the 2001 ROD is to manage all known sites until a determination can be made regarding which S&M category, if any, the species should be assigned to (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. No specific management recommendations have been developed for *L. teretiusculum*.

3.2.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *L. teretiusculum* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table LETE-1 shows the total number of known sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 304 observations from BLM and Forest Service geodatabases were converted into 267 sites in the NSO range (region). Table LETE-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table LETE-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure LETE-1 displays the regional distribution of the species across NFS lands, Figure LELE-2 displays the extent of known sites located areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure LETE-3 displays the species' regional distribution as well as the extent of all forest types and LSOG forests below 6,000 feet msl on BLM and NFS lands.

TABLE LETE-1

Number of *Leptogium teretiusculum* Sites (2017)

Location*	Number of Sites
Regional Area	267
Local Area	77
Analysis Area (Project Area)	6 (6)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE LETE-2

Distribution of *Leptogium teretiusculum* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	16	2	1
BLM	251	75	5
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	52	18	3

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE LETE-3

Distribution of *Leptogium teretiusculum* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	-	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	-	-	-
Congressionally Reserved (CR)	**1**	**-**	**-**
Late Successional Reserve (LSR)	**8**	**2**	**1**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**-**	**-**	**-**
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	7	-	-
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	4	-	-
Congressional Reserve	**2**	**-**	**-**
District Designated Reserve	**103**	**48**	**4**
Harvest Land Base	122	42	2
Late Successional Reserve	**113**	**21**	**-**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**71**	**28**	**3**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Leptogium teretiusculum is somewhat widely distributed across seven physiographic provinces in Washington (Western and Eastern Cascades), Oregon (Coast Range, Cascades West and East, and Klamath Mountains), and California (Klamath) (see Figure LETE-1). The majority of the sites are clustered in the Klamath Mountains and the southern portion of the Cascade Range in Oregon. Sites in California are scattered in the Klamath Mountains, and sites in Washington are apparently isolated from other sites in the region. Many opportunities for dispersal between sites in the Klamath Mountains and Cascade Range in Oregon appear to exist based on the proximity of sites to one another and the extent of coniferous, mixed hardwood-coniferous, and hardwood forests and riparian corridors within these forests. Other sites are more isolated and appear to have limited connectivity between sites. The species appears to be well distributed in the Klamath Mountains in Oregon based on the abundance and size of sites, proximity of sites to one another, and distribution of sites across forests that may provide suitable habitat in the mountain range.

All 267 known sites in the region are at least partially on BLM (251) and NFS (16) lands. Fifty-two sites are also partially located on private lands. Sites included on the National Forests that encompass the project area include two sites on the Rogue River-Siskiyou National Forest. The remaining sites on NFS lands are located on the Deschutes, Gifford Pinchot, Mt. Baker-Snoqualmie, Mt. Hood, Shasta-Trinity, Six Rivers, and Willamette National Forests.

Across the NSO range, nine sites are at least partially located in reserve lands managed by the Forest Service, including eight sites in LSRs, and one site in a Congressionally Reserved area (see Figure LETE-2). These sites represent 56 percent of the total NFS-managed sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 125 sites are located entirely in reserve lands managed by BLM, which represents 50 percent of the total number of BLM-managed sites in the region. While the 125 sites in BLM reserves are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management. *Leptogium teretiusculum* occurs in riparian areas; thus NFS and BLM designated riparian reserves offers protection of both known sites and the species' preferred habitat.

Leptogium teretiusculum is more commonly found in LSOG forests based on available data (187 of 267 total sites are in LSOG), but it is also found in non-LSOG forests and may be restricted to riparian or high humidity areas of coniferous, mixed-hardwood coniferous, and hardwood forests. Based on current site locations, the species is found in all forest types below about 5,600 feet msl and has been documented in most of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl, including the LSOG component of these forests, across the NSO range could provide habitat for *L. teretiusculum* and support additional sites. These forests encompass an estimated 19.2 million acres on BLM and NFS lands in the region, including an estimated 11.3 million acres in reserve land allocations (59 percent of the forests; Table LETE-4). Of this acreage, an estimated 6.1 million acres are LSOG (see Figure LETE-3), including 4 million acres in reserve land allocations (66 percent of the forests). Although all forests below 6,000 feet msl are widespread across the NSO range, riparian areas of these forests are less common and are scattered across the region.

TABLE LETE-4

Extent of Forests That Could Provide Habitat for *Leptogium teretiusculum* on NFS and BLM Lands a/

Location	All Forests below 6,000 feet		LSOG Forests below 6,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	19,183,086	11,264,423	6,088,524	3,998,501
Local Area	608,824	403,947	184,099	135,653
Project Area	1,536	1,069	326	233

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

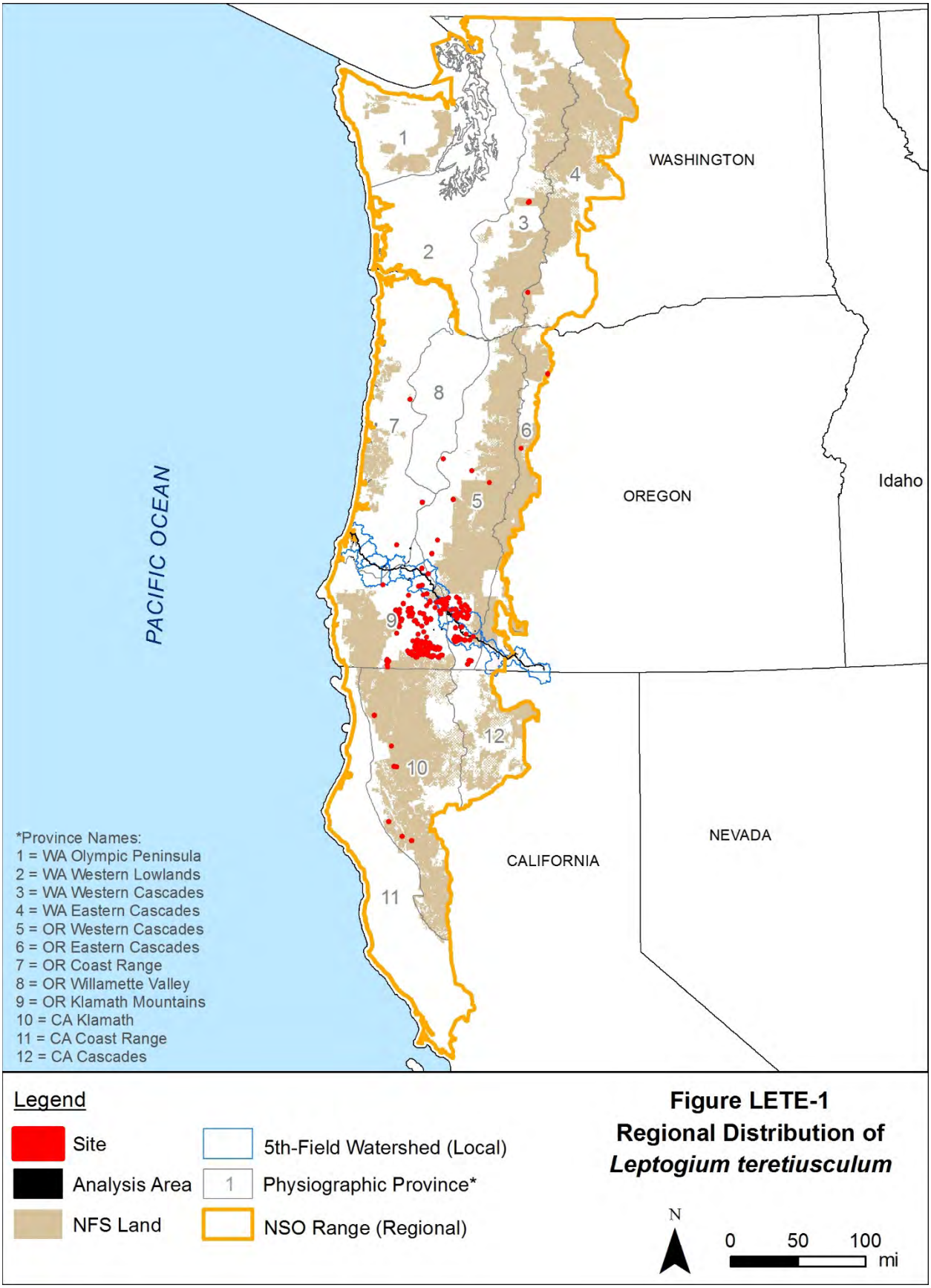


Figure LETE-1
Regional Distribution of
Leptogium teretiusculum

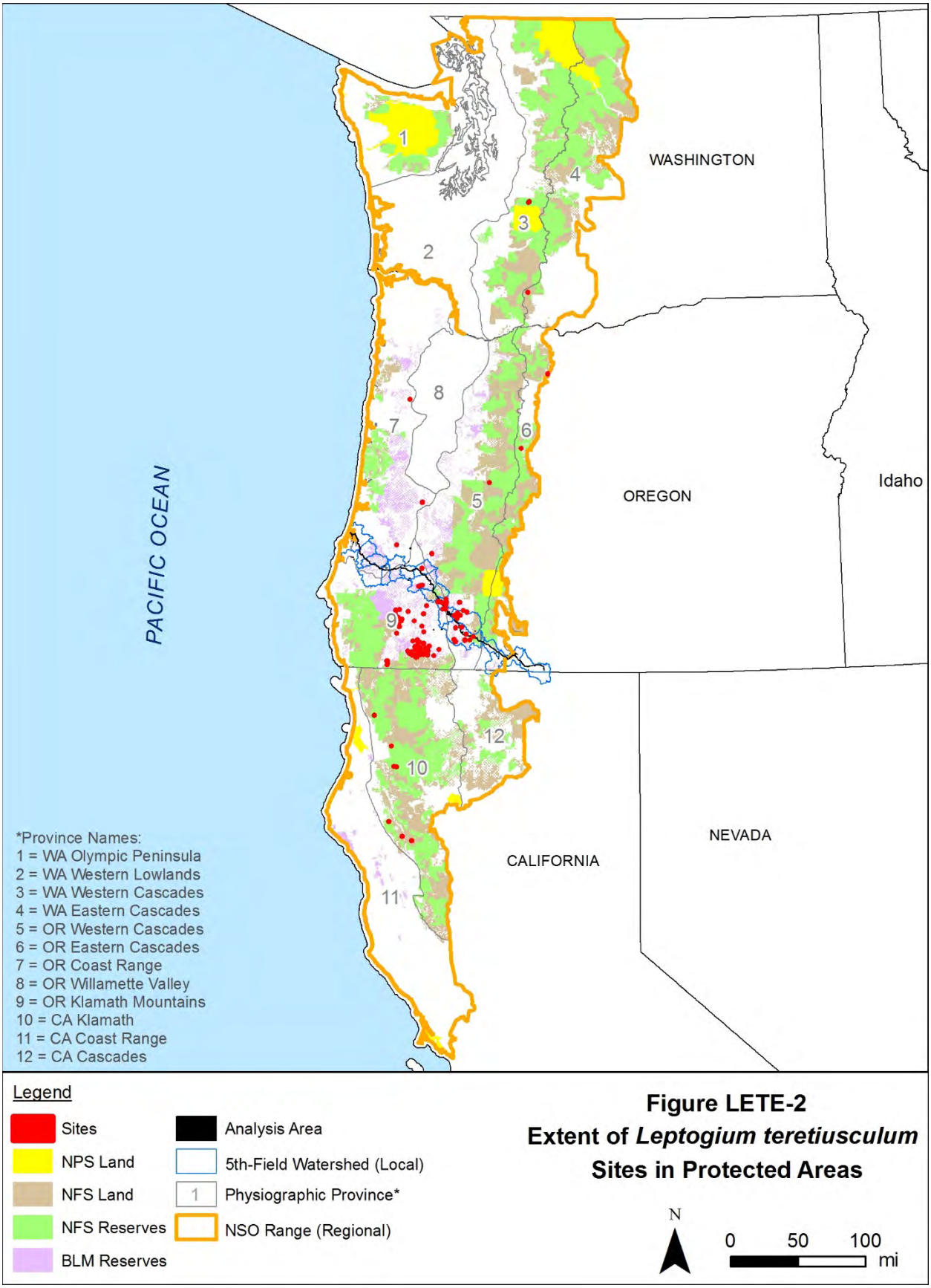


Figure LETE-2
Extent of *Leptogium teretiusculum* Sites in Protected Areas

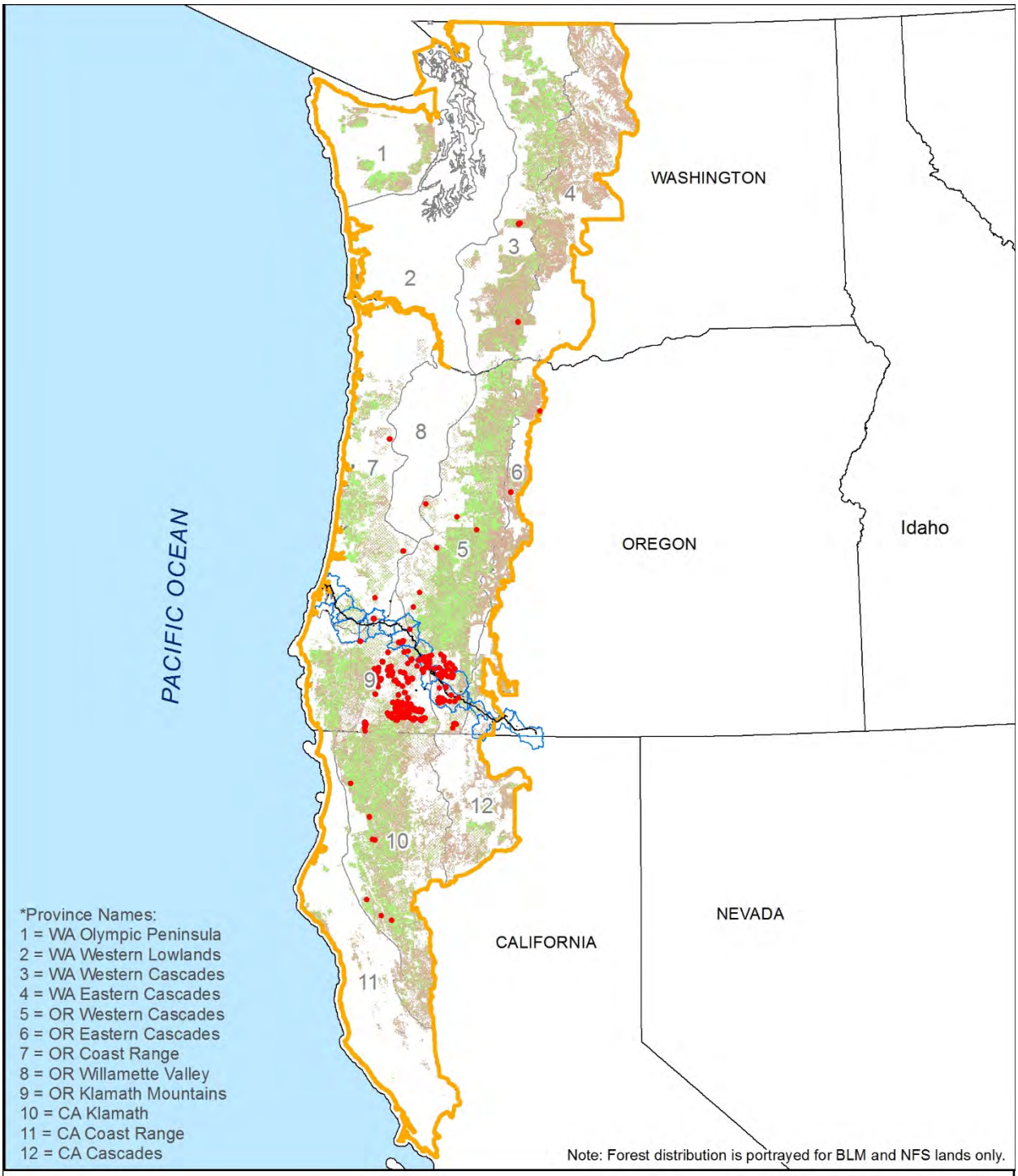


Figure LETE-3
Potential Habitat For
Leptogium teretiusculum

Local Distribution

Within the local area, *L. teretiusculum* is distributed across nine 5th-field watersheds that overlap the project area (see Table LETE-5 and Figure LETE-4). The sites in Big Butte Creek, Little Butte Creek, and Trail Creek watersheds are more clustered than sites in the other watersheds. All of the sites appear to have some level of connectivity between them and others in the regional area, with multiple opportunities for dispersal, based on the extent of all forests below 6,000 feet msl in the watersheds and region. Many sites are located within 12 miles to the northeast in the Cascade Range and within 30 miles to the southwest in the Klamath Mountains. The sites in the vicinity of the local area are located on BLM lands, with a large proportion located entirely in reserves.

TABLE LETE-5

Distribution of *Leptogium teretiusculum* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	19	-	11
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	20	2	16
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	1	-	1
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	2 a/	-	2
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	1	-	1
Rogue River-Shady Cove (818)	6 b/	-	6
South Umpqua River (781)	4 a/	-	4
Spencer Creek (865)	-	-	-
Trail Creek (804)	25 b.	-	25
Upper Cow Creek (801)	1	-	1

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.
Site counts are not additive because some sites occur in multiple watersheds and the counts overlap, as noted below:
a/ One site is in both Myrtle Creek and South Umpqua River watersheds.
b/ One site is in both Rogue River-Shady Cove and Trail Creek watersheds.

Of the 77 sites in the local area, two are on NFS lands. These sites are located on lands designated as LSRs. Eighteen sites are partially on private lands and 75 are at least partially on BLM lands. Of the sites in the local area, two sites are at least partially in NFS reserve lands and 33 sites are entirely in BLM reserve lands, representing 45 percent of the NFS and BLM sites. The two sites on NFS lands in the local area represent the only known sites on NFS lands in southern Oregon, with the nearest sites located approximately 100 miles north and south of the project area, in northern Oregon and northern California, respectively.

Coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl encompass approximately 608,824 acres on BLM and NFS lands in the local area, including 403,947 acres in reserve land allocations (66 percent of the forests). Of this acreage, an estimated 184,099 acres are LSOG, including 135,653 acres in reserve land allocations (74 percent of the forests). Other sites may also exist in the local area where surveys have not been completed, based on the number and distribution of sites in the local area, proximity of other sites in the region, and the extent of forests that may provide suitable habitat (see Figures LETE-3 and LETE-4).

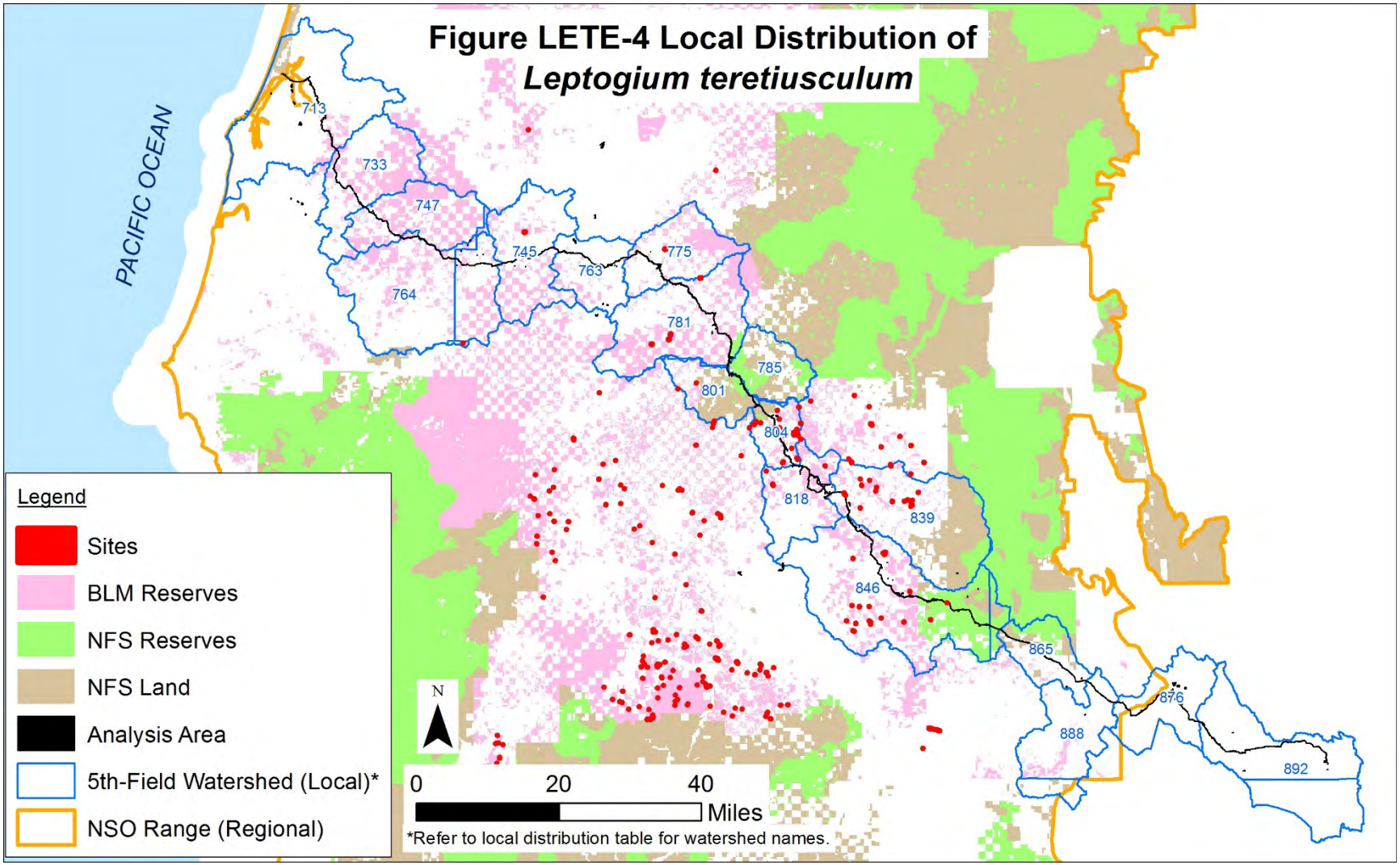


Figure LETE-4 Local Distribution of
Leptogium teretiusculum
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis and project areas contain six sites of *L. teretiusculum*, one of which is on NFS land on the Rogue River-Siskiyou National Forest. Three sites are partially on private lands and five are at least partially on BLM lands. The analysis area sites are distributed across three 5th-field watersheds in the central portion of the analysis area. Several sites are located in the immediate vicinity of the analysis area (see Local Distribution discussion above).

The site on NFS land in the analysis area is located on a LSR. Of the five sites on BLM lands in the analysis area, three are located entirely in reserve lands (District Designated Reserves and Riparian Reserves).

Surveys for the PCGP Project resulted in five observations of the species (Siskiyou BioSurvey LLC 2008a, 2011a, 2016a [unpublished data]). The five observations combined with a recorded observation from 2001 in agency databases comprises the six sites in the analysis area.

Project Impacts

Analysis

The PCGP Project would affect one site of the 16 sites on NFS lands in the region, representing 6 percent of the sites on NFS lands. Site impacts on other land ownerships include five sites affected on BLM lands. The total number of sites affected is six out of the 267 total sites on all lands. Table LETE-6 provides an overview of the features of the PCGP Project that would affect the *L. teretiusculum* site on NFS land. The construction corridor and associated work and storage areas would affect approximately 1.3 acres in the site (about 34 percent of the site). Measures outlined in Chapter 1 would be implemented to minimize vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *L. teretiusculum* in and near the project area.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

TABLE LETE-6

Impacts to *Leptogium teretiusculum* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	1	0.8 ac
Temporary Extra Work Area (TEWA)	1	0.1 ac
Uncleared Storage Area (UCSA)	1	0.4 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 0.8 acre of vegetation and soils within one site and could result in the removal of *L. teretiusculum* populations or individuals on trees that are removed. Disturbance in the TEWAs would result in similar impacts on about 0.1 acre within the site. The establishment of the corridor could modify microclimate conditions around populations or individuals adjacent to the corridor. The removal of forests and host trees could negatively affect *L. teretiusculum* in adjacent areas by removing its habitat and potential host trees, potentially affecting site persistence even if the entire

site is not disturbed. In addition, modification of shading, moisture, and habitat conditions as a result of the corridor and TEWAs could make habitat within the sites no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Material storage within UCSAs would disturb about 0.4 acre of understory habitat in one site, which could modify microhabitats near extant populations or individuals, potentially making the habitat unsuitable for the species, but individuals on trees are not likely to be removed or disturbed.

Across the project area, the PCGP Project would remove an estimated 1,236 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl, including 251 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *L. teretiusculum.* Within this impact area, about 609 acres (about 49 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 261 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of all forests below 6,000 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the single NFS site as a result of the effects of the PCGP Project, one site of *L. teretiusculum* would remain on NFS lands in the local area (in an LSR), and 15 sites, including eight in reserves, would remain on NFS lands in the NSO range. The remaining sites on NFS lands could be affected by natural hazards (e.g., fire, drought), but they would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The eight sites in reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. Based on these site counts, approximately 53 percent of the remaining *L. teretiusculum* on NFS lands in the NSO range would be protected in reserves.

The PCGP project may also affect five sites that are at least partially on BLM lands. Assuming persistence cannot be maintained at these sites, 72 sites would remain on BLM lands in the local area, including 30 entirely in reserves, and 246 sites, including 122 entirely in reserves would remain on BLM lands in the NSO range. While sites on BLM lands are not subject to S&M Standards and Guideline protections, sites in reserves would likely receive some level of protection under BLM management.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Leptogium teretiusculum* is a Category E (rare) S&M species throughout the NSO range. Per the 2001 ROD, information on Category E species is insufficient to determine what level of management is needed for reasonable assurance of species persistence. New information received since the species was listed in the 2001 ROD, however, indicates that the species appears to be more common than previously documented, as described below:

  - *Leptogium teretiusculum* has a somewhat wide distribution across seven physiographic provinces and three states in the region and a moderate number of overall sites (16 on NFS lands, 267 on all lands). The species appears to be well distributed in the Klamath Mountains in Oregon, but has a scattered distribution outside the mountain range with few clusters of sites. The currently known number of sites on NFS and BLM lands is an increase of about 238 sites since 2007.

  - An estimated 50 percent of the sites (134 sites) on federal lands are at least partially in reserves.

- Coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl (general habitat for the species) are widely distributed across the region and encompass approximately 19.2 million acres on BLM and NFS lands with an estimated 59 percent in reserves. Most of the forests are found in the Cascade Range and Klamath Mountains, where most sites are documented. The Coast Range and other areas also contain coniferous, mixed hardwood-coniferous, and hardwood forests, but fewer sites are located in these areas. A subcomponent of these forests likely provides habitat for *L. teretiusculum*.

- The PCGP Project would affect one of 16 NFS sites of *L. teretiusculum*, representing 6 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the site, a low-moderate number of sites (15) would remain on NFS lands in the region. Only one site would remain on NFS lands in the local area (in an LSR), representing the only site remaining on NFS lands in southern Oregon, although many sites on BLM lands and other land ownerships are in the immediate vicinity in the Cascade Range and Klamath Mountains. A total of 122 sites would remain entirely in BLM reserves in the region and 30 sites would remain entirely in BLM reserves in the local area. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would affect one site in an LSR and the percentage of sites on NFS lands in reserves would decrease from 56 to 50 percent. Of the remaining sites on NFS lands, eight are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, and one is at least partially in a Congressionally Reserved area where management activities that may adversely affect *L. teretiusculum* are unlikely. A total of 122 sites would remain entirely in BLM reserves, including LSRs where management actions are restricted to those activities that benefit LSOG forests, District Designated Reserves where management activities that may adversely affect *L. teretiusculum* are unlikely, and Riparian Reserves where management activities are restricted to those activities that benefit the conservation of riparian areas and riparian associated species. The species occurs in riparian areas, thus Riparian Reserves offers protection of the species' sites and preferred habitat.

- The PCGP Project would result in a permanent loss of an estimated 261 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl (less than 1 percent of the total regional acreage). An estimated 11.3 million acres (59 percent) of coniferous, mixed, and hardwood forests and 4 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *L. teretiusculum*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Leptogium teretiusculum* is a Category E species for which pre-disturbance surveys are not applicable and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during strategic and other surveys.

3.2.4 Conclusions

If implemented as proposed, the PCGP Project would affect site persistence of *L. teretiusculum* at one site on NFS lands and five sites on BLM lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 15 sites would remain on NFS lands across the region, including eight at least partially in reserves, and one site would remain on NFS lands in the local area (in an LSR). Additionally, 248 sites would remain on BLM lands across the region, including 122 sites entirely in reserves, and 72 sites would remain on BLM lands in the local area, including 30 entirely in reserves. Although the PCGP Project would affect site persistence of *L. teretiusculum* at one site on NFS lands, this site is near the many sites in the Klamath Mountains in Oregon, where the species is well distributed.

- With project implementation, only one site would remain on NFS lands in southern Oregon, with the nearest sites on NFS lands located approximately 100 miles north and south of the project area. Sites on BLM lands are much more abundant in the vicinity of the analysis area, with many sites located in the Cascade Range and Klamath Mountains in southern Oregon. It is expected that BLM management would enable the majority of the sites in reserves to persist. Due to the significant number of sites remaining on BLM lands in the local area (72 sites), with a large proportion located entirely in reserves (30 sites), it can be assumed that many sites would be protected and the species would remain locally abundant. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *L. teretiusculum* would persist in the region without considering the site as part of the population.

- The PCGP Project would remove approximately 1,236 acres of coniferous, mixed hardwood-coniferous, and hardwood forests and 251 acres of LSOG forests below 6,000 feet msl (a negligible amount of the forests). An estimated 49 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide corridor would be maintained in low-growing vegetation across the project area. An estimated 11.3 million acres (59 percent) of coniferous, mixed, and hardwood forests and 4 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the NSO range.

Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 2007

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely in BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is somewhat widely distributed.

The PCGP Project would not be able to avoid impacts to the *L. teretiusculum* site on NFS land in the analysis area, although some individuals or populations within the site may persist following project implementation. Based on the above conclusions, avoidance of the *L. teretiusculum* site is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plan that applies to the affected site would waive implementation of Management Recommendations for the *L. teretiusculum* site affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near the affected site over the long term. The monitoring plan shall be approved by the Forest Service.

4.0 VASCULAR PLANTS

4.1 CYPRIPEDIUM FASCICULATUM

Cypripedium fasciculatum is a perennial herb in the Orchidaceae family and is commonly known as clustered lady's-slipper, brownie lady's-slipper, or brownie slipper orchid.

4.1.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *C. fasciculatum* as a Category C (uncommon) species across the NSO range. ORBIC evaluated *C. fasciculatum* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and again in its most recent update of the *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2016, the species was considered to be not rare and apparently secure, but with cause for long-term concern, within its global range (G4). In Oregon, it was imperiled because of rarity or other factors that make it vulnerable to extinction (S2). The species is on the ORBIC List 2. It is not considered a BLM Sensitive or Strategic species in Oregon but it is considered a Forest Service Sensitive species in Oregon.

4.1.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

C. fasciculatum is a long-lived perennial orchid that may take multiple years to flower (Vance 2005). When it does flower, it relies on a small predatory wasp for pollination (Lichthardt 2003). It develops symbiotic relationships with specific mycorrhizal fungi to obtain nutrients and in one study was found to only associate with sebacinaceous endomycorrhizal fungi from the Tulasnellaceae family; which maybe a limiting factor to its distribution and habitat preferences (Vance 2005, Shefferson et al 2005). It may take several years of mycorrhizal-supported growth before seedlings accumulate enough stored starch to develop a stem and leaves above ground (Vance 2005). The species can remain dormant below ground for multiple years while receiving moisture and nutrients from mycorrhizal fungi. It returns as a vegetative shoot to reproduce when environmental conditions are favorable and sufficient carbohydrates have been stored.

Unlike most other plant species, *C. fasciculatum* cannot replace damaged new spring growth until the following year after injury is incurred. Plants whose spring growth is injured by fire, late frost, disease, foraging animals, or other damaging events suffer severe impediments to growth and may die (Vance 2005). Plants with low energy reserves may require more than one vegetative growth season before flowering and may remain dormant below the soil. Fire may play an important role in the species' life cycle (Holthausen et al. 1994), as the species tends to inhabit areas that regularly experience low intensity fire (ORBIC 2004).

Range

Cypripedium fasciculatum is found in multiple disjunct ranges in mountainous areas of the western and interior-western United States, from central California to Washington and from the Pacific coast to Colorado and Wyoming (ORBIC 2004, Vance 2005). The species tends to be scattered and widely separated across its range (Vance 2005), although its distribution within each state is sparse and limited (Lichthardt 2003). In California, *C. fasciculatum* has been found in the Santa Cruz Mountains and Coast Range and from the central Sierra Nevada Mountains through the southern Cascade Range and the Klamath Mountains (ORBIC 2004). In Oregon, it has been found in the Cascade and Coast Ranges and Klamath Mountains, as well as in the northern Cascade and Sawtooth Ranges. The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, its range was likely similar to the current range, with populations distributed across western North America. Local distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported *C. fasciculatum* from more than 500 element occurrences across western North America in 2004. In the Pacific Northwest, Oregon had the highest number of element occurrences with 304. California had an estimated 100 element occurrences, and Washington had 59 element occurrences (ORBIC 2004). Based on 2004 information, the species had experienced a short-term decline across its range and in Oregon and was also considered to be at moderate risk of further long-term population decline. *Cypripedium fasciculatum* has many sites in southwest Oregon that have been documented since the 2001 ROD was published. Many of these sites consist of very few individuals, and small sites are often not relocated in subsequent visits such that the numbers of occurrences may not be an adequate representation of numbers of viable populations (Richard Helliwell, Pers. Comm.). The species was not found during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). The 2007 Final SEIS reported 462 sites on NFS and BLM lands and 1,283 total sites on all lands in the NSO range (USDA and USDI 2007).

For the PCGP Project, surveys for special-status plants were conducted between 2007 and 2016 in the PCGP Project area and within 200 feet of habitat removal (Siskiyou BioSurvey LLC 2008a, 2011a, 2016a [unpublished data]). These surveys targeted *C. fasciculatum*, but resulted in no observations of the species. The current estimated number of sites and distribution of the species based on 2017 data are presented below under Species Distribution.

Habitat

In the Pacific Northwest, *C. fasciculatum* is found in a wide array of habitats, including a diversity of soil types, vegetation communities, slopes, and aspects (Vance 2005). The species tends to occur at elevations ranging from 100 to 6,500 feet msl and appears to be strongly associated with Douglas-fir. Habitat ranges from mature coniferous forests to openings and edges of mixed successional forests. The species requires a rich organic humus layer that can support the microfauna associated with its life cycle. It can be damaged by direct sunlight and is generally found in mid-seral to late seral stage forests that have enough structure to allow light to selectively

reach the forest floor (Hoover et al. 2012). In successional forest habitats where tree canopy shading is too spare, *C. fasciculatum* often occurs where it can receive cover from understory vegetation. Localized habitats range from stream banks to forested slopes and areas that have been subject to some level of disturbance, such as roadside ditches or road cuts, but the plant is almost always found under shade from overhanging vegetation. *Cypripedium fasciculatum* may prefer specific microclimate conditions of LSOG forests, but it may not be as restricted to these conditions.

Threats

Primary threats to *C. fasciculatum* are actions that remove the overstory canopy and disturb soil (Lichthardt 2003), including logging, road construction, development, and grazing (ORBIC 2004, Vance 2005). High intensity fires have a strong potential to eliminate populations, especially in areas that have been subject to decades of fire suppression (ORBIC 2004). Localized threats include collection and trampling, particularly in or near campgrounds (Lichthardt 2003). Habitat fragmentation, physical trampling, specimen collection, and fire suppression have led to reductions in habitat and populations (USDA and USDI 2007). In 1995, lady-slipper orchids of the *Cypripedium* genus, including *Cypripedium fasciculatum*, were rated by the World Wildlife Fund to be among the top 10 most sought plants or animals threatened by illegal trade (Seevers and Lang 1998).

Management Recommendations

As a Category C S&M species, the direction under the 2001 ROD is to manage high-priority sites to provide a reasonable assurance of species persistence (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. Management recommendations for *C. fasciculatum* were developed in 1998 and updated in 2005 (Vance 2005). The guidance includes:

- Maintain sufficient cover to avoid any more than intermittent direct solar radiation on *C. fasciculatum* plants.
- Maintain decayed down logs (decay class 4 and 5), snags, and duff layer within the species habitat area for favorable forest floor conditions, habitat, soil moisture and mycorrhizal associates. Where fuel concentrations are within the historic range of variability, provide for future recruitment of coarse woody debris.
- Avoid activities that alter or remove soil, duff, or the organic matter in the species habitat area.
- Manage sites to include entire populations plus an area large enough to maintain current habitat and associated microclimate, primarily temperature and moisture.
- Where fuel concentrations exceed historic range of variability (fuel condition class 2 and 3), treat fuels within and adjacent to the site to reduce risk of high intensity fire.
- Restrict activities within species habitat areas during the species' growing season which ranges from March (or whenever leaves visible) through August (or when capsules split and shed seeds). Growth season can vary from site-to-site and year-to-year and should be checked before activity takes place.

- Because plants do not appear above ground every year, it is important to buffer species locations in order to capture dormant plants.

4.1.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *C. fasciculatum* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table CYFA-1 shows the total number of known sites in the regional (NSO range), local (18 5th field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 1,924 observations from BLM and Forest Service geodatabases were converted into 1,392 sites in the NSO range (region). Table CYFA-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table CYFA-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure CYFA-1 displays the regional distribution of the species across NFS lands, Figure CYFA-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure CYFA-3 displays the species' regional distribution with the extent of coniferous and mixed hardwood-coniferous forests and LSOG forests below 7,000 feet on BLM and NFS lands within the NSO range.

TABLE CYFA-1

Number of *Cypripedium fasciculatum* Sites (2017)

Location*	Number of Sites
Regional Area	1,392
Local Area	48
Analysis Area (Project Area)	2 (2)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE CYFA-2

Distribution of *Cypripedium fasciculatum* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	540	3	1
BLM	833	46	1
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	193	17	1

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE CYFA-3

Distribution of *Cypripedium fasciculatum* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	154	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	24	-	-
Congressionally Reserved (CR)	**9**	**-**	**-**
Late Successional Reserve (LSR)	**174**	**1**	**1**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**15**	**-**	**-**
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	189	2	-
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	6	-	-
Congressional Reserve	**-**	**-**	**-**
District Designated Reserve	**240**	**29**	**1**
Harvest Land Base	374	20	-
Late Successional Reserve	**473**	**15**	**-**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	2	-	-
Riparian Reserve	**425**	**27**	**1**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

C. fasciculatum has a somewhat wide distribution across six physiographic provinces in Washington (Western and Eastern Cascades), Oregon (Cascades West and Klamath Mountains), and California (Klamath and Cascades) (see Figure CYFA-1). Sites are found in two general groups in the Klamath Mountains and Cascade Range in Oregon and California, and the eastern Cascade Range in Washington. Sites are abundant and clustered in southern Oregon and northern California, while the very few sites present in the eastern Cascades in Washington are in one cluster. The species is extremely abundant in the Klamath Mountains and is less abundant in the Cascade Range. Many opportunities for dispersal between sites within each group appear to exist based on the proximity of the sites to one another and the extent of coniferous and mixed hardwood-coniferous forests. The species appears to be well distributed in the Klamath Mountains in Oregon and California based on the abundance and size of sites, proximity of sites to one another, and distribution of sites across forests that may provide suitable habitat in the mountain ranges.

Of the 1,392 known sites in the region, 193 sites are at least partially located on private lands; 833 sites are at least partially on BLM lands, and 540 sites are at least partially on NFS lands across the region. Sites included on the National Forests that encompass the project area include 237 sites on the Rogue River-Siskiyou National Forest and three sites on the Umpqua National Forest. The remaining 303 sites on NFS lands are on the Gifford Pinchot, Klamath, Mendocino, Mt. Baker-Snoqualmie, Shasta-Trinity, and Six Rivers National Forests. Across the NSO range, 198 sites are located in reserve lands managed by the Forest Service, including 174 in LSRs, 15 in Known Owl Activity Centers, and nine in Congressionally Reserved areas (see Figure CYFA-2). These sites represent 37 percent of the total Forest Service-managed sites in the region.

The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 451 sites are located entirely in BLM reserves across the region, which represents 54 percent of the total number of BLM-managed sites in the region. While the sites on BLM lands are not covered under the S&M Standards and Guidelines protections, the sites entirely in reserves likely receive some degree of protection through BLM reserve management.

C. fasciculatum is more commonly found in LSOG forests based on available data (1,203 of 1,392 total sites are in LSOG), but it is also relatively common in non-LSOG forests and has been found in a variety of forest types. Based on current site locations, the species is found primarily in coniferous and mixed forests below about 6,600 feet msl and has been documented in part of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous and mixed hardwood-coniferous forests below 7,000 feet msl, including the LSOG component of these forests, across the NSO range could provide habitat for *C. fasciculatum* and support additional sites. These forests encompass an estimated 19.1 million acres on BLM and NFS lands in the NSO range, including an estimated 11.5 million acres in reserve land allocations (60 percent of the forests; Table CYFA-4). Of this acreage, an estimated 6.1 million acres are LSOG (see Figure CYFA-3), including 4 million acres in reserve land allocations (66 percent of the forests). These forests are widespread across the NSO range.

TABLE CYFA-4

Extent of Forests That Could Provide Habitat for *Cypripedium fasciculatum* on NFS and BLM Lands a/

Location	Coniferous and Mixed Forests below 7,000 feet		LSOG Forests below 7,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	19,107,221	11,459,768	6,054,163	3,990,134
Local Area	579,152	376,674	183,763	135,203
Project Area	1,419	982	323	230

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

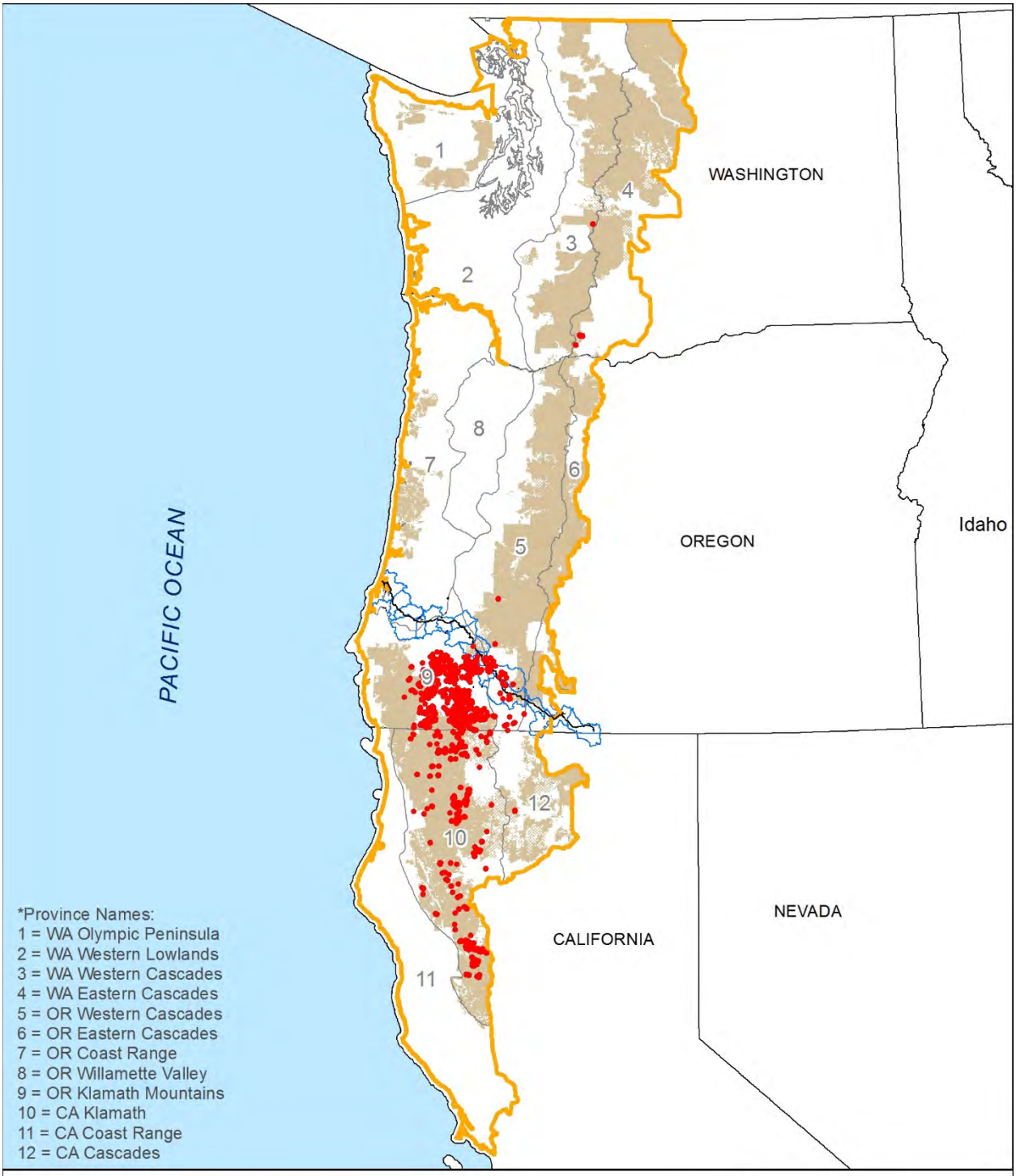


Figure CYFA-1
Regional Distribution of
Cypripedium fasciculatum

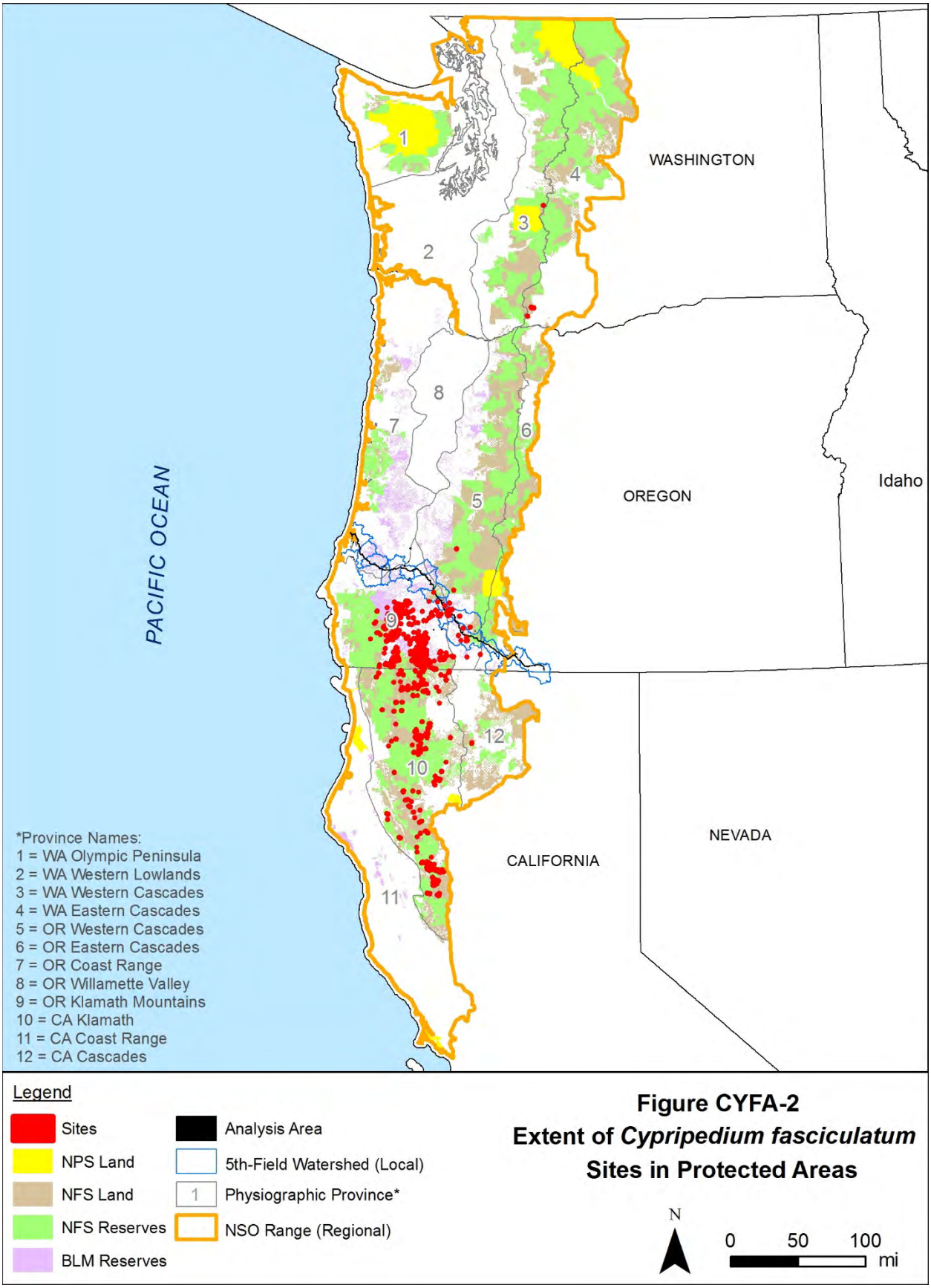


Figure CYFA-2
Extent of *Cypripedium fasciculatum* Sites in Protected Areas

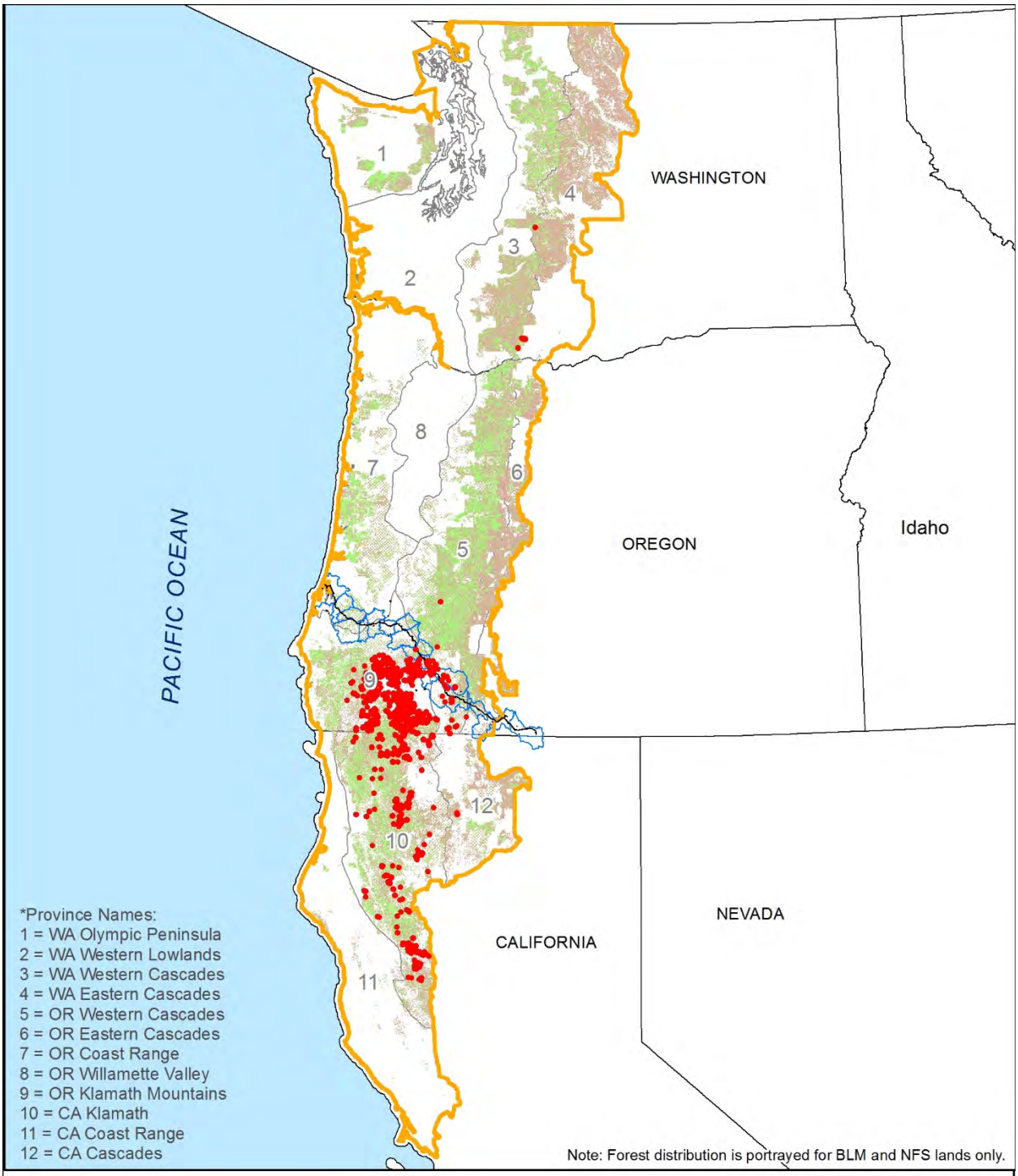


Figure CYFA-3
Potential Habitat For
Cypripedium fasciculatum

Local Distribution

Within the local area, *C. fasciculatum* is distributed across five 5th-field watersheds that overlap the project area (see Table CYFA-5 and Figure CYFA-4). Sites in four of the watersheds are clustered and close to one another. Scattered sites are located in the Upper Cow Creek and Big Butte Creek watersheds. All of the sites appear to have some level of connectivity between them and others in the region because the sites are part of a large group of sites in the Klamath Mountains. The vast majority of the sites in the Klamath Mountains are on BLM lands, with a large proportion of the sites located entirely in reserves.

Three of the 48 sites in the local are at least partially on NFS lands, 46 are at least partially on BLM lands, and 11 sites are at least partially on private lands. The sites on NFS lands are located on lands designated as Other (Matrix) and LSR, while the sites on BLM lands are located in District Designated Reserves, Harvest Land Base, LSRs, and Riparian Reserves. Of the 48 sites in the local area, one site is entirely within NFS reserves and 26 sites are entirely within BLM reserves, representing 56 percent of the NFS and BLM sites.

Coniferous and mixed hardwood-coniferous forests below 7,000 feet msl encompass approximately 579,152 acres on BLM and NFS lands in the local area, with 376,674 acres in reserve land allocations (65 percent of the forests). Of this acreage, an estimated 183,763 acres are LSOG, including 135,203 acres in reserve land allocations (74 percent of the forests). Other sites may also exist in the local area where surveys have not been completed, based on the distribution and abundance of sites in the local and regional areas and extent of forests that may provide suitable habitat (see Figures CYFA-3 and CYFA-4).

TABLE CYFA-5

Distribution of *Cypripedium fasciculatum* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	9	-	8
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	9	-	9
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	-	-	-
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	18	-	17
South Umpqua River (781)	-	-	-
Spencer Creek (865)	-	-	-
Trail Creek (804)	10	-	10
Upper Cow Creek (801)	2	1	1

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.

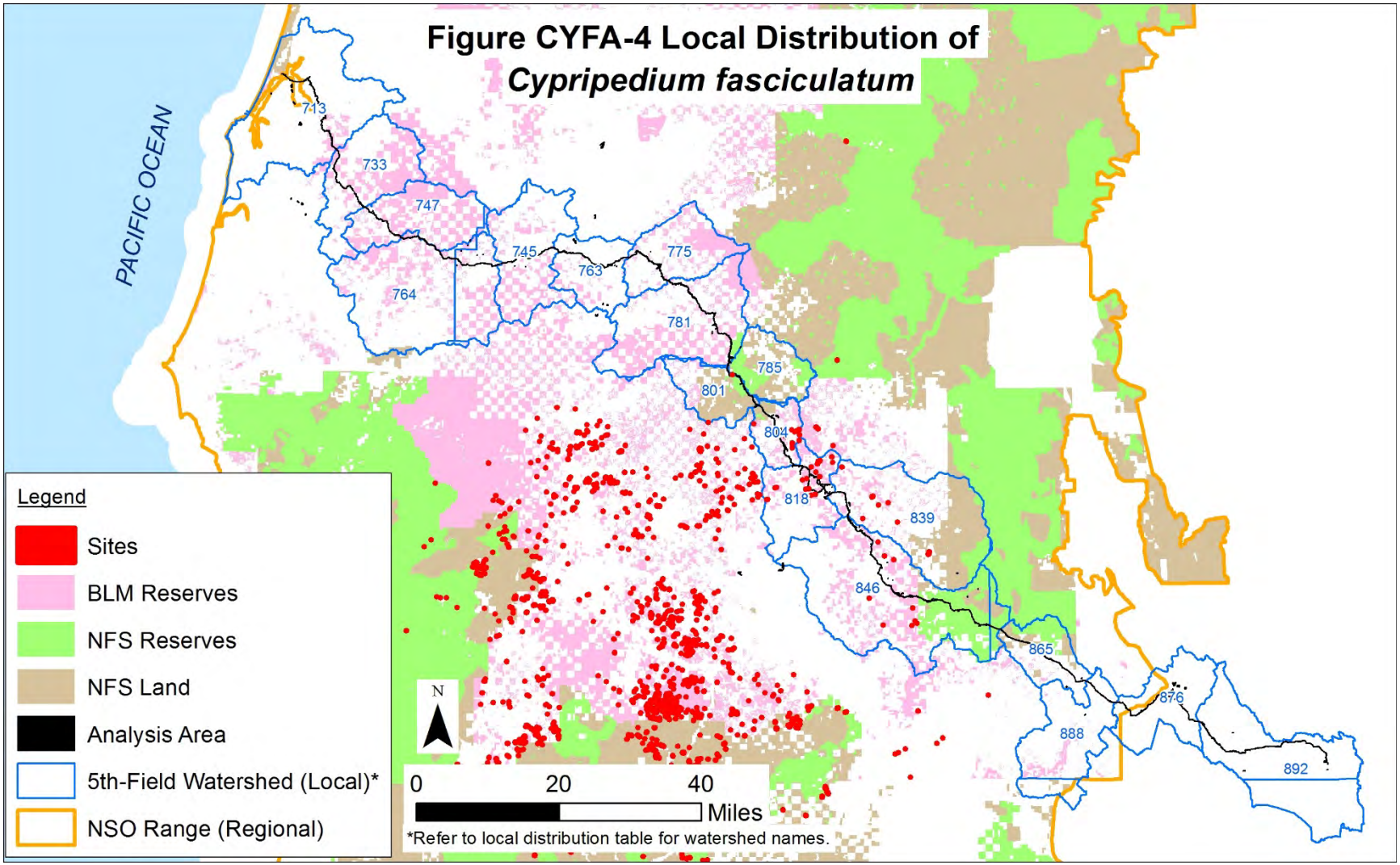


Figure CYFA-4 Local Distribution of
Cypripedium fasciculatum
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis and project areas contain two sites of *C. fasciculatum*. One site is partially on NFS lands and private lands and one site is on BLM lands. The analysis area sites are in two watersheds where the Klamath Mountains and the Cascade Range intersect: the Rogue River-Shady Cove watershed and the Upper Cow Creek watershed. Several sites are located within the immediate vicinity of the analysis area (see Local Distribution discussion above).

The site partially on NFS land is located in an LSR, while the site on BLM land is located in Harvest Land Base.

Surveys for the PCGP Project did not result in any observations of the species (Siskiyou BioSurvey LLC 2008a, 2011a). Two recorded observations from 1994 and 2003 in agency databases comprise the two sites in the analysis area. Within the project area, one site is at MP 104.1, and the other site is along a road west of MP 128.

Project Impacts

Analysis

The PCGP Project would affect one site out of the 540 sites on NFS lands in the region, representing less than 1 percent of the sites. Site impacts on other land ownerships include one site affected on BLM lands. The total number of sites affected is two sites of the 1,392 total sites on all lands. Table CYFA-6 presents an overview of the features of the PCGP Project that would affect the *C. fasciculatum* site on NFS land. The construction corridor, associated work areas, and road improvements would affect approximately 0.5 acre within the site (about 19 percent of the site). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *C. fasciculatum* in and near the project area. This discussion presents an overview of the types of impacts that would be expected in the sites based on the features of the PCGP Project and that could affect site persistence.

TABLE CYFA-6

Impacts to *Cypripedium fasciculatum* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	1	0.3 ac
Temporary Extra Work Area (TEWA)	1	0.1 ac
Uncleared Storage Area (UCSA)	-	-
Roads (TMP)	1	0.1 ac
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 0.3 acre of vegetation and soils within one site and could result in the removal of *C. fasciculatum* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about 0.1 acre within the same site. The establishment of the corridor could modify microclimate conditions around populations or individuals adjacent to the corridor. The removal of forests and disturbance to soil could negatively affect *C. fasciculatum* in adjacent areas by removing its habitat and potentially dormant individuals, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat

conditions as a result of the corridor and TEWAs could make habitat within the sites no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Road improvements and establishment would disturb approximately 0.1 acre within the site and could remove habitat and extant populations or individuals of *C. fasciculatum*.

Across the project area, the PCGP Project would remove an estimated 1,142 acres of coniferous and mixed hardwood-coniferous forests below 7,000 feet msl, including 249 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *C. fasciculatum*. Within this impact area, about 567 acres (about 50 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 246 acres of coniferous and mixed forests below 7,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous and mixed hardwood-coniferous forests below 7,000 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the single site on NFS lands as a result of the PCGP Project, two *C. fasciculatum* sites would remain on NFS lands in the local area, including one in reserves, and 539 sites, including 198 in reserves, would remain on NFS lands in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but they would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 198 sites in reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. Based on these site counts, approximately 37 percent of the remaining *C. fasciculatum* on NFS lands in the NSO range would be protected in reserves.

The PCGP project may also affect one site on BLM land. Assuming persistence cannot be maintained at the single site, 45 sites would remain on BLM lands in the local area, including 26 entirely in reserves, and 832 sites, including 451 entirely in reserves would remain on BLM lands in the NSO range. While sites on BLM lands are not subject to S&M Standards and Guidelines protections, sites in reserves would likely receive some protection under the BLM 2016 RMPs.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Cypripedium fasciculatum* is a Category C (uncommon) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category C species are likely to be necessary

to provide reasonable assurance of species persistence in the range of the NSO. New information since the species was listed in the 2001 ROD, however, indicates that the species appears to be more common than previously documented, as described below:

- *Cypripedium fasciculatum* has a somewhat wide distribution across five physiographic provinces and three states in the region and a moderate-high number of overall sites (540 on NFS lands, 1,392 on all lands). The species appears to be well distributed in the Klamath Mountains in Oregon and California. The currently known number of sites on NFS and BLM lands is an increase of about 904 sites since 2007.

- An estimated 21 percent of the sites (313 sites) are in reserves.

- Coniferous and mixed hardwood-coniferous forests below 7,000 feet msl (general habitat for the species) are widespread across the NSO range and encompass approximately 19.1 million acres on BLM and NFS lands with an estimated 60 percent in reserves. A subcomponent of these forests likely provides habitat for *C. fasciculatum*.

- The PCGP Project would affect one of 540 Forest Service-managed sites of *C. fasciculatum*, representing less than 1 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the site, a moderate-high number of sites (539 sites) would continue to be documented on NFS lands in the region. Two sites would remain on NFS lands in the local vicinity of the analysis area with many other sites in the nearby Klamath Mountains. An additional 26 sites would remain entirely in BLM reserves in the local area and 451 sites would remain entirely in BLM reserves across the region. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would not affect any sites in reserves, and the percentage of sites in reserves would remain about the same. Of the remaining sites on NFS lands, 189 are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and nine are in Congressionally Reserved areas where management activities that may adversely affect *C. fasciculatum* are unlikely. A total of 451 sites would remain entirely in BLM reserves, including District Designated Reserves where management activities that may adversely affect *C. fasciculatum* are unlikely, LSRs where management actions are restricted to those activities that benefit LSOG forests, and Riparian Reserves where management actions are restricted to those activities that benefit the conservation of aquatic and riparian-dependent terrestrial resources.

- The PCGP Project would result in a permanent loss of an estimated 246 acres of coniferous and mixed hardwood-coniferous forests below 7,000 feet msl (less than 1 percent of the total acreage in the species' range). An estimated 11.5 million acres (60 percent) of coniferous and mixed forests and 4 million acres (66 percent) of LSOG forests below 7,000 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *C. fasciculatum*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. This is a Category C species for which pre-

disturbance surveys are practical and have been conducted in many areas; thus, it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during surveys.

4.1.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *C. fasciculatum* at one site on NFS lands and one site on BLM lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 539 sites would remain on NFS lands across the region, and two sites would remain on NFS lands in the local area. An additional 451 sites would remain entirely in BLM reserves across the region and 26 sites would remain entirely in BLM reserves in the local area. Although the PCGP Project would affect site persistence of *C. fasciculatum* at one site on NFS land, the site is part of the large group of sites in the Klamath Mountains in Oregon and California where the species is well distributed. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *C. fasciculatum* would persist in the region without considering the single site as part of the population.

- The PCGP Project would remove approximately 1,142 acres of coniferous and mixed forests and 249 acres of LSOG forests below 7,000 feet msl (a negligible amount of the forests). An estimated 50 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide unforested corridor would remain across the project area. An estimated 11.5 million acres (60 percent) of coniferous and mixed forests and 4 million acres (66 percent) of LSOG coniferous and mixed forests below 7,000 feet msl would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 2007.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely in BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is widely distributed.

The PCGP Project would not be able to avoid impacts to the *C. fasciculatum* site on NFS land in the analysis area, although some individuals or populations within the sites may persist following project implementation. Based on the above conclusions, avoidance of the single *C. fasciculatum* site on NFS land is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plan that applies to the affected site would waive implementation of Management Recommendations for the *C. fasciculatum* site affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near the affected site over the long term. The monitoring plan shall be approved by the Forest Service.

5.0 MOLLUSK SPECIES

5.1 DEROCERAS HESPERIUM

Deroceras hesperium is a land slug in the Limacidae family and is commonly known as evening fieldslug. A recent study on the molecular characteristics of the species and a similar species also found in the Pacific Northwest, *D. laeve*, revealed that *D. hesperium* is likely a variant of *D. laeve* and not a distinct species (Roth et al. 2013). Identification of *D. hesperium* in the NSO range is being reviewed, but this discussion presents information on *D. hesperium* as it has been known by that name in the NSO range because it is still on the S&M list, pending an ASR.

5.1.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *D. hesperium* as a Category B (rare) species. ORBIC evaluated *D. hesperium* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and 2010 *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2010), but the species was not re-evaluated in the most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2010, the species was considered to be at high risk of extinction due to a very restricted range, very few populations, steep declines, or other factors, within its global range (G2) and was at high risk of extinction due to extreme rarity, very steep declines, or other factors in Oregon (S1). This species is on the ORBIC List 1. It is not considered a BLM or Forest Service Sensitive or Strategic Species in Oregon.

5.1.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

D. hesperium is a hermaphroditic (has both male and female organs) terrestrial gastropod slug (Duncan 2005). It is able to self-fertilize or cross-fertilize and lays eggs in porous soils and forest duff. The slug requires high moisture environments throughout its life cycle. Food likely consists of bacteria, fungi, yeasts, and other microscopic organisms (microscopic periphyton) scraped from the moist surfaces of green and decaying vegetation, rocks, and wood. *D. hesperium* is sometimes found in association with Crater Lake tightcoil (*Pristiloma arcticum crateris*).

Range

D. hesperium is endemic to the Pacific Northwest. In Oregon, it has been found in scattered locations from the Pacific coast to the both sides of the Cascade Range (Duncan 2005). It has also been found across western Washington to Vancouver Island, British Columbia. The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, Holthausen et al. (1994) indicated that the species may have been widely distributed on the west side of the Cascade Range. Habitat modifications and other environmental factors, as discussed below under Threats, have likely reduced available habitat and may have further restricted the species' distribution.

Population Status

ORBIC (2004) reported *D. hesperium* from an estimated seven element occurrences across the species' range in 2004. This species was only found in two areas in the NSO range: northwestern Oregon and the northern Olympic Peninsula in Washington (ORBIC 2004). In 2004, *D. hesperium* was considered to be one of the least known slugs in western North America, and the species population trends appeared to be substantially declining (ORBIC 2004). Duncan (2005) reported 19 known sites in agency databases in 2005; these known sites were in the Klamath Mountains as well as other parts of Oregon outside the NSO range. The species was not found during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). The 2007 Final SEIS reported 14 sites on NFS and BLM lands and 20 total sites on all lands in the NSO range (USDA and USDI 2007).

Surveys for Category A and B S&M mollusks were conducted in 2007, 2013, 2014, and 2015 in the PCGP Project area and within 100 feet of habitat removal (Siskiyou BioSurvey LLC 2008b; Whiteman 2013, 2014, 2015). These surveys targeted *D. hesperium* along with several other S&M mollusks, and resulted in one observation of the species. *D. hesperium* has not been found in high numbers during past survey efforts, although limited mollusk surveys have been conducted across the NSO range, and more survey effort may locate additional populations of the species. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Relatively few details are known about the specific habitat requirements of *D. hesperium* (Duncan 2005). The species is known to occur in perennially wet meadows in forest and riparian habitats. It has been found from coastal meadows just above sea level to higher elevations near the crest of the Cascade Range. Most observations have been documented in high moisture locations in or near herbaceous vegetation, under litter, or around rock substrates. Porous soils, low-growing vegetation, rocks, and decomposing vegetation on the forest floor provide cover for hiding and escaping from predators, as well as protection against extreme temperature and humidity. Suitable habitat may be limited to within 100 feet of perennial water sources (i.e., within Riparian Reserves) except in areas where coastal fog provides continuous moisture. *D. hesperium* is not likely restricted to specific microclimate conditions of LSOG forests as much as it is restricted to high moisture habitats.

Threats

Primary threats to *D. hesperium* are those that result in degradation or destruction of occupied habitat through activities that compact the soil, reduce litter cover, impact food sources, or alter available moisture by changing shade and water inputs (Duncan 2005). These activities include removal of standing trees and woody debris on the forest floor for firewood, spring water diversions, livestock grazing, camping, heavy equipment operations, and fire. Development of wet meadow habitat for agriculture, urbanization, and forest management presents a threat to the

species (Duncan 2005). The slug's habitat is also susceptible to ingrowth of tree and shrub species in historically herbaceous habitats. Winter recreational activities, such as snowmobiling and skiing, can negatively alter microsite conditions by compacting snow and causing it to lose its insulative properties, possibly resulting in freezing of hibernation habitat.

Management Recommendations

As a Category B S&M species, the direction under the 2001 ROD is to manage all known sites and reduce the inadvertent loss of undiscovered sites (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. Management recommendations were developed for *D. hesperium* in 1998 and updated in 2005 (Duncan 2005). This guidance includes: minimizing alterations in microsite characteristics, including management of areas large enough to moderate fluctuations in humidity and temperature; maintaining existing cover by preserving dead and downed woody debris; protecting occupied rockslides and talus areas from road construction, quarrying, and other activities; maintaining the canopy closure of trees within the habitat area to moderate fluctuations of temperature and humidity on the site; maintaining the hardwood tree component (i.e., maples, cottonwood, red alder, aspen) and native plant diversity to provide a constant supply of logs, leaves, and leaf mold; maintaining riparian areas according to S&M ROD guidance and, if necessary, increasing Riparian Reserve widths; avoiding burning within occupied habitats and managing burns to minimize adverse effects of fire; avoiding activities that would lower the water table at the site, thus reducing soil moisture below that required by the species, or possibly altering vegetative communities; protecting known sites from grazing; and avoiding activities that would cause soil compaction.

5.1.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *D. hesperium* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table DEHE-1 shows the total number of sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 68 observations from BLM and Forest Service geodatabases were converted into 54 sites in the NSO range (region). Table DEHE-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table DEHE-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure DEHE-1 displays the regional distribution of the species across NFS lands, Figure DEHE-2 displays the extent of known sites in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure DEHE-3 displays the species' regional distribution as

well as the extent of all forest types and LSOG forests below 6,000 feet msl on BLM and NFS lands.

TABLE DEHE-1

Number of *Deroceras hesperium* Sites (2017)

Location*	Number of Sites
Regional Area	54
Local Area	14
Analysis Area (Project Area)	1 (1)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE DEHE-2

Distribution of *Deroceras hesperium* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	27	9	1
BLM	18	3	-
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	10	2	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE DEHE-3

Distribution of *Deroceras hesperium* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	1	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	6	-	-
Congressionally Reserved (CR)	**1**	**-**	**-**
Late Successional Reserve (LSR)	**6**	**1**	**-**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**-**	**-**	**-**
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	8	3	-
Riparian Reserve	**6**	**5**	**1**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	1	-	-
Congressional Reserve	**1**	**-**	**-**
District Designated Reserve	**1**	**-**	**-**
Harvest Land Base	5	3	-
Late Successional Reserve	**1**	**-**	**-**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**11**	**-**	**-**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center.

Regional Distribution

Deroceras hesperium has a somewhat limited distribution across four physiographic provinces in Oregon (Coast Range, Cascades East and West, and Klamath Mountains) (see Figure DEHE-1). A relatively large cluster of sites is located in the southern Cascade Range, and other clustered sites are located in the northern Cascade Range and southern Coast Range. Scattered sites are located in the northern Cascade Range, and several isolated sites are located in other areas. The

species appears to have a limited distribution outside the Cascade and Coast Ranges based on the low number of sites and scattered nature of most sites in the outlying areas. *D. hesperium* does not appear to be well distributed within its range in the NSO range.

Ten of 54 sites are located in private or state lands, 18 sites are on BLM lands, and 27 sites are on NFS lands across the region. Sites included on the National Forests that encompass the project area include one site on the Umpqua National Forest and 23 sites on the Fremont-Winema National Forest. Sites on other National Forests include one site on the Deschutes National Forest and two sites on the Mt. Hood National Forest.

Across the NSO range, 13 sites are at least partially located in reserve lands managed by the Forest Service, including one in a Congressionally Reserved Area, six in LSRs, and eight in Riparian Reserves (see Figure DEHE-2). This represents 48 percent of the total Forest Service-managed sites in the region. Other sites may also be associated with Riparian Reserves that have not been mapped at the regional scale, as defined in the respective Forest Service land management plans. The remaining Forest Service-managed sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 12 sites are located entirely in reserves managed by BLM. While sites on BLM lands are not covered by the S&M Standards and Guidelines, they likely receive some level of protection under BLM reserve management.

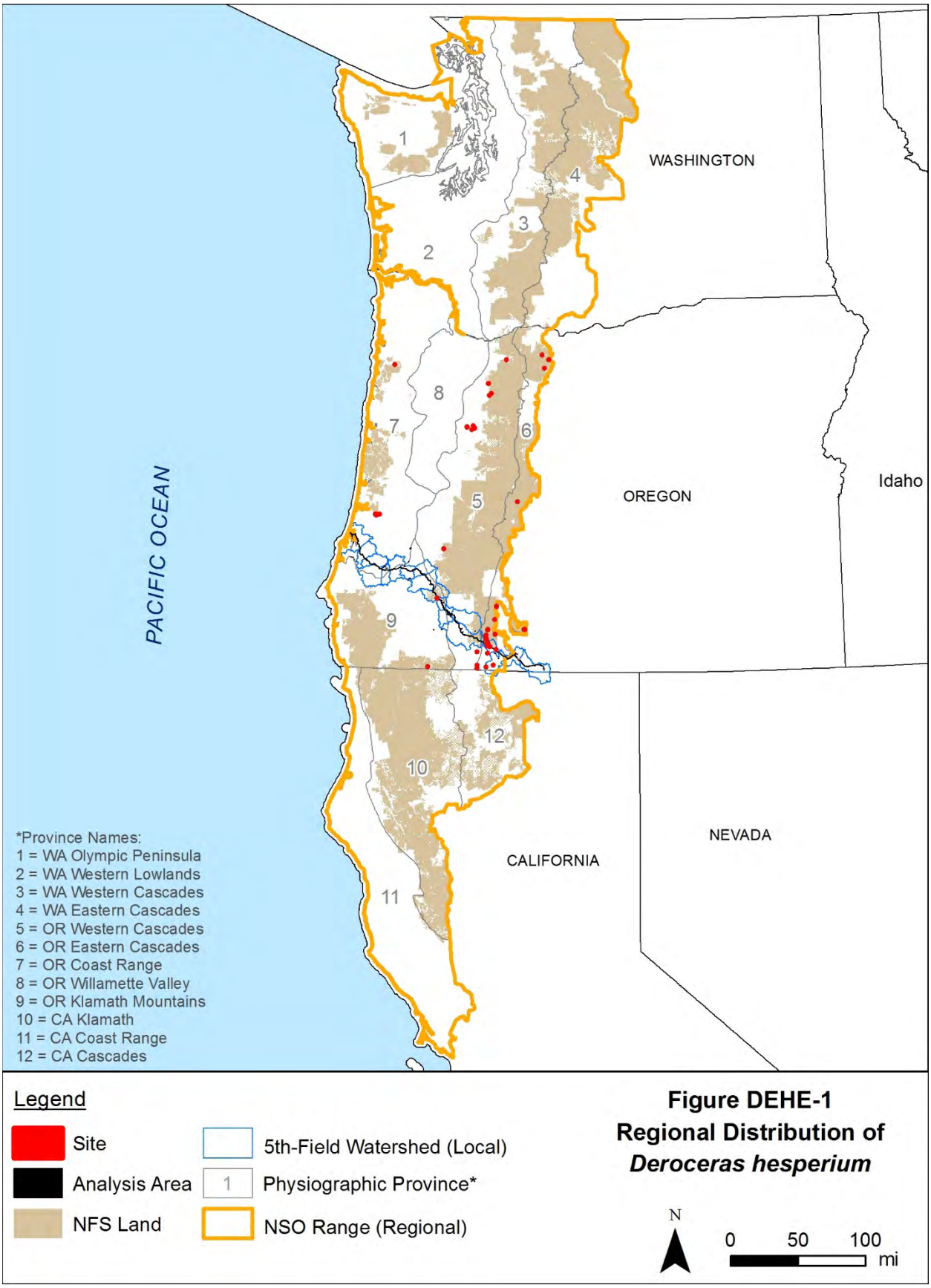
Deroceras hesperium is more common in LSOG forests based on available data (32 of 54 total sites are in LSOG) and may be restricted to moist conditions associated with riparian areas. Based on current site locations, the species is primarily found in coniferous, mixed hardwood-coniferous forests and to a lesser extent in hardwood forests below about 5,300 feet msl in Oregon. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous, mixed hardwood-coniferous, and hardwood forests in the NSO range could provide habitat for *D. hesperium* and support additional sites. These forests encompass an estimated 19.2 million acres on BLM and NFS lands across the NSO range, including an estimated 11.3 million acres in reserve land allocations (59 percent of the forests; Table DEHE-4). Of this acreage, an estimated 6.1 million acres are LSOG (see Figure DEHE-3), including 4 million acres in reserve land allocations (66 percent of the forests). Although coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl are widespread across the NSO range, moist riparian areas are much less common.

TABLE DEHE-4

Extent of Forests that Could Provide Habitat for *Deroceras hesperium* on BLM and NFS Lands*

Location	All Forests below 6,000 feet		LSOG Forests below 6,000 feet	
	Total	**Reserves**	**Total**	**Reserves**
Regional Area	19,183,086	11,264,423	6,088,524	3,998,501
Local Area	608,824	403,947	184,099	135,653
Project Area	1,536	1,069	326	233

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
*The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.


WASHINGTON
OREGON
Idaho
NEVADA
CALIFORNIA
PACIFIC OCEAN
1
2
3
4
5
6
7
8
9
10
11
12
*Province Names:
1 = WA Olympic Peninsula
2 = WA Western Lowlands
3 = WA Western Cascades
4 = WA Eastern Cascades
5 = OR Western Cascades
6 = OR Eastern Cascades
7 = OR Coast Range
8 = OR Willamette Valley
9 = OR Klamath Mountains
10 = CA Klamath
11 = CA Coast Range
12 = CA Cascades
Legend
Site
Analysis Area
NFS Land
5th-Field Watershed (Local)
1 Physiographic Province*
NSO Range (Regional)
Figure DEHE-1
Regional Distribution of
Deroceras hesperium
N
0 50 100
mi

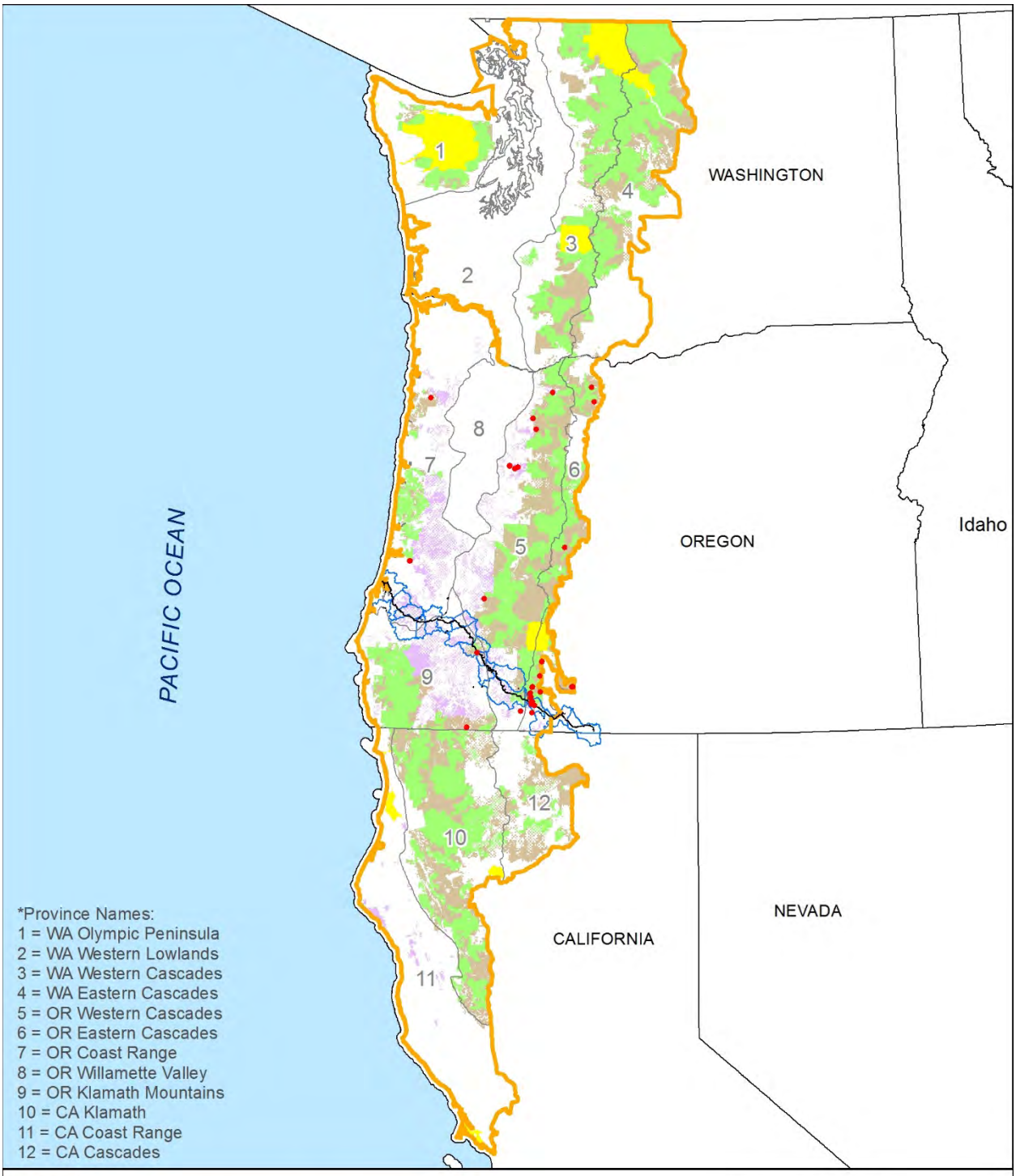


Figure DEHE-2
Extent of *Deroceras hesperium*
Sites in Protected Areas

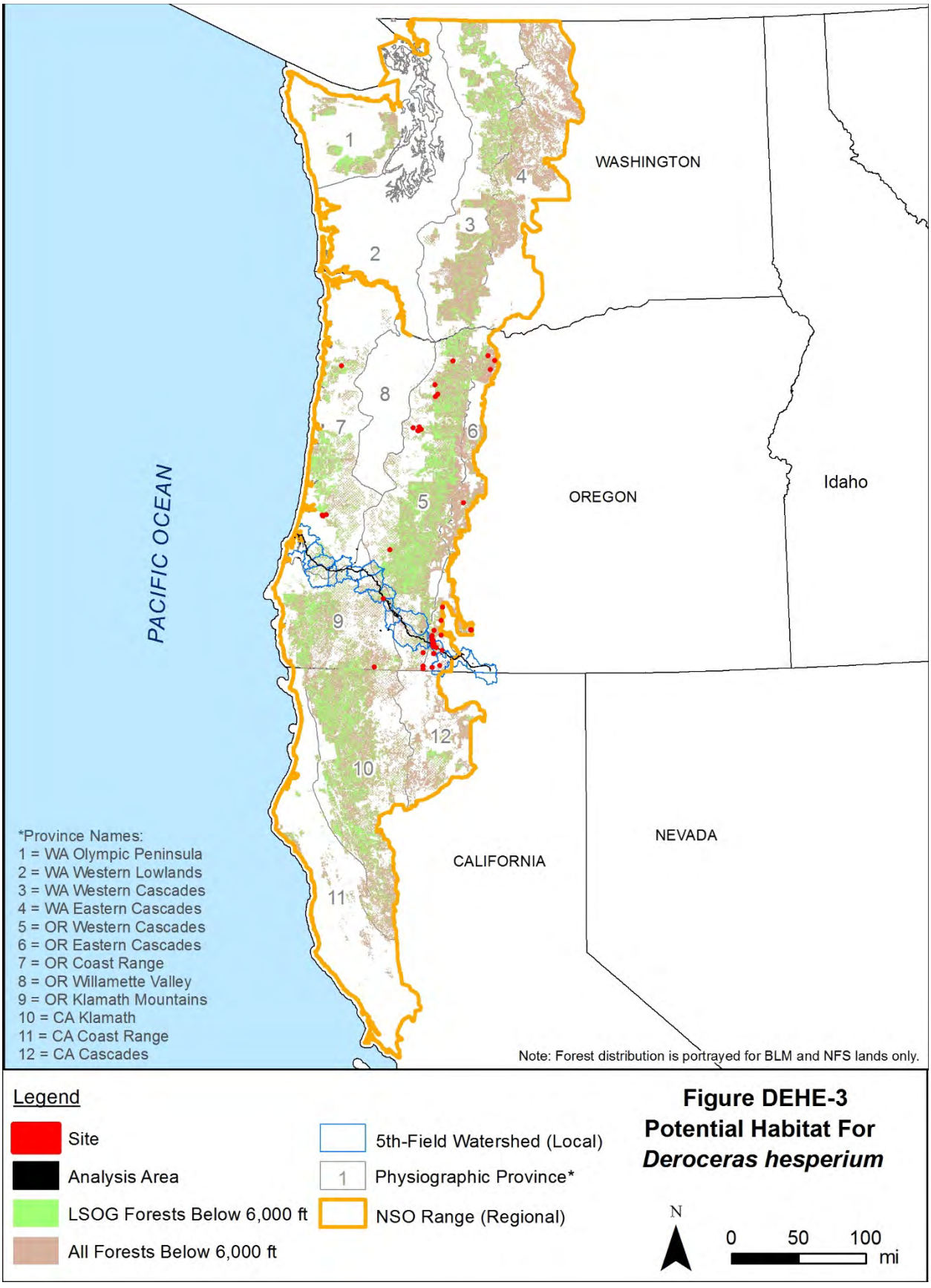


Figure DEHE-3
Potential Habitat For
Deroceras hesperium

Local Distribution

Within the local area, *D. hesperium* is found in three 5th-field watersheds (Klamath River-John C. Boyle Reservoir, Spencer Creek, and Upper Cow Creek) that overlap the project area (see Table DEHE-5 and Figure DEHE-4). The majority of the 14 local sites are in the eastern Cascade Range in the eastern portion of the local area, while one site is isolated in the Klamath Mountains in the center of the local area. The local sites in the eastern Cascade Range are part of a large group of sites in the southern Cascade Range in Oregon. Many sites are located within 20 miles north of the local area on NFS lands, while several more sites are located entirely in BLM reserves within 20 miles south of the local area. Multiple avenues of connectivity appear to be available between sites in the Cascade Range and Klamath Mountains based on the extent of coniferous, mixed, and hardwood forests and drainages within these forests.

Of the 14 sites in the local area, three are on BLM lands, nine are on NFS lands, and two are on private lands. The Forest Service-managed sites are primarily located on lands designated as Riparian Reserves, with several sites located in Other (Matrix), and one site located in LSRs (Table DEHE-5). None of the local sites on BLM lands are located in reserves.

Coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl encompass approximately 608,824 acres on BLM and NFS lands in the local area, including 403,947 acres in reserve land allocations (66 percent of the forests). Of this acreage, an estimated 184,099 acres are LSOG, including 135,653 acres in reserve land allocations (74 percent of the forests). Other sites may also exist in the local area where surveys have not been completed, particularly in the Cascade Range, based on the number of sites in the local area, distribution of those sites, and the extent of forests that may provide suitable habitat (see Figures DEHE-3 and DEHE-4).

TABLE DEHE-5

Distribution of *Deroceras hesperium* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	-	-	-
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	2	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	-	-	-
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	-	-	-
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	-	-	-
Spencer Creek (865)	11	8	-
Trail Creek (804)	-	-	-
Upper Cow Creek (801)	1	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.

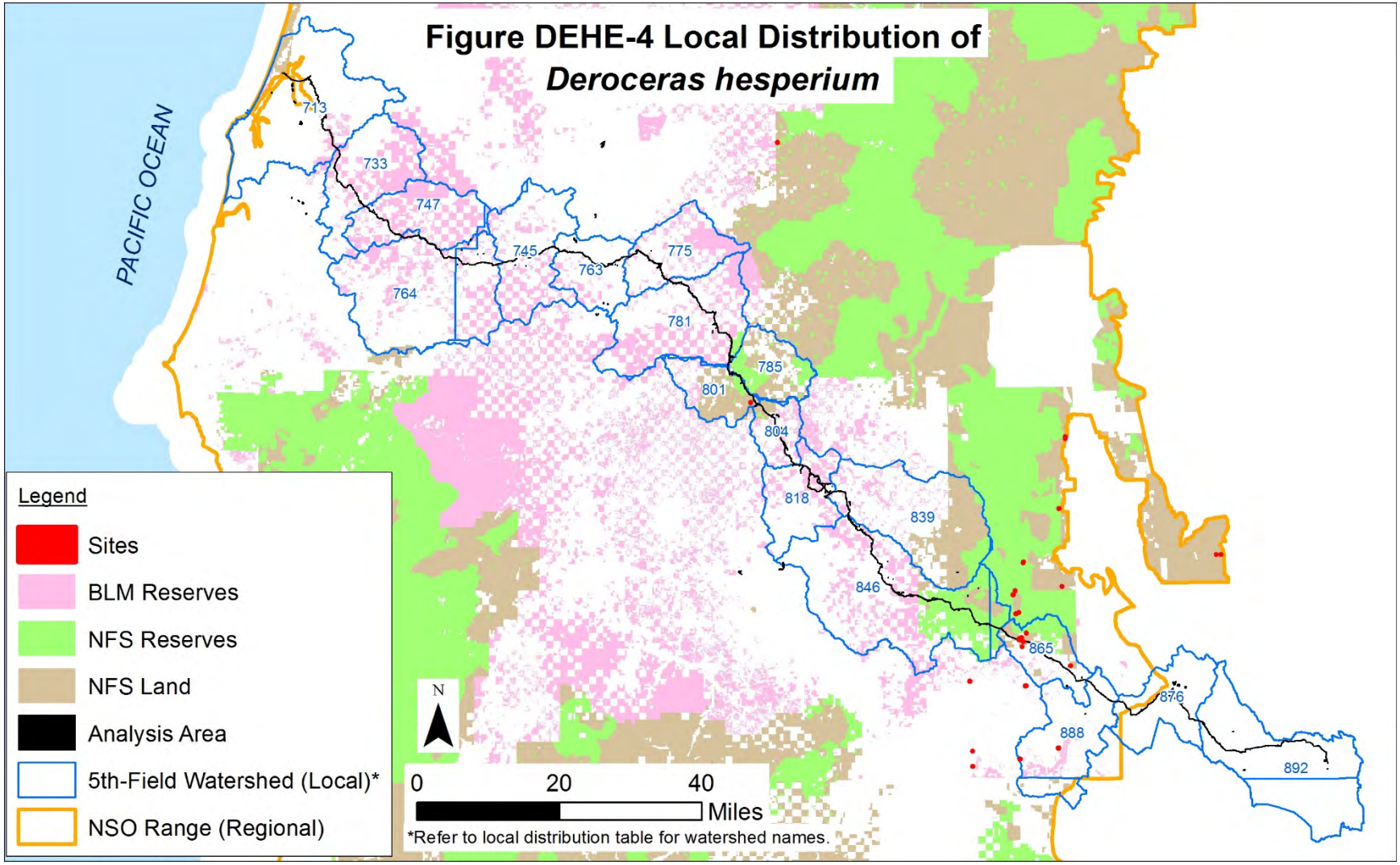


Figure DEHE-4 Local Distribution of
Deroceras hesperium
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis and project areas contain one site of *D. hesperium*. This site is on NFS land designated as Riparian Reserves on the Fremont-Winema National Forest. It is part of a large group of sites in the southern Cascade Range, as described in the Local Distribution discussion above.

Although surveys for the PCGP Project resulted in one observation of *D. hesperium* in the survey area (Siskiyou BioSurvey LLC 2008b), the observation is outside the analysis area, and a recorded observation from 2010 in agency records comprises the site in the analysis area. The site is located near MP 171.1.

Project Impacts

Analysis

The PCGP Project would affect one out of the 27 sites on NFS lands in the region, representing approximately 4 percent of the sites (or one out of 54 total sites on all lands in the NSO range). Table DEHE-6 provides an overview of the features of the PCGP Project that would affect the *D. hesperium* site. The construction corridor and associated work areas would affect approximately 0.02 acre (25 percent) of the site (the site is approximately 0.08 acre), and the corridor would cross through the southern portion of the site (see Figure DEHE-5). Measures outlined in Chapter 1 would be implemented to minimize soil and vegetation disturbance in the project area and restore areas following construction, which could minimize adverse impacts on *D. hesperium* in and near the project area. Due to the limited distribution of the species, the effects on one site could potentially alter the distribution of the species in the NSO range.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

TABLE DEHE-6

Impacts to *Deroceras hesperium* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	1	0.018 ac
Temporary Extra Work Area (TEWA)	1	0.004 ac
Uncleared Storage Area (UCSA)	-	-
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

The PCGP Project would result in ground disturbance and vegetation removal across the southern and eastern portions of the site near MP 171.1. The recorded observation of the species is on the northern side of the project area, and individuals could be directly affected by activities within the corridor (see Figure DEHE-5).

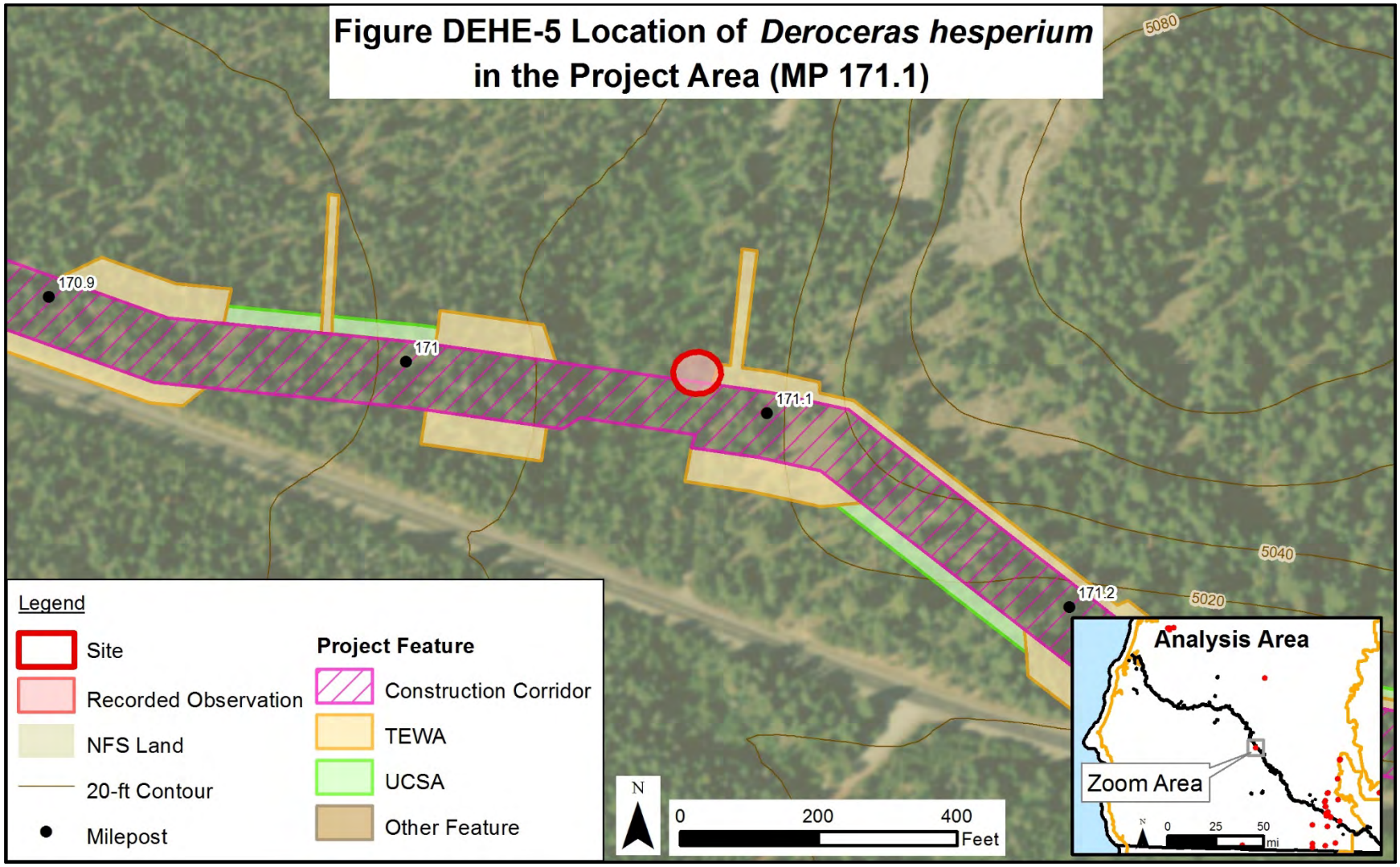


Figure DEHE-5 Location of *Deroceras hesperium* in the Project Area (MP 171.1)
5080
170.9
171
171.1
171.2
5040
5020
Legend
Site
Recorded Observation
NFS Land
20-ft Contour
Milepost
Project Feature
Construction Corridor
TEWA
UCSA
Other Feature
N
0
200
400
Feet
Analysis Area
Zoom Area
N
0
25
50
mi

Establishment of the 95-foot wide construction corridor would disturb vegetation and soils around the recorded observation within the site and could result in injury or mortality to individuals. The area within the site is forested in a relatively level area, and a dirt road is located just east of the site where a TEWA would be located. The establishment of the corridor and a TEWA could modify microclimate conditions around the recorded observation. The removal of forests and disturbance to soil and understory components would negatively affect *D. hesperium* by removing its habitat and affecting humidity, temperatures, and refugia in the understory of the habitat, affecting site persistence. Nearby suitable habitat could still be used by the species, but the habitat affected by the PCGP Project is no longer expected to be suitable. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project.

Based on this analysis, *D. hesperium* is not likely to persist at the site following project implementation. This site is one of nine sites on NFS lands in the local area and is part of a large cluster of sites in the southern Cascade Range in Oregon. It may contribute to the distribution of the species within the local area and nearby portions of the Cascade Range. However, if site persistence is not maintained, *D. hesperium* would still be found in the southern Cascade Range in Oregon, and nearby suitable habitat within the mountain range would still provide opportunities for the species to be found in the general vicinity based on the distribution of other sites in nearby portions of the local and regional areas.

Across the project area, the PCGP Project would remove an estimated 1,236 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl, including 251 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *D. hesperium*. Within this impact area, about 609 acres (about 49 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, but these areas would not likely provide habitat for the species during the life of the PCGP Project, unless they are restored to moist riparian habitat. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 261 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of forests below 6,000 feet msl in the NSO range.

Discussion

Assuming site persistence cannot be maintained at the site as a result of the PCGP Project, eight *D. hesperium* sites would remain on NFS lands in the local area, with five sites at least partially in reserves, and 26 sites, including 12 at least partially in reserves, would remain on NFS lands in the NSO range. An additional 12 sites would remain entirely in BLM reserves across the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but the NFS sites would be subject to the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 12 sites in NFS reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. While sites on BLM lands are not subject to S&M Standards and Guidelines protections, sites in reserves would likely receive some level of protection under BLM management. Based on these site counts, approximately 55 percent of the remaining *D. hesperium* sites on BLM and NFS lands in the NSO range would be protected in reserves.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Deroceras hesperium* is a Category B (rare) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category B species are likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information received since the species was listed in the 2001 ROD, however, indicates that the species appears to be more common than previously documented, as described below:

  — *Deroceras hesperium* has a somewhat limited distribution across four physiographic provinces and one state in the region and a low-moderate number of overall sites (27 on NFS lands, 54 on all lands). *D. hesperium* does not appear to be well distributed in any part of its range because sites are mostly scattered despite the distribution of potential habitat. The currently known number of sites on BLM and NFS lands is an increase of 31 sites since 2007.

  — An estimated 53 percent of the sites (24 sites) are in reserves.

- Coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl (general habitat for the species) are widely distributed across the NSO range and encompass approximately 19.2 million acres on BLM and NFS lands with an estimated 59 percent in reserves. Moist riparian areas (potential habitat for the species) within these forests are less common. A subcomponent of these forests likely provides habitat for *D. hesperium*.

- The PCGP Project would affect one of 27 Forest Service-managed sites of *D. hesperium*, representing approximately 4 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the site, a low-moderate number of sites (26) would continue to be documented on NFS lands in the region with a somewhat limited distribution across the NSO range. An additional 12 sites would remain entirely in BLM reserves in the region. Several sites (eight sites) would remain on NFS lands in the local vicinity of the analysis area with several other sites in the southern Cascade Range in Oregon. Many of the sites in southern Oregon are on NFS lands or located entirely in BLM reserves. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The single site affected by the PCGP Project is in a reserve. Of the remaining sites on NFS lands, six are in LSRs where management actions are restricted to those activities that benefit LSOG forests, one is in a Congressionally Reserved area where management activities that may adversely affect *D. hesperium* are unlikely, and five are in Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species. Other sites may be in

Riparian Reserves based on the species' habitat requirements, which would afford additional protections to the sites. A total of 12 sites would remain entirely in BLM reserves, including Congressional Reserves, District Designated Reserves, LSRs, and Riparian Reserves.

- The PCGP Project would result in a permanent loss of an estimated 261 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl (less than 1 percent of the total acreage in Oregon). An estimated 11.3 million acres (59 percent) of coniferous, mixed, and hardwood forests and 4 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the NSO range.

- The remaining forests may support additional populations of *D. hesperium*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. This is a Category B species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during strategic and other surveys.

5.1.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *D. hesperium* at one site on NFS land; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 26 sites would remain on NFS lands across the region, and eight sites would remain on NFS lands in the local area. An additional 12 sites would remain entirely in BLM reserves across the region. Although the PCGP Project would affect site persistence of *D. hesperium* at one site, the site is part of a large group of sites in the southern Cascade Range in Oregon, including many sites on NFS lands and several sites entirely in BLM reserves. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *D. hesperium* would persist in the region without considering the site as part of the population.

- The PCGP Project would remove approximately 1,236 acres of coniferous, mixed hardwood-coniferous, and hardwood forests and 251 acres of LSOG forests below 6,000 feet msl (a negligible amount of the forests). An estimated 49 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 11.3 million acres (59 percent) of coniferous, mixed, and hardwood forests and 4 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys.

- The remaining sites are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely on BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. Although a single natural disturbance

event or combination of events could affect a significant portion of sites in one of the three groups of sites in the Oregon Cascade or Coast Range, the sites are scattered across the region and are less likely to be collectively affected by a single event.

The PCGP Project would not be able to avoid impacts to the *D. hesperium* site in the analysis area. Based on the above conclusions, avoidance of the *D. hesperium* site is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plan that applies to the affected site would waive implementation of Management Recommendations for the *D. hesperium* site affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near the affected site over the long term. The monitoring plan shall be approved by the Forest Service.

5.2 MONADENIA CHACEANA

Monadenia chaceana is a land snail in the Bradybaenidae family and is commonly known as chace sideband or Siskiyou sideband.

5.2.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *M. chaceana* as a Category B (rare) species. ORBIC evaluated *M. chaceana* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and again in its most recent update of *Rare, Threatened and Endangered Species of Oregon* (ORBIC 2016). In 2016, the species was considered to be between moderate to high risk of extinction due to a very restricted range, few populations, recent and widespread declines, or other factors, within its global range and in Oregon (G2G3, S2S3, respectively). The species is on the ORBIC List 3. It is considered a BLM and Forest Service Strategic Species in Oregon.

5.2.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Like other species in the genus *Monadenia*, *M. chaceana* is a hermaphroditic terrestrial gastropod and requires high moisture content throughout its life cycle (Duncan 2005b). Eggs are laid in loose soil, and the life span of the species is thought to be approximately 6 years. It becomes dormant during summer and winter and is normally crepuscular (active during dawn and dusk) during spring and fall. Dormant periods are spent in refugia deep within the interstitial space between rocks. Individuals that inhabit talus slopes also use the surrounding forest habitat during moist, cool weather to forage for food.

Range

Monadenia chaceana is endemic to the Pacific Northwest, where it has only been found in southwest Oregon and far northern California, primarily in Siskiyou County (Duncan 2005b). The known range of the species in 2004 encompassed approximately 100–400 square miles (ORBIC 2004). The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, it may have been similar to the current range, with populations limited to the Pacific Northwest. It may have had more abundant local distributions across its range, but habitat modifications and other environmental factors, as discussed below under Threats, have likely reduced available habitat and may have further restricted the species' distribution.

Population Status

ORBIC (2004) reported *M. chaceana* from an estimated 33 element occurrences across the species' range in 2004. This species was only found in two areas in the NSO range: southern Oregon and Siskiyou County, California (ORBIC 2004). In 2004, *M. chaceana* was thought to be rare because it was only known from two population areas (ORBIC 2004). The species was found in two locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). The 2007 Final SEIS reported 206 sites on NFS and BLM lands and 233 total sites on all lands in the NSO range (USDA and USDI 2007).

Surveys for Category A and B S&M mollusks were conducted in 2007, 2013, 2014, and 2015 in the PCGP Project area and within 100 feet of habitat removal (Siskiyou BioSurvey LLC 2008b; Whiteman 2013, 2014, 2015). These surveys targeted *M. chaceana* and resulted in 12 observations of the species. Based on the increased number of sites since 2004 as a result of the increased number of surveys, it is likely that this species is more abundant than previously known, and more survey effort would be expected to locate additional populations within the NSO range, particularly in southern Oregon and northern California where most observations have been reported. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

M. chaceana is typically found in shaded areas in dry coniferous, mixed hardwood-coniferous, and hardwood forests (Duncan 2005b). It has been found in the lower reaches of major drainages, in talus and rock slides, under rocks and woody debris in moist conifer forests, in caves, and in shrubby areas in riparian corridors (ORBIC 2004). Favorable microsite conditions include stable rock formations and lower talus slopes with availability of subsurface water and large interstitial spaces between rocks (Duncan 2005b). In mesic habitats, the snail may use hollow cavities in living hardwoods, large woody debris, dense ground cover, bark, sword fern root masses, or rodent burrows for aestivation and refugia from predation, desiccation, or fire. *M. chaceana* is not likely restricted to specific microclimate conditions of LSOG forests as much as it is restricted to moist forests with suitable rock substrate.

Threats

Threats to *M. chaceana* include habitat alteration and fragmentation and activities that increase temperature, decrease moisture, or decrease food supplies (Duncan 2005b). Timber harvest resulting in less than 40 percent canopy closure adversely affects the species, particularly where residual habitat is additionally affected by prescribed fire. Prescribed burns threaten the species because they are typically conducted in the spring and fall when *M. chaceana* is active (USDA and USDI 2007). Wildfires are less of a threat because they typically occur in summer months when *M. chaceana* undergoes aestivation. Other threats include herbicide use, recreation development, quarry development, road construction, timber harvest and monoculture, and disturbances that alter hydrologic patterns or refugia habitat (ORBIC 2004).

Management Recommendations

As a Category B S&M species, the direction under the 2001 ROD is to manage all known sites and reduce the inadvertent loss of undiscovered sites (USDA and USDI 2001). This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. Management recommendations were developed for *M. chaceana* in 1998 and updated in 2005 (Duncan 2005b). This guidance includes: maintaining a food supply of leaf and needle litter and fungi within a cool moist environment during fall and spring active periods, providing stable refuge sites used during dormant periods in summer and winter, maintaining undisturbed talus and rock substrates, and managing the surrounding vegetative cover to provide coarse woody debris and uncompacted forest litter.

5.2.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *M. chaceana* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table MOCH-1 shows the total number of sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (50-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 460 observations from BLM and Forest Service geodatabases were converted into 410 sites in the NSO range (region). Table MOCH-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table MOCH-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs the regional, local, and analysis areas. Figure MOCH-1 displays the regional distribution of the species across NFS lands, Figure MOCH-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure MOCH-3 displays the species' regional distribution as well as the extent of all forest types and LSOG forests below 6,500 feet msl on BLM and NFS lands.

TABLE MOCH-1

Number of *Monadenia chaceana* Sites (2017)

Location*	Number of Sites
Regional Area	410
Local Area	160
Analysis Area (Project Area)	14 (6)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE MOCH-2

Distribution of *Monadenia chaceana* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	258	81	9
BLM	140	78	5
NPS	1	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	15	2	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE MOCH-3

Distribution of *Monadenia chaceana* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	46	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	4	-	-
Congressionally Reserved (CR)	**5**	**1**	**-**
Late Successional Reserve (LSR)	**44**	**19**	**8**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**6**	**-**	**-**
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	159	63	-
Riparian Reserve	**2**	**1**	**1**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	8	-	-
Congressional Reserve	**1**	**1**	**-**
District Designated Reserve	**8**	**3**	**-**
Harvest Land Base	34	9	-
Late Successional Reserve	**77**	**63**	**5**
Not Designated (ND)	3	-	-
Other (Matrix, Other)	5	-	-
Riparian Reserve	**19**	**13**	**-**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center

Regional Distribution

Monadenia chaceana has a somewhat wide distribution across six physiographic provinces in Oregon (Coast Range, Klamath Mountains, and Cascades East and West) and California (Klamath and Cascades) (see Figure MOCH-1). Sites are primarily found in a large group of several clusters in the eastern Klamath Mountains and southern Cascade Range in Oregon and extreme northern California. Several scattered sites are found further south in the Klamath Mountains in California. *Monadenia chaceana* appears to be well distributed in southern Oregon and extreme northern California.

Fifteen of 410 sites are at least partially located on private lands; one site is on NPS land (Crater Lake National Park); 258 sites are at least partially on NFS lands; and 140 sites are at least partially on BLM lands across the region. Sites included on the National Forests that encompass the project area include 90 sites on the Rogue River-Siskiyou National Forest, one site on the Fremont-Winema National Forest, and 134 sites on the Umpqua National Forest. Sites included on other National Forests include 37 sites on the Klamath National Forest and two sites on the Shasta-Trinity National Forest.

Across the NSO range, 54 sites are at least partially located on reserve lands managed by the Forest Service, including 44 in LSRs, six in Known Owl Activity Centers, five in Congressionally Reserved areas, and two in Riparian Reserves (see Figure MOCH-2). This represents 21 percent of the total Forest Service-managed sites in the region. Other sites may also be associated with Riparian Reserves that have not been mapped at the regional scale, as defined in the respective Forest Service land management plans. The remaining Forest Service-managed sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 90 sites are entirely in BLM reserves and one site in on NPS lands across NSO range. While the NPS site and sites entirely in BLM reserves are not covered under the S&M Standards and Guidelines protections, they likely receive some degree of protection under National Park and BLM reserve management.

Monadenia chaceana is less common in LSOG forests based on available data (193 of 410 total sites are in LSOG) and is relatively common in non-LSOG forests. Based on current site locations, the species is found in coniferous, mixed hardwood-coniferous, and hardwood forests between about 1,500–6,300 feet msl in parts of Oregon and California. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous, mixed hardwood-coniferous, and hardwood forests across the NSO range could provide habitat for *M. chaceana* and support additional sites. These forests encompass an estimated 20 million acres on BLM and NFS lands in the NSO range, including an estimated 11.8 million acres in reserve land allocations (59 percent of the forests; Table MOCH-4). Of this acreage, an estimated 6.2 million acres are LSOG (see Figure MOCH-3), including 4.1 million acres in reserve land allocations (66 percent of the forests). Although coniferous, mixed hardwood-coniferous, and hardwood forests below 6,500 feet msl are widespread across the NSO range, the specific habitat requirements of the species are less common.

TABLE MOCH-4

Extent of Forests that Could Provide Habitat for *Monadenia chaceana* on BLM and NFS Lands*

Location	All Forests below 6,500 feet		LSOG Forests below 6,500 feet	
	Total	Reserves	Total	Reserves
Regional Area	19,990,201	11,776,394	6,187,259	4,065,947
Local Area	616,550	408,331	185,580	136,830
Project Area	1,537	1,069	327	233

Data Source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
*The acreage estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

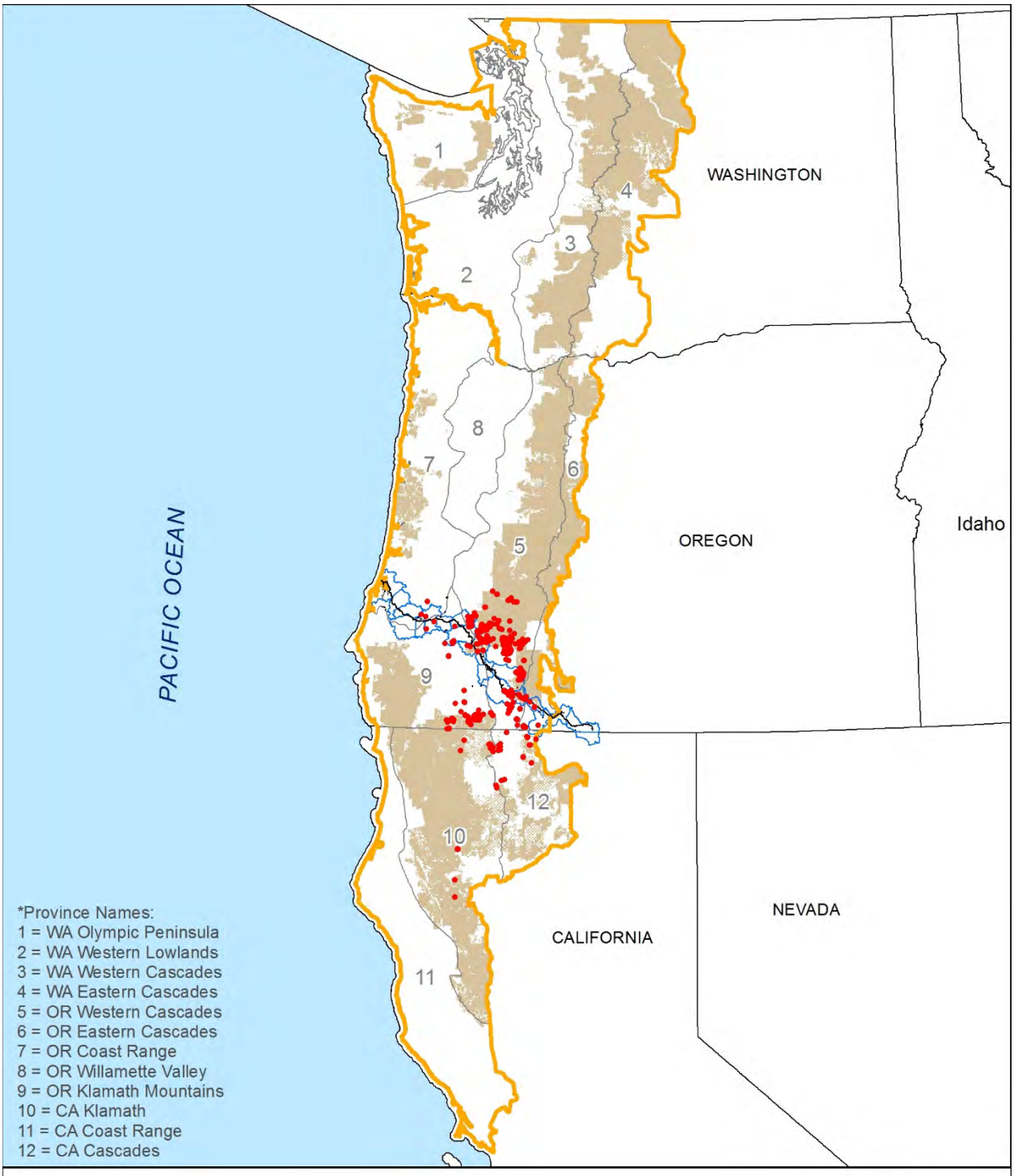


Figure MOCH-1
Regional Distribution of
Monadenia chaceana

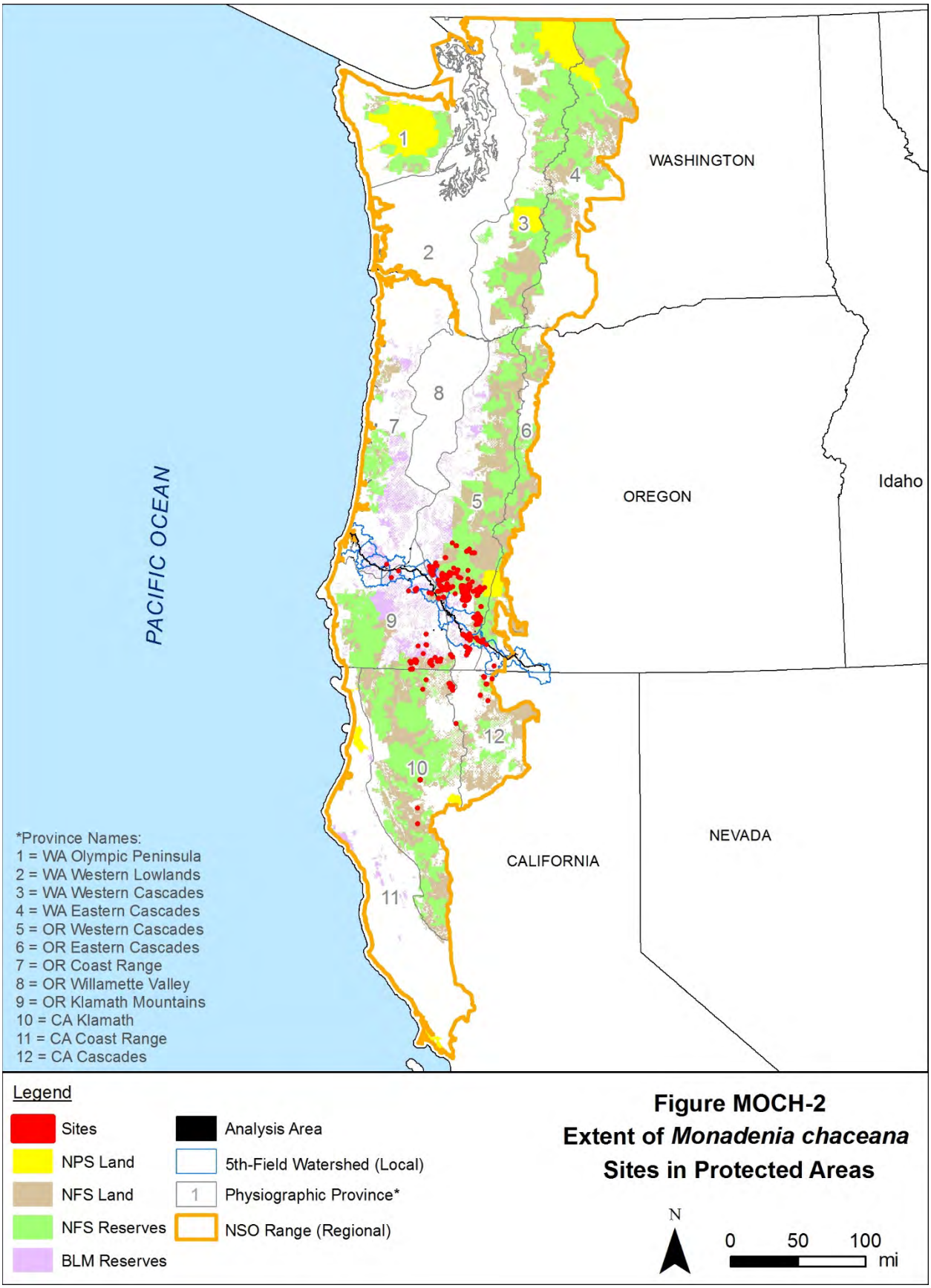


Figure MOCH-2
Extent of *Monadenia chaceana* Sites in Protected Areas

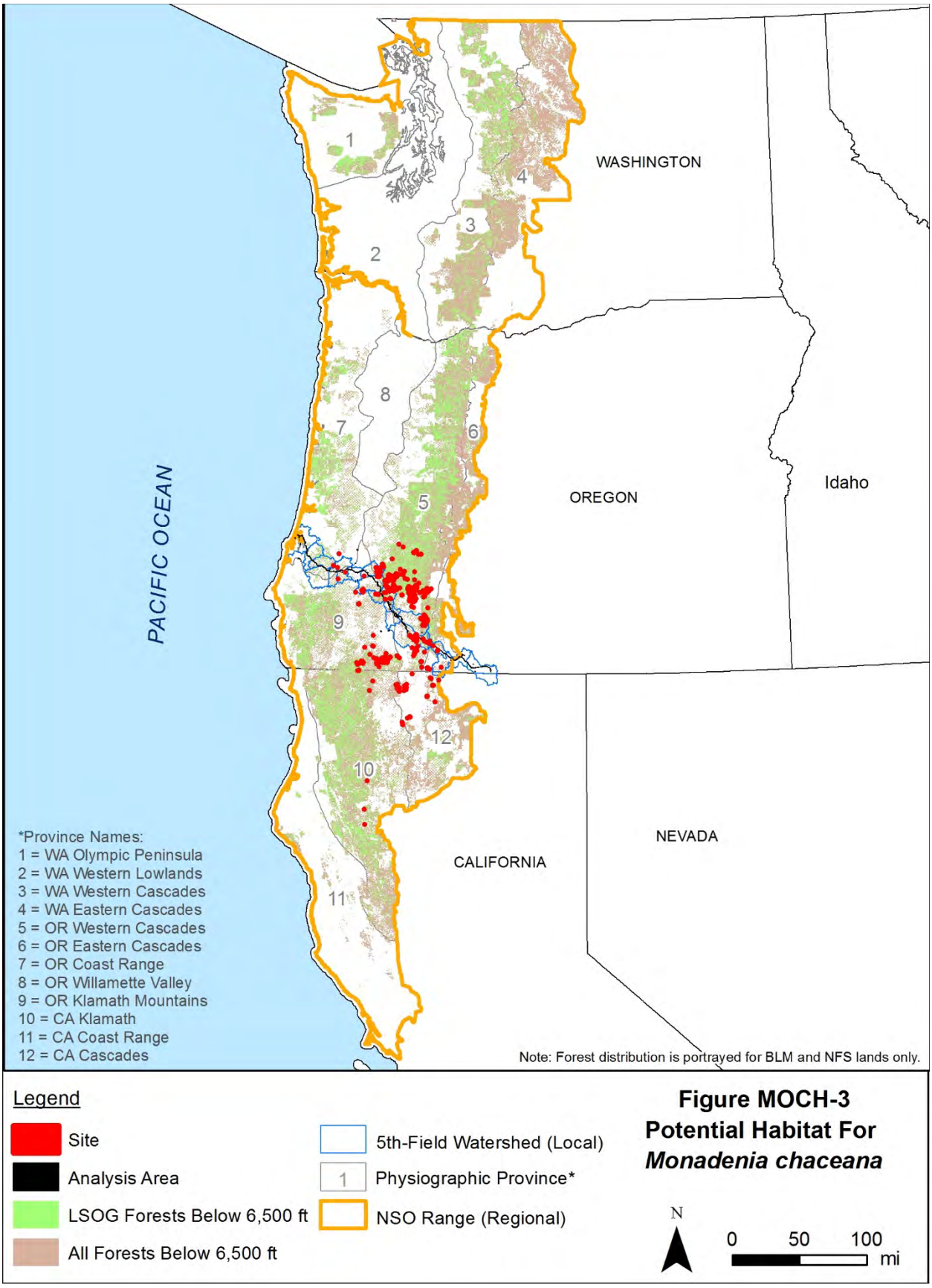


Figure MOCH-3
Potential Habitat For
Monadenia chaceana

Local Distribution

Within the local area, *M. chaceana* is distributed across 10 5th-field watersheds that overlap the project area (see Table MOCH-5 and Figure MOCH-4). The sites are scattered across the local area in the Coast Range, Klamath Mountains, and Cascade Range. Most sites appear clustered and near one another, although sites in the westernmost and easternmost watersheds are scattered. Across the watersheds, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous, mixed, and hardwood forests. Many sites are located on NFS lands or are entirely in BLM reserves in the nearby Klamath Mountains and Cascade Range.

Of the 160 sites in the local area, 81 sites are at least partially on NFS lands, 78 are on BLM lands, and two sites are at least partially on private lands. The NFS sites are located on lands designated as Other (Matrix), Congressionally Reserved, LSR, and Riparian Reserves. Two sites are at least partially on private lands. Of the sites in the local area, 20 sites are at least partially in NFS reserves and 69 sites are entirely in BLM reserves, collectively representing 56 percent of the NFS and BLM sites.

Coniferous, mixed hardwood-coniferous, and hardwood forests below 6,500 feet msl encompass approximately 616,550 acres on BLM and NFS lands in the local area, with 408,331 acres in reserve land allocations (66 percent of the forests). Of this acreage, an estimated 185,580 acres are LSOG, including 136,830 acres in reserves (74 percent of the forests). Other sites may also exist in the local area, particularly in the Klamath Mountains and Cascade Range, where surveys have not been completed, based on the number of sites in the local area, distribution of those sites, and the extent of forests that may provide suitable habitat (see Figures MOCH-3 and MOCH-4).

TABLE MOCH-5

Distribution of *Monadenia chaceana* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	19	7	-
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	1	-	1
Elk Creek-South Umpqua (785)	43	-	-
Klamath River-John C Boyle Reservoir (888)	1	-	1
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	50	13	36
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	22	-	22
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	3	-	3
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	14	-	12
Spencer Creek (865)	3	-	-
Trail Creek (804)	-	-	-
Upper Cow Creek (801)	4	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.

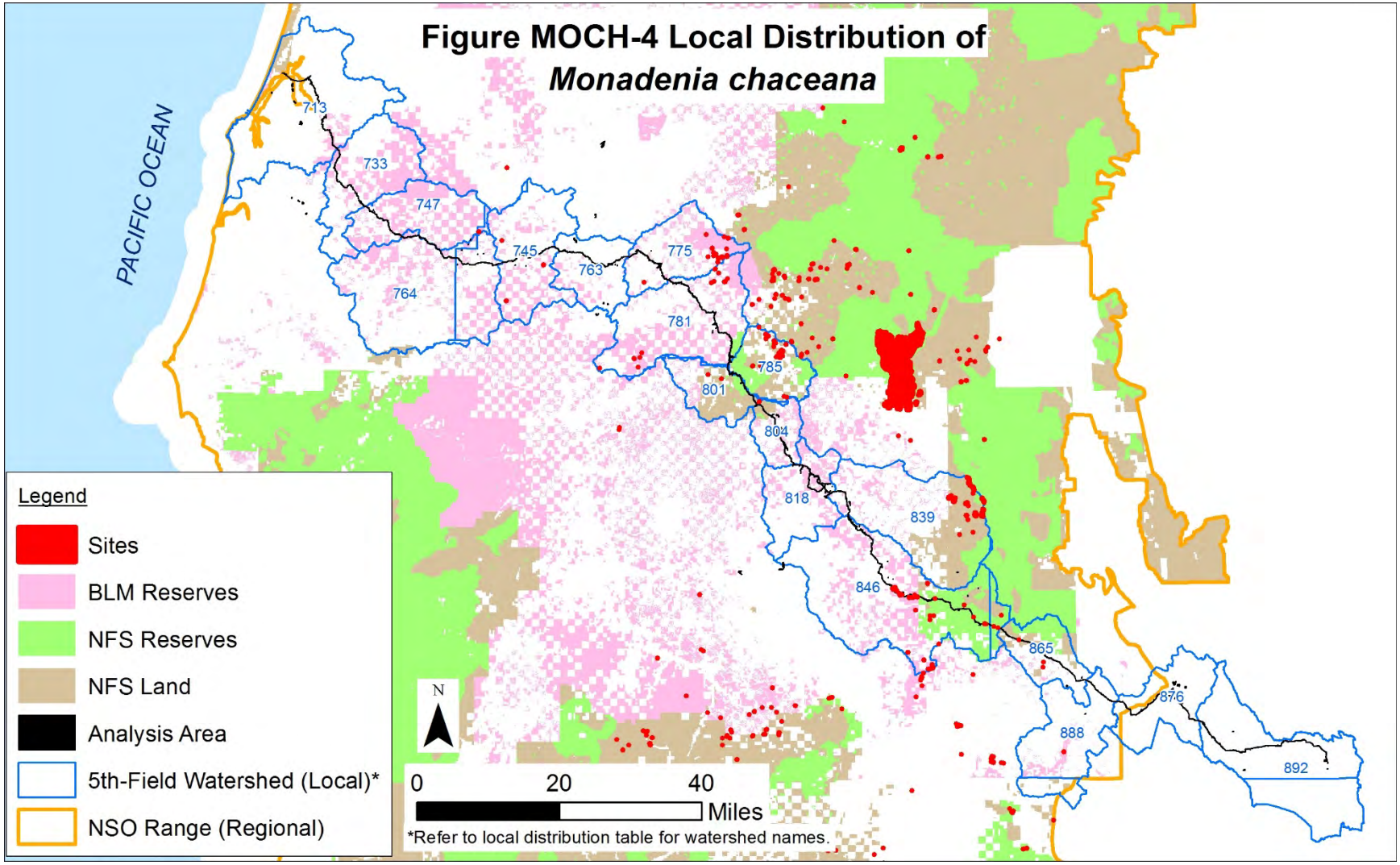


Figure MOCH-4 Local Distribution of
Monadenia chaceana
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis area contains 14 sites of *M. chaceana*, and the project area contains six sites. Nine sites are on NFS lands with the majority on the Rogue River-Siskiyou National Forest and a single site on the Fremont-Winema National Forest. The remaining five sites in the analysis area are on BLM lands. The sites are found in the Little Butte Creek and Spencer Creek watersheds in the eastern portion of the analysis area. Many sites are also located within the immediate vicinity of the analysis area in the Cascade Range and Klamath Mountains (see Local and Regional Distribution discussions above).

Surveys for the PCGP Project resulted in 12 total observations of the species in or near the project area (Siskiyou BioSurvey LLC 2008b). An estimated three of these recorded observations in combination with agency records comprise the 14 sites in the analysis area; the other observations are in sites outside the analysis area.

Project Impacts

Analysis

The PCGP Project would affect nine sites out of the 258 sites on NFS lands in the region, representing approximately 3 percent of the NFS sites. Site impacts on other land ownerships include five sites affected on BLM lands. The total number of sites affected is 14 sites out of the 410 total sites on all lands. Table MOCH-6 presents an overview of the features of the PCGP Project that would affect the *M. chaceana* sites on NFS lands. The construction corridor and associated work and storage areas would affect about 0.3 acre within four sites (about 94 percent of the four sites), and five additional sites could be indirectly affected near the project area on NFS lands.

The following discussion presents an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb approximately 0.27 acre of vegetation and soils within four sites and could result in injury or mortality to *M. chaceana* individuals. The establishment of the corridor and TEWA could modify microclimate conditions in suitable habitat adjacent to the corridor and could also result in indirect effects on the five additional sites near the project area. The removal of forests and understory components could negatively affect *M. chaceana* in adjacent areas by removing its habitat, potentially affecting site persistence even if the entire site is not disturbed. In addition, modification of shading, moisture, and habitat conditions as a result of the corridor could make habitat within the sites no longer suitable for the species. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Material storage within UCSAs would disturb about 0.03 acre of understory habitat in one site, which could remove logs or woody debris, potentially making the habitat unsuitable for the species or injuring individuals.

TABLE MOCH-6

Impacts to *Monadenia chaceana* Sites on NFS Lands in the Project Area

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	-	0.27 ac
Temporary Extra Work Area (TEWA)	-	-
Uncleared Storage Area (UCSA)	-	0.03 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

Across the project area, the PCGP Project would remove an estimated 1,237 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,500 feet msl, including 251 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *M. chaceana*. Within this impact area, about 609 acres (about 49 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential habitat, although some of the restored areas may provide habitat for the species during the life of the PCPG Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 261 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,500 feet msl. This loss of forests represents less than 1 percent of the total estimated area of forests below 6,500 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the nine sites on NFS lands as a result of the PCGP Project, 72 *M. chaceana* sites would remain on NFS lands in the local area, including 12 at least partially in reserves, and 249 sites, including 46 at least partially in reserves, would remain on NFS lands in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but they would be subject to S&M Standards and Guidelines protections and applicable management recommendations with regard to agency-related actions. The sites in reserves are assumed to have additional protections provided by the NWFP Standards and Guidelines in place for those land allocations. Based on these site counts, approximately 18 percent of the remaining *M. chaceana* sites on NFS lands in the NSO range would be protected in reserves.

The PCGP project may also affect five sites on BLM lands. Assuming persistence cannot be maintained at the five sites, 73 sites would remain on BLM lands in the local area, including 64 entirely in reserves, and 135 sites, including 85 entirely in reserves would remain on BLM lands in the NSO range. While sites on BLM lands are not subject to S&M Standards and Guidelines protections, sites entirely in reserves would likely receive some protection under the BLM 2016 RMPs.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states “instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision” (Standards and Guidelines, pg. 4). The Forest Service has embraced this

approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Monadenia chaceana* is a Category B (rare) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category B species are likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information since the species was listed in the 2001 ROD, however, indicates that the species appears to be more common than previously documented, as described below:

  — *Monadenia chaceana* has a somewhat wide distribution across six physiographic provinces and two states in the region and a moderate-high number of overall sites (258 on NFS lands and 410 on all lands). The species appears to be well distributed in its range in southern Oregon and extreme northern California. The currently known number of sites on BLM and NFS lands is an increase of 192 sites since 2007, with several sites documented during the PCGP Project surveys.

  — An estimated 34 percent of the sites (141 sites) are in reserves.

- Coniferous, mixed hardwood-coniferous, and hardwood forests below 6,500 feet msl (general habitat for the species) are widely distributed across the NSO range and encompass approximately 20 million acres on BLM and NFS lands with an estimated 59 percent in reserves. Most of the forests are found in the Cascade Range and Klamath Mountains, where most sites are documented. The Coast Range also contains coniferous, mixed, and hardwood forests, but few sites are located in the mountain range. A subcomponent of these forests likely provides habitat for *M. chaceana*.

- The PCGP Project would affect nine of 258 Forest Service-managed sites of *M. chaceana*, representing approximately 3 percent of the sites on NFS lands in the NSO range. An additional five sites would be affected on BLM lands. Assuming site persistence cannot be maintained at the 14 sites in the analysis area, a moderate-high number of sites (249) would continue to be documented on NFS lands in the region with a somewhat wide distribution across Oregon and California. Many sites (72) would remain on NFS lands in the local vicinity of the analysis area. An additional 85 sites would remain entirely in BLM reserves in the NSO range and 64 sites would remain entirely in BLM reserves in the local area. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would affect eight sites in NFS reserves, and the percentage of sites in NFS reserves would decrease from 21 percent to 18 percent. Of the remaining sites, 42 are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, five are in Congressionally Reserved areas where management activities that may adversely affect *M. chaceana* are unlikely, and two are in Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species. The PCGP project would also affect five sites entirely in BLM reserves. A total of 85 sites would remain entirely in BLM reserves, including District Designated and Congressional Reserves where management activities that may adversely affect *M. chaceana* are unlikely, LSRs where

management actions are restricted to those activities that benefit LSOG forests, and Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species.

- The PCGP Project would result in a permanent loss of an estimated 261 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,500 feet msl (less than 1 percent of the total acreage in the NSO range). An estimated 11.8 million acres (59 percent) of all forests and 4.1 million acres (66 percent) of LSOG forests below 6,500 feet msl would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *M. chaceana*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. This is a Category B species for which pre-disturbance surveys are not practical and have not been extensively conducted; however, it is reasonable to conclude that additional sites exist in the range of the NSO, particularly in the Klamath Mountains and Cascade Range, that have not been discovered based on the increased number of sites documented during strategic and other surveys, including surveys associated with the PCGP Project.

5.2.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *M. chaceana* at nine sites on NFS lands and five sites on BLM lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 249 sites would remain on NFS lands across the region, and 72 sites would remain on NFS lands in the local area. Additionally, 135 sites would remain on BLM lands across the region, including 85 sites entirely in reserves, and 73 sites would remain on BLM lands in the local area, including 64 sites entirely in reserves. Although the PCGP Project would affect site persistence of *M. chaceana* at nine sites on NFS lands, these sites are part of a group of sites in the Cascade Range in southern Oregon where the species is locally abundant and well distributed. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Monadenia chaceana* would persist in the region without considering the nine sites as part of the population.

- The PCGP Project would remove approximately 1,237 acres of all forests and 251 acres of LSOG forests below 6,500 feet msl (a negligible amount of the forests). An estimated 49 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 11.8 million acres (59 percent) of all forests and 4.1 million acres (66 percent) of LSOG forests below 6,500 feet msl would remain in reserves in the NSO range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely on BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. Although a single natural

disturbance event or combination of events could affect a significant portion of sites in a portion of southern Oregon, many sites are found in the area and are less likely to be collectively affected by a single event.

The PCGP Project would not be able to avoid impacts to all *M. chaceana* sites in the analysis area, although some individuals within the sites could persist following project implementation. Based on the above conclusions, avoidance of the nine *M. chaceana* sites is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plans that apply to affected sites would waive implementation of Management Recommendations for *M. chaceana* sites affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

6.0 VERTEBRATE SPECIES

6.1 ARBORIMUS LONGICAUDUS

Arborimus longicaudus is a small arboreal rodent in the Muridae family and is commonly known as red tree vole. The species has also been known as *Phenacomys longicaudus* (Oregon red tree vole).

6.1.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *A. longicaudus* as a Category C (uncommon) species. ORBIC evaluated *A. longicaudus* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and again its most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2016, the species was considered to be at moderate risk of extinction due to a restricted range, relatively few populations, recent and widespread declines; and uncommon but not rare with some cause for long-term concern due to declines within its global range (G3G4). In Oregon, it was considered to be at moderate risk of extinction due to a restricted range, relatively few populations, and recent and widespread declines (S3). The species is on the ORBIC List 4. It is considered a BLM and Forest Service Sensitive species in Oregon, and the North Oregon Coast Distinct Population Segment is a candidate for listing under the Endangered Species Act.

6.1.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Arborimus longicaudus is a small microtine rodent that is described as one of the most arboreal mammals in the Pacific Northwest (Forest Service and BLM 2001). Individuals occupy small home ranges and exhibit weak dispersal ability. The species lives in tree canopies and seldom migrates to the forest floor. Coniferous tree canopies provide nesting habitat, climatic buffering, refuge from predators, dispersal routes, forage, and drinking water. *Arborimus longicaudus* uses Douglas-fir needles for nest building materials and as its primary food source, which it makes palatable by stripping the resin ducts from each needle (U.S. Fish and Wildlife Service 2017). On the coast, *A. longicaudus* also utilize western hemlock and Sitka spruce needles (Forest Service and BLM 2016). The rodent is a primary prey item of the NSO and is also preyed on by northern saw-whet owl (*Aegolius acadicus*), raccoon (*Procyon lotor*), ringtail cat (*Bassariscus astutus*), and members of the weasel family (Mustelidae) (U.S. Fish and Wildlife Service 2017).

Range

Arborimus longicaudus is widespread in mesic and xeric coniferous forests in western Oregon and northwestern California (USDA and USDI 2007, U.S. Fish and Wildlife Service 2013). Its current

range extends from Del Norte County, California in the south to the Columbia River in Oregon in the north and from the Pacific Coast eastward to the Cascade Range (U.S. Fish and Wildlife Service 2013). *Arborimus longicaudus* has primarily been found in Oregon (ORBIC 2004, Hayes 1996). The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, it may have been similar to the current range, with populations limited to parts of Oregon and California. The species was likely found further north of the Columbia River and further east of the Cascade Range crest in the past (U.S. Fish and Wildlife Service 2013). It may have had more abundant local distributions across its range, but habitat modifications and other environmental factors, as discussed below under Threats, have likely reduced available habitat and may have further restricted the species' distribution.

Population Status

ORBIC (2004) reported *A. longicaudus* from an estimated 81–300 element occurrences across Oregon and California in 2004. Most occurrences were in Oregon (81–300) with fewer (1–5) in California (ORBIC 2004). In 2004, *A. longicaudus* was considered to be moderately vulnerable, primarily because of its relatively slow reproduction frequency, high age of maturity, and/or moderate fecundity (ORBIC 2004). Population trends throughout its range were unknown, although extirpations had been reported in some localities, and the species' distribution was reduced as a result of preferred habitat removal. In 2007, the species was widespread and rather common in some regions of Oregon, but populations had substantially declined where landscape disturbances, such as logging and fire, resulted in loss of mature forests (USDA and USDI 2007). The species was found in 80 locations during Random Multi-Species surveys across the NSO range (USDA and USDI 2007). The 2007 Final SEIS (USDA and USDI 2007) reported 1,032 sites on NFS and BLM lands and 1,039 total sites on all lands in the NSO range.

Protocol-level surveys are required for *A. longicaudus* and were conducted across approximately 1,319 acres of suitable habitat in the PCGP Project area between 2007 and 2016 (Siskiyou Biosurvey 2008a, 2012b, and 2016b). These surveys resulted in the identification of 1,661 nest trees, with some trees having multiple nests. A total of 3,334 nests were encountered, which included 1,311 confirmed active nests and 2,023 inactive nests. These observations have significantly increased the number of sites documented in BLM and Forest Service records, and more survey effort would be expected to locate more nest sites and trees. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Arborimus longicaudus inhabits moist coniferous and mixed hardwood-coniferous forests containing Douglas-fir, grand fir, Sitka spruce, western hemlock, and white fir (Johnson and George 1991, Manning and Maguire 1999, U.S. Fish and Wildlife Service 2013) and has been found from sea level to 5,500 feet msl (Huff et al. 2012). The species has been found in greater abundance and frequency in old-growth forests than in younger forests (Aubry et al. 1991). Old-growth Douglas-fir trees provide optimal habitat for *A. longicaudus* (Carey 1991). Although *A. longicaudus* has been found to utilize younger forests, data suggest that younger forests may be population sinks rather than population sources (Carey 1991). Younger forests in early seral

conditions are considered low quality, transitional habitats. *Arborimus longicaudus* seems to prefer specific microclimate conditions of LSOG forests, although it is occasionally found in younger forests (U.S. Fish and Wildlife Service 2013).

Threats

Arborimus longicaudus exhibits a very high sensitivity to forest disturbance, has low dispersal capability and reproductive potential, and occupies a small home range. It is threatened by logging, fire, and other management activities that isolate remaining populations. Forest fragmentation prevent gene flow and negatively affect genetic diversity in the metapopulation (Holthausen et al. 1994). Because of the species' limited dispersal capabilities, connectivity between LSOG habitat is considered important to metapopulation dynamics. Populations inhabiting younger forests may not longer exist in the area if they do not adequately reproduce each year (Forest Service and BLM 2001). These threats continue to affect populations of *A. longicaudus* in the NSO range by isolating nest sites and reducing suitable habitat (U.S. Fish and Wildlife Service 2013).

Management Recommendations

As a Category C S&M species, the direction under the 2001 ROD is to manage high-priority sites to provide a reasonable assurance of species persistence. This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. Management recommendations were created for *Arborimus longicaudus* in 2000 (Forest Service and BLM 2000). The specific objectives for the management recommendations were derived from the 1994 ROD standards and guidelines for the species that stated "management standards will be developed to manage habitat for the species on sites where they are located." These management objectives are to:

- maintain the physical integrity of the habitat at active and undetermined sites;
- maintain red tree vole populations at sites where they currently occur; and
- prevent the inadvertent loss of red tree voles at sites where the species is assumed to occur but were not detected due to incomplete surveys.

The direction includes guidance for establishing Habitat Areas for purposes of managing the species and its habitat in accordance with the 1994 ROD. Any management that occurs within a Habitat Area should not remove or modify nest trees, the canopy structure of the stand, or remove any of the dominant, codominant, or intermediate crowns. This includes activities that may isolate nest trees or alter the microclimate within the stand. Some activities may be appropriate if they maintain or improve, and do not degrade (short- or long-term), the habitat condition in the Habitat Area.

6.1.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *A. longicaudus* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table ARLO-1 shows the total number of sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (100-meter spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). A total of 13,455 observations from BLM and Forest Service geodatabases were converted into 4,946 sites in the NSO range (region). The sites in the analysis area were further modified to generate Habitat Areas for the red tree vole as defined in the Management Recommendations for the species (Forest Service and BLM 2001), which resulted in 64 Habitat Areas from 103 sites. Table ARLO-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table ARLO-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure ARLO-1 displays the regional distribution of the species across NFS lands, Figure ARLO-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure ARLO-3 displays the species' regional distribution with the extent of coniferous and mixed hardwood-coniferous forests and LSOG forests below 6,000 feet msl on BLM and NFS lands across the NSO range.

TABLE ARLO-1

Number of *Arborimus longicaudus* Sites (2017)

Location*	Number of Sites
Regional Area	4,946
Local Area	1,067
Analysis Area (Project Area)	103 (80)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE ARLO-2

Distribution of *Arborimus longicaudus* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	1,524	466	55
BLM	3,418	604	48
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	869	181	28

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.

TABLE ARLO-3

Distribution of *Arborimus longicaudus* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	225	-	-
Adaptive Management Reserves (AMR)	9	-	-
Administratively Withdrawn (AW)	44	1	-
Congressionally Reserved (CR)	**11**	**-**	**-**
Late Successional Reserve (LSR)	**505**	**227**	**24**
Marbled Murrelet Area (LSR3)	**8**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**14**	**1**	**-**
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	805	259	32
Riparian Reserve	**1**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	**2**	**-**	**-**
District Designated Reserve	**1,059**	**252**	**19**
Harvest Land Base	1,708	358	26
Late Successional Reserve	**2,196**	**375**	**33**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	8
Riparian Reserve	**1,985**	**349**	**25**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center (KOAC).

Regional Distribution

Arborimus longicaudus is somewhat widely distributed across seven physiographic provinces in Oregon (Willamette Valley, Coast Range, Cascades East and West, and Klamath Mountain) and California (Klamath and Coast) (see Figure ARLO-1). Most sites are found in the Klamath Mountains in Oregon, where sites are abundant and close together in large clusters or groups. Sites in the western Cascade Range in Oregon are more scattered, yet are relatively abundant with many clusters of sites. Sites in other areas of Oregon and California are scattered and less abundant. *Arborimus longicaudus* appears to be well distributed within its range in Oregon based on the abundance and size of sites, proximity of sites to one another, and distribution of sites across forests that may provide suitable habitat in the mountain ranges.

Of the 4,946 sites in the region, 869 sites are at least partially located on private, state, or other lands, 3,418 sites are at least partially on BLM lands, and 1,524 sites are at least partially on NFS lands across the region. Sites included on National Forests that encompass the project area include 573 sites on the Rogue River-Siskiyou National Forest and 663 sites on the Umpqua National Forest. The remaining sites on NFS lands are located on the Mt. Hood, Siuslaw, Six Rivers, and Willamette National Forests and in the Columbia River Gorge National Scenic Area.

Across the NSO range, 524 sites are located on reserve lands managed by the Forest Service, including 505 at least partially in LSRs, eight in Marbled Murrelet Areas, 14 at least partially in Known Owl Activity Centers, 11 in Congressionally Reserved areas, and one in Riparian Reserves. These sites represent 34 percent of the total Forest Service-managed sites in the region. The remaining NFS sites sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. An additional 1,710

sites are located entirely in reserve lands managed by BLM, which represents approximately 50 percent of the total number of BLM-managed sites in the region.

Arborimus longicaudus is primarily found in LSOG forests based on available data (4,499 of 4,946 total sites are in LSOG) and seems to prefer specific microclimates of LSOG forests, although it is occasionally found in younger forests. Based on current site locations, the species is primarily found in coniferous and mixed hardwood-coniferous forests below about 5,300 feet msl in the Klamath Mountains and Coast Range of Oregon and California and the Cascade Range of Oregon. LSOG coniferous and mixed hardwood-coniferous forests in this range could provide habitat for *A. longicaudus* and support additional sites. These forests encompass an estimated 5.9 million acres on BLM and NFS lands in the NSO range (see Figure ARLO-3 and Table ARLO-4), including 3.9 million acres in reserve land allocations (66 percent of the forests). LSOG coniferous and mixed forests below 6,000 feet msl are somewhat widely distributed across Oregon and northern California, but connectivity between the forests may be limited in some areas, restricting the species' distribution. Younger coniferous and mixed forests may provide habitat for the species as they mature and develop suitable habitat conditions over time, and these forests are more widespread across Oregon and California.

TABLE ARLO-4

Extent of Forests that Could Provide Habitat for *Arborimus longicaudus* on BLM and NFS Lands*

Location	Coniferous and Mixed Forests below 6,000 feet		LSOG Forests below 6,000 feet	
	Total	**Reserves**	**Total**	**Reserves**
Regional Area	18,055,593	10,707,574	5,908,944	3,894,277
Local Area	568,307	369,371	181,349	133,178
Project Area	1,419	982	323	230

Data Source: Gradient nearest neighbor vegetation data from Moeur et al. 2011

Note: Areas are presented in acres. Regional area estimates are for a portion of the NSO range, as noted in the text, which is where the species is known to or may occur.

*The acreage estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

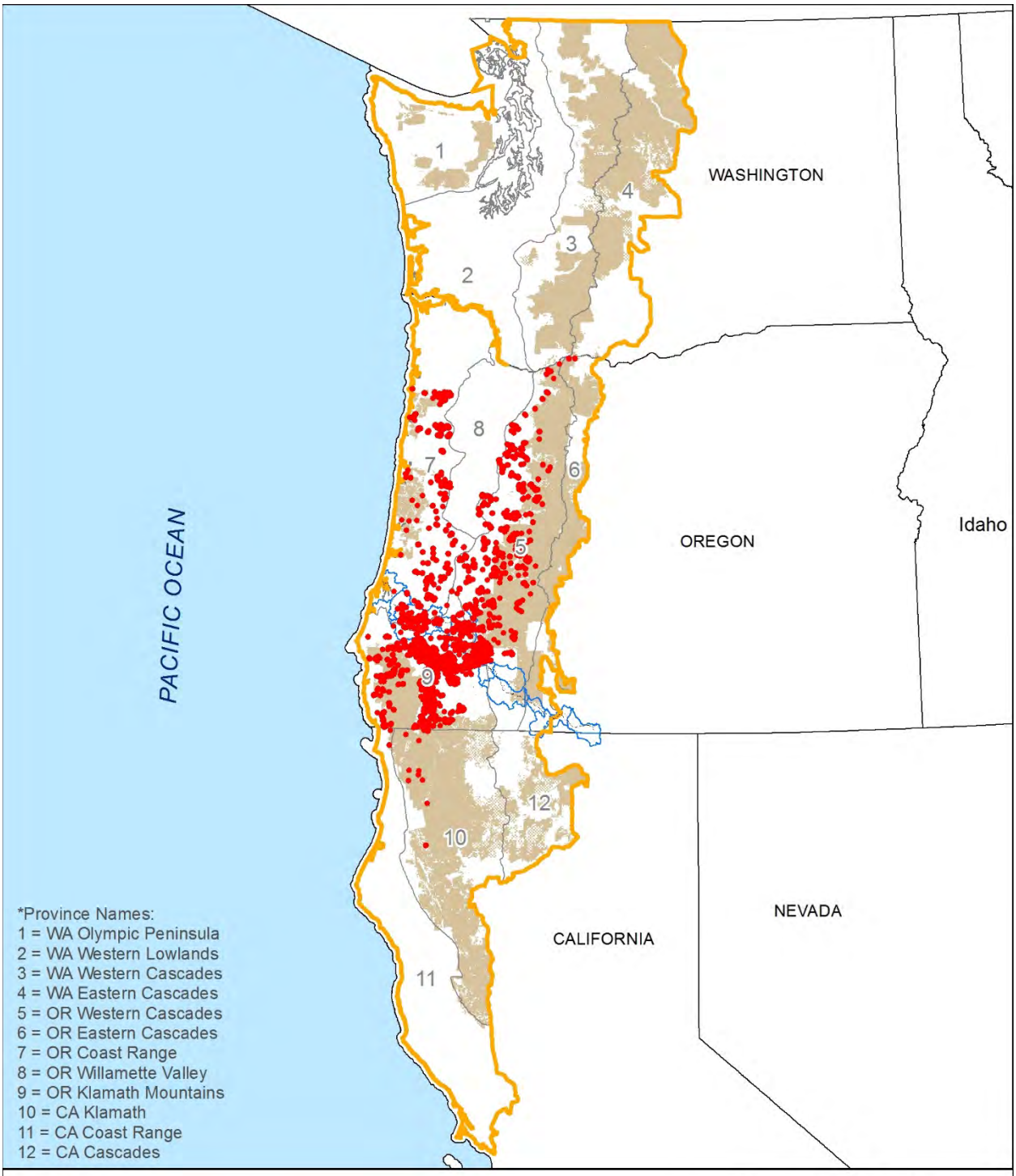
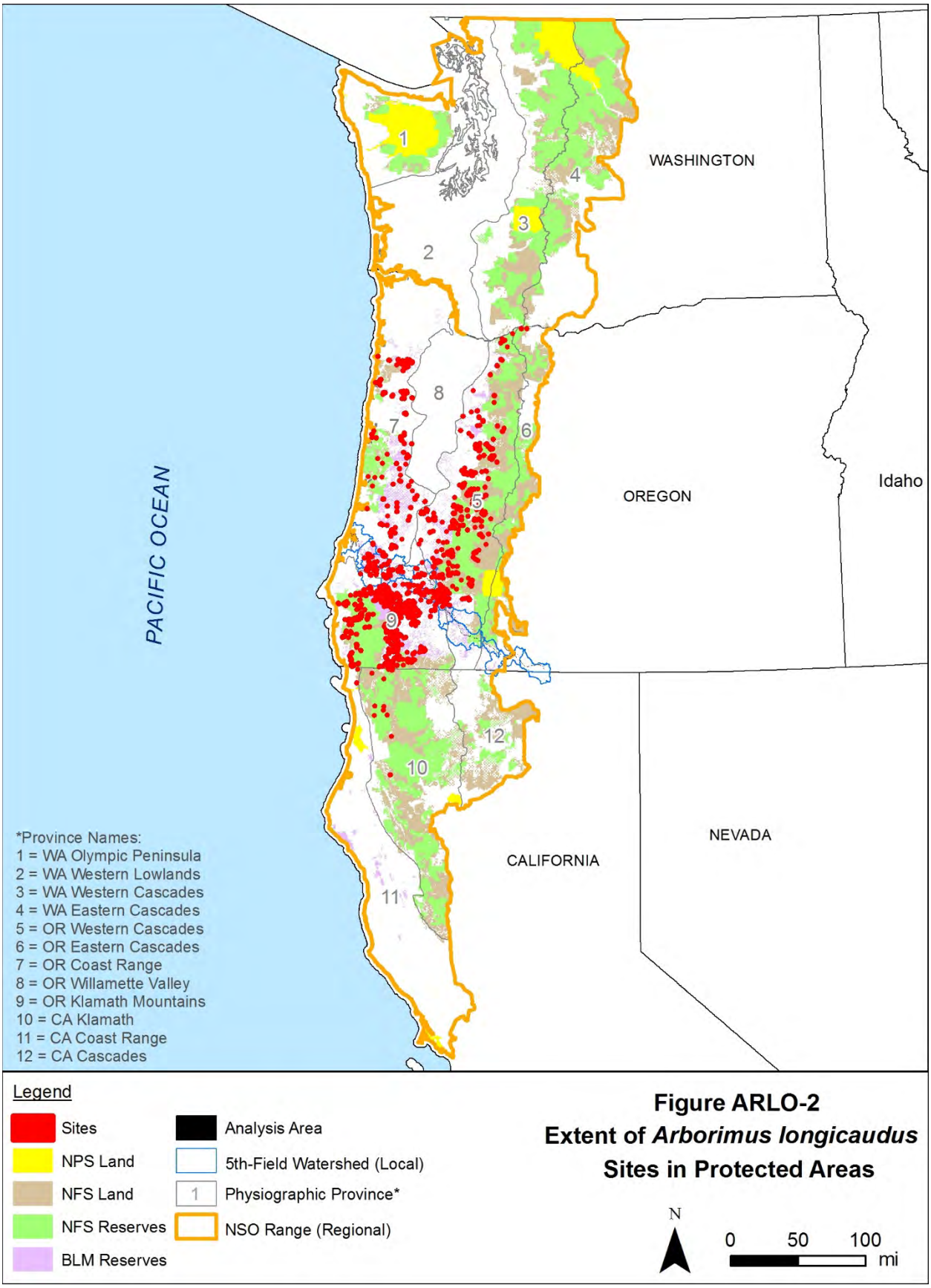


Figure ARLO-1
Regional Distribution of
Arborimus longicaudus


WASHINGTON
OREGON
CALIFORNIA
NEVADA
Idaho
PACIFIC OCEAN
1
2
3
4
5
6
7
8
9
10
11
12
*Province Names:
1 = WA Olympic Peninsula
2 = WA Western Lowlands
3 = WA Western Cascades
4 = WA Eastern Cascades
5 = OR Western Cascades
6 = OR Eastern Cascades
7 = OR Coast Range
8 = OR Willamette Valley
9 = OR Klamath Mountains
10 = CA Klamath
11 = CA Coast Range
12 = CA Cascades
Legend
Sites
NPS Land
NFS Land
NFS Reserves
BLM Reserves
Analysis Area
5th-Field Watershed (Local)
1 Physiographic Province*
NSO Range (Regional)
Figure ARLO-2
Extent of Arborimus longicaudus
Sites in Protected Areas
N
0 50 100
mi

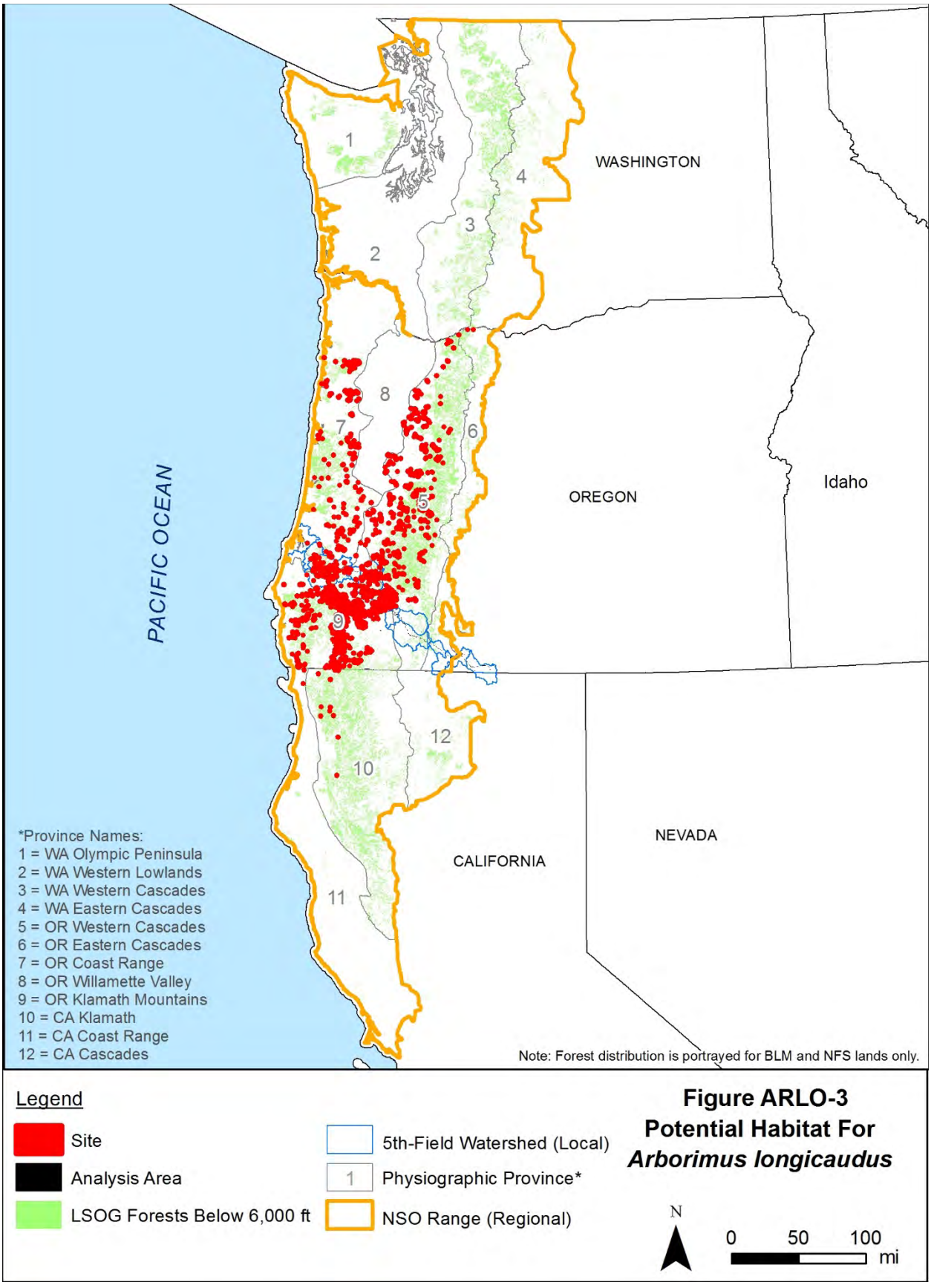


Figure ARLO-3
Potential Habitat For
Arborimus longicaudus

Local Distribution

Within the local area, *A. longicaudus* is distributed across 12 5th-field watersheds that overlap the project area (see Table ARLO-5 and Figure ARLO-4). The sites are distributed across the western Cascade Range, Klamath Mountains, and Coast Range in the local area, with many clusters of sites. Many other sites in the vicinity located entirely in BLM reserves or NFS lands and may offer opportunities for dispersal or connectivity between sites across LSOG coniferous and mixed forests.

Of the 1067 sites in the local area, 181 sites are at least partially on private or other lands, 604 sites are at least partially on BLM lands, and 466 sites are at least partially on NFS lands. Of the sites in the local area, 223 sites are at least partially in NFS reserve lands and 246 sites are entirely in BLM reserve lands, collectively representing 44 percent of the NFS and BLM sites.

LSOG coniferous and mixed hardwood-coniferous forests below 6,000 feet msl encompass approximately 181,349 acres on BLM and NFS lands in the local area, with 133,178 acres in reserve land allocations (73 percent of the forests). Other sites may also exist throughout the local area where surveys have not been completed, based on the number and distribution of sites in the local and nearby regional areas and the extent of forests that may provide suitable habitat (see Figures ARLO-3 and ARLO-4).

TABLE ARLO-5

Distribution of *Arborimus longicaudus* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	-	-	-
Coos Bay Frontal (713)	1	-	-
East Fork Coquille River (747)	23*	-	23
Elk Creek-South Umpqua (785)	411*	210	9
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	-	-	-
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	154*	-	146
Middle South Umpqua River (763)	11*	-	9
Myrtle Creek (775)	45*	-	40
North Fork Coquille River (733)	9	-	9
Olalla Creek-Lookingglass Creek (745)	31*	-	29
Rogue River-Shady Cove (818)	4	-	4
South Umpqua River (781)	7*	-	-
Spencer Creek (865)	-	-	-
Trail Creek (804)	232*	-	204
Upper Cow Creek (801)	88*	23	29

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.
*Note: Site counts are not additive because some sites occur in multiple watersheds and the counts overlap.

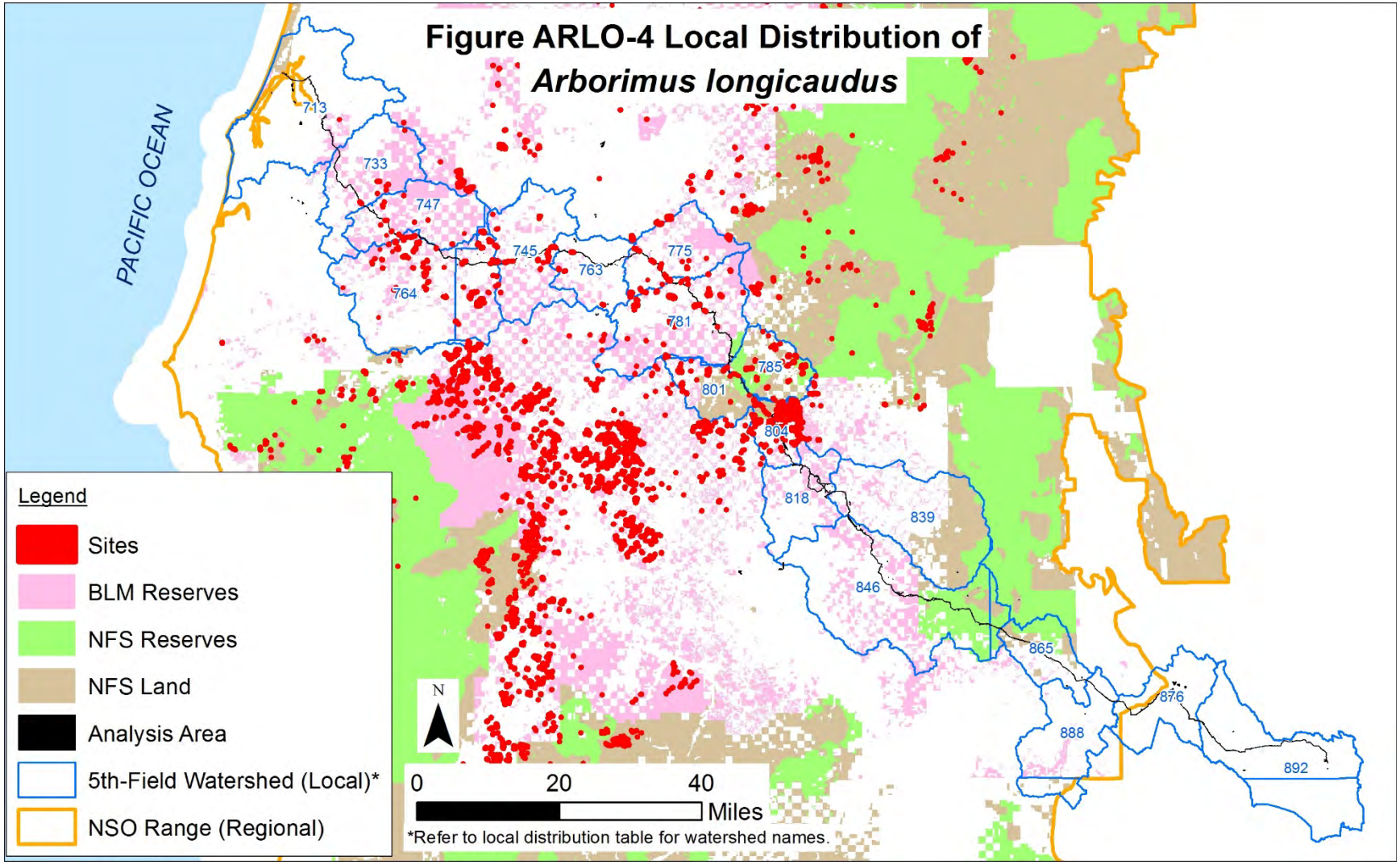


Figure ARLO-4 Local Distribution of
Arborimus longicaudus
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis area contains 103 sites of *A. longicaudus*, and the project area contains 80 sites. A total of 28 sites are at least partially on private lands, 48 sites are at least partially on BLM lands, and 55 sites are at least partially on NFS lands. While the majority of the NFS sites are in lands designated as Other (Matrix), 24 sites are in LSRs. An additional 26 sites are entirely in BLM reserves in the analysis area. The analysis area sites are distributed across 10 5th-field watersheds, and many other sites are located in the vicinity of the analysis area, including sites on NFS lands or entirely in BLM reserves (see Local Distribution discussion above).

Surveys for the PCGP Project resulted in 1,311 total observations of active nests of the species in or near the project area (Siskiyou BioSurvey LLC 2008a, 2012b, and 2016b). All of these recorded observations in combination with other observations in agency databases comprise the 103 sites in the analysis area and the 80 sites in the project area. Within the project area, the 80 sites are between MPs 27.1 and 116.8.

Project Impacts

Analysis

The PCGP Project would affect 55 sites out of the 1,524 sites on NFS lands in the region, representing approximately 4 percent of the sites. Sites impacts on other land ownerships include 48 sites affected out of the 3,418 sites on BLM lands. The total number of sites affected would be 103 sites out of 4,946 sites on all lands. The 103 sites were converted into 64 Habitat Areas in the analysis area, 25 of which occur on NFS lands. These Habitat Areas were used for the analysis of impacts to the species. Table ARLO-6 presents an overview of the features of the PCGP Project that would affect the *A. longicaudus* Habitat Areas on NFS lands. The construction corridor, associated work and storage areas, and roads would affect approximately 62.5 acres within the Habitat Areas (about 17 percent of the Habitat Areas on NFS lands). This discussion presents an overview of the types of impacts that would be expected in the Habitat Areas based on the features of the PCGP Project that could affect site persistence.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 48.2 acres of vegetation and soil within 23 Habitat Areas and could result in the removal of trees that support *A. longicaudus* nests or cause injury or mortality to individuals. Disturbance in the TEWAs would result in similar impacts on about 8.4 acres within 20 Habitat Areas, and road improvements and establishment would result in similar impacts on about 0.2 acre within one Habitat Area. The establishment of the corridor, TEWAs, and roads could modify microclimate conditions around nests or potential nest trees adjacent to these areas. The removal of forests and potential nest trees could negatively affect *A. longicaudus* in adjacent areas by removing its habitat and opening the tree canopy, potentially affecting site persistence at the Habitat Areas even if the entire Habitat Area is not disturbed. In particular, modification of shading and habitat conditions as a result of the corridor, TEWAs, and roads could make entire Habitat Areas no longer suitable for the species because of the preference for closed canopy habitats. Restored portions of the corridor and TEWAs would be dominated by early seral vegetation for approximately 30 years, which would result in long-term changes to habitat conditions. A portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Material storage within UCSAs would disturb about 5.7

acres of understory habitat in seven Habitat Areas, but these activities would be limited to understory disturbance and are less likely to affect *A. longicaudus* in the canopies of trees.

TABLE ARLO-6

Impacts to *Arborimus longicaudus* Habitat Areas on NFS Lands in the Project Area

Project Activity	Number of Habitat Areas Affected	Area of Disturbance within Habitat Areas
Construction Corridor	23	48.2 ac
Temporary Extra Work Area (TEWA)	20	8.4 ac
Uncleared Storage Area (UCSA)	7	5.7 ac
Roads (TMP)	1	0.2 ac
Other Minimal Disturbance Activities	-	-

ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

Across the project area, the PCGP Project would remove an estimated 125 acres of LSOG coniferous and mixed hardwood-coniferous forests below 6,000 feet msl. These impacts would result in a reduction of habitat that may be suitable for *A. longicaudus*. Within this impact area, about 65 acres (about 52 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, but the restored areas would not return to LSOG conditions for more than 80 years and would not likely provide habitat for the species during the life of the PCGP Project. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area and would not provide habitat for the species. The permanent loss of LSOG coniferous and mixed forests below 6,000 feet msl represents less than 1 percent of the total estimated area of these forests across the species' range.

Discussion

Assuming site persistence cannot be maintained at the 25 Habitat Areas or 55 sites on NFS lands as a result of the PCGP Project, 411 sites of *A. longicaudus* would remain on NFS lands in the local area, including 199 in reserves, and 1,469 sites, including 500 in reserves, would remain on NFS lands in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but they would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 500 sites in reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. Based on these site counts, approximately 34 percent of the remaining *A. longicaudus* sites on NFS lands in the NSO range would be protected in reserves.

The PCGP project may also affect 39 Habitat Areas and 48 sites on BLM land. Assuming persistence cannot be maintained at these sites, 556 sites would remain on BLM lands in the local area, including 220 entirely in reserves, and 3,370 sites, including 1,684 entirely in reserves would remain on BLM lands in the NSO range. While sites on BLM lands are not subject to S&M Standards and Guidelines protections, the species is considered a BLM Sensitive Species in Oregon, and would receive protection under BLM management. *Arborimus longicaudus* sites that are entirely in reserves would likely receive additional protection under the BLM 2016 RMPs.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with

the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Arborimus longicaudus* is a Category C (uncommon) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category C species are likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information, however, since the species was listed in the 2001 ROD indicates that the species appears to be more common than previously documented, as noted below:

  — *A. longicaudus* has a somewhat wide distribution across seven physiographic provinces and two states in the region and a moderate-high number of overall sites (1,524 on NFS lands and 4,946 on all lands). The species appears to be well distributed in its range in Oregon. The currently known number of sites on BLM and NFS lands is an increase of 3,914 sites since 2007, with many sites documented during the PCGP Project surveys.

  — An estimated 47 percent of the sites (2,234 sites) are in reserves.

- LSOG coniferous and mixed hardwood-coniferous forests below 6,000 feet msl (general habitat for the species) are somewhat widely distributed across the NSO range and encompass approximately 5.9 million acres on BLM and NFS lands with an estimated 66 percent in reserves. Most of the forests are found in the Cascade Range and Klamath Mountains, where most sites are documented. The Coast Range and other areas also contain LSOG forests, and many sites are located in the Coast Range. A subcomponent of these forests likely provides habitat for *A. longicaudus*.

- The PCGP Project would affect 55 of 1,524 Forest Service-managed sites of *A. longicaudus*, representing approximately 4 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the 55 sites (25 Habitat Areas), a moderate-high number of sites (1,469) would continue to be documented on NFS lands in the region with a somewhat wide distribution across Oregon and California. Many sites (411 sites) would remain in the local vicinity of the analysis area. The PCGP project would also affect 48 of 3,418 BLM-managed sites, leaving 3,370 sites on BLM lands in the region and 220 sites on BLM lands in the local area. Of the sites remaining on BLM lands, 1,684 sites would remain entirely in reserves. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would affect site persistence at 24 sites in NFS reserves, but the percentage of sites in reserves would remain the same (34 percent). Of the remaining sites on NFS lands, 503 are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, and 11 are at least partially in Congressionally Reserved areas where management activities that may adversely affect *A. longicaudus* are unlikely. The PCGP Project would also affect 26 sites entirely in BLM reserves. A total of 1,684 sites would remain entirely in BLM reserves, including District Designated and Congressional Reserves where management activities that may adversely affect *A. longicaudus* are unlikely, LSRs where management actions are restricted to those activities

that benefit LSOG forests, and Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species.

- The PCGP Project would result in a permanent loss of an estimated 220 acres of LSOG coniferous and mixed hardwood-coniferous forests below 6,000 feet msl (less than 1 percent of the total acreage in the species' range). An estimated 3.9 million acres (66 percent) of LSOG forests below 6,000 feet msl would remain in reserves in the species' range.

- The remaining forests could support additional populations of *A. longicaudus*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. This is a Category C species for which pre-disturbance surveys are practical and have been conducted in parts of the NSO range, and it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during pre-disturbance and other surveys, including surveys associated with the PCGP Project.

6.1.1 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *A. longicaudus* at 55 sites on NFS lands and 48 sites on BLM lands; however, the remaining sites would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 1,469 sites would remain on NFS lands across the region, including 500 sites at least partially in reserves, and 411 sites would remain on NFS lands in the local area, including 199 sites at least partially in reserves. Additionally, 3,370 sites would remain on BLM lands across the region, including 1,684 sites entirely in reserves, and 556 sites would remain on BLM lands in the local area, including 220 sites entirely in reserves. Although the PCGP Project would affect site persistence of *A. longicaudus* at 55 sites (25 Habitat Areas) on NFS lands and 48 sites (39 Habitat Areas) on BLM lands, the sites are part of the many sites in the Klamath Mountains and western Cascade Range in Oregon where the species is well distributed. It is expected that BLM management would allow the majority of sites on BLM lands persist. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Arborimus longicaudus* would persist in the region without considering the 103 sites as part of the population.

- The PCGP Project would remove approximately 125 acres of LSOG coniferous and mixed forests below 6,000 feet msl (a negligible amount of the forests). An estimated 52 percent of the forests would be restored to similar conditions or shrublands, but a 30-foot wide early-successional corridor would remain across the project area. An estimated 3.9 million acres (66 percent) of LSOG coniferous and mixed forests below 6,000 feet msl would remain in reserves in the species' range. Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 2007.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable

future. The remaining sites on BLM lands are expected to receive protection from BLM Sensitive species management in Oregon. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is somewhat widely distributed.

The PCGP Project would not be able to avoid all *A. longicaudus* sites or Habitat Areas in the analysis area, although some individuals or nests within the sites may persist following project implementation. Based on the above conclusions, avoidance of the 55 *A. longicaudus* sites or 25 Habitat Areas is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plans that apply to affected sites would waive implementation of Management Recommendations for *A. longicaudus* sites and Habitat Areas affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

6.2 STRIX NEBULOSA

Strix nebulosa is a forest owl in the Strigidae family and is commonly known as great gray owl. Two subspecies are recognized: *Strix nebulosa nebulosa* in North America and *Strix nebulosa lapponica* in Asia and Europe. A third subspecies, *Strix nebulosa yosemitensis*, has been recognized as an isolated population restricted to the Yosemite region of the central Sierra Nevada Mountains (Hull et al. 2014).

6.2.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 ASR modifications to the S&M species list, identifies *S. nebulosa* as a Category A (rare) species. ORBIC evaluated *S. nebulosa* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and again in its most recent update of *Rare, Threatened and Endangered Species of Oregon* (ORBIC 2016). In 2016, the species was considered to be demonstrably common, widespread, and abundant within its global range (G5) and at moderate risk of extinction due to a restricted range, relatively few populations, recent and widespread declines, or other factors in Oregon (S3). The species is on the ORBIC List 3. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

6.2.2 Background Information

This section presents background information on the species based on published documents and other relevant sources and includes information available prior to this analysis. Site counts, for example, are presented in this section using previously published estimates, and current site counts, which are used for the analysis, are discussed below under Persistence Evaluation. The background information in this section is used to support the persistence evaluation in the following section, which is updated with more recent information (e.g., recent survey data) specifically used for the persistence evaluation.

Life History

Strix nebulosa is nocturnal and highly elusive. The species tends to be long lived and has relatively low rates of reproduction and adult mortality (Williams 2012). Individuals in the wild are estimated to live between 10–20 years and begin breeding at three years of age. They are solitary

in fall and early winter and become somewhat gregarious in the early spring. Adult males establish breeding territory in the autumn or winter by vocalizing in the vicinity of their nest, most often nocturnally. The owl demonstrates a strong fidelity to breeding and wintering areas (Bull et al. 1988), but individuals do not necessarily use the same nest year after year (Williams 2012). The owl does not build its own nests, but instead uses existing stick nests constructed by other raptors and large corvids. It also utilizes trees with large mistletoe clumps, depressions in the broken tops of large trees, or even artificial nesting platforms (Williams 2012, Quintana-Coyer et al. 2004). The nesting period is from March 1 through July 31 (Williams 2012).

The owl preys primarily on woodland and meadow rodents and to a lesser degree on other small mammal species, birds, and insects (Bull and Henjum 1990). In the western United States, *S. nebulosa* often preys on California vole (*Microtus californicus*), mole species (*Scapanus* spp.), and Botta's pocket gopher (*Thomomys bottae*). Conversely, adults and owlets are preyed upon by great horned owl (*Bubo virginianus*), raven (*Corvus corax*), northern goshawk (*Accipiter gentilis*), golden eagle (*Aquila chrysaetos*), and American marten (*Martes americana*) (Ulev 2007).

Range

Strix nebulosa ranges across the boreal forests of North America, Europe, and Asia (ORBIC 2004). In North America, its range extends from Quebec to Alaska, southward through the alpine and subalpine forests of the Cascade Mountains in Washington and Oregon, the northern Sierra Nevada Mountains in California, the northern Rocky Mountains, and portions of northern Minnesota, Michigan, and Wisconsin (Williams 2012, Quintana-Coyer et al. 2004). The northern limit of its range extends to the treeline, and the southern limit extends into other forest types (Williams 2012). The currently known range of the species within the NSO range based on 2017 data is discussed below under Species Distribution.

Although information on the species' historical range is not known, it was likely similar to the current range, with populations widely distributed across North America, Europe, and Asia. Regional and local distributions across its range may have varied based on specific habitat conditions and have likely been affected by habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported *S. nebulosa* from more than 300 element occurrences worldwide in 2004. In the Pacific Northwest, most occurrences were from Oregon (21–300), with fewer in California (6–20) and Washington (1–5) (ORBIC 2004). ORBIC estimated that 4–12 of the occurrences in Oregon were in protected areas in 2004. In Oregon, *S. nebulosa* was considered rare to uncommon in 2004, but populations were stable to relatively stable (ORBIC 2004). Within the NSO range, the population trend of *S. nebulosa* has been decreasing (USDA and USDI 2007). The species was not included in the Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). In 2007, the NFS and BLM reported 118 sites on federal lands and 131 total sites on all lands in the NSO range (USDA and USDI 2007).

Protocol surveys were conducted for *S. nebulosa* in 2007–2008 and 2010–2011 in suitable habitat in and near the PCGP Project area. Approximately 4,440 acres were surveyed in 2007–2008 (Siskiyou BioSurvey LLC 2008a), and two proposed re-routes, including suitable habitat within 0.25-mile, were surveyed in 2010–2011 (Siskiyou BioSurvey LLC 2011b). In 2007, 18 detections

of the species were recorded, including two pairs and one resident owl. In 2008, 31 detections of the species were recorded, including 13 clusters, three pairs, and one resident owl. In 2010–2011, two great gray owls were heard, but more details on the owls were not recorded, and they were assumed to be individual detections, not pairs. The current estimated number of sites and distribution of the species based on 2017 data are presented below under Species Distribution.

Habitat

Strix nebulosa has been found in coniferous and mixed hardwood-coniferous forests up to approximately 6,000 feet msl (Williams 2012, Quintana-Coyer et al. 2004). The owl is typically found in mature coniferous forest composed primarily of pine (*Pinus* spp.), fir (*Abies* spp.), and spruce (*Picea* spp.) and nests in large, undisturbed forest stands (Williams 2012). It has a close association with habitat edges, particularly the interface between mature forest and meadows where snags are present and adjacent clearings are generally larger than 10 acres (Williams 2012, Quintana-Coyer et al. 2004). Natural forest openings along the edges of meadows, bogs, and other open areas serve as foraging habitat, where individuals perch on low branches and watch for prey species (Ulev 2007). LSOG forests, selectively logged forests, and clearcuts also provide foraging habitat (Williams 2012). Habitats composed of large open areas with few or no trees or with high shrub density tend to be avoided (Duncan 1997).

In the Siskiyou Mountains in southwestern Oregon, *S. nebulosa* has been reported nesting most frequently in LSOG forest stands composed primarily of Douglas fir located near forest edges (Quintana-Coyer et al. 2004). It tends to select oak trees, Pacific madrone, and LSOG Douglas-fir forests adjacent to Oregon white oak (*Quercus garryana*) woodlands and chaparral (Williams 2012). In the central and southern Cascade Range in Oregon, the species most often use lodgepole pine and ponderosa pine forests (Williams 2012, Bull and Henjum 1990).

Threats

Timber harvesting, including through non-clearcut methods, is the greatest threat to the species due to habitat loss and decrease in habitat quality. Removal of large diameter trees results in dense canopy reduction, which the species requires for nesting and roosting (Williams 2012). Changes in forest stand dynamics can also indirectly affect nest availability by reducing or destroying nesting habitat for northern goshawks and other raptors whose nests are later used by *S. nebulosa.* Regenerating timber harvest also threatens the species because the densely growing young trees shade out the grasses and other understory vegetation used by rodents (Williams 2012). Forest fire suppression has led to intrusion of small conifer trees into meadows and other open areas, reducing foraging habitat in already small meadow areas. Because the species is at risk from predation by great horned owl in large open areas, clear cutting does not necessarily improve foraging habitat (Duncan 1997).

Management Recommendations

As a Category A S&M species, the direction under the 2001 ROD is to manage all known sites to provide a reasonable assurance of species persistence. This statement is no longer applicable on BLM lands under the 2016 BLM RMPs, although it is still valid on NFS lands within the range of the NSO. The *Survey Protocol for Great Gray Owl (Strix nebulosa) within the Northwest Plan Area* provide criteria to define *S. nebulosa* sites (Huff and Goodwin 2016), as described in Chapter 1. The *Conservation Assessment for Great Gray Owl (Strix nebulosa)* provides management

considerations for the species (Williams 2012). The guidance includes retaining sufficient landscape-level habitat features; protecting and maintaining existing nest sites; minimizing disturbance around nest sites during the breeding season; and providing artificial nest structures. Habitat features that should be retained include open areas for foraging adjacent to stands of mature or old-growth trees for nesting and roosting; irregular borders to increase forest edge area; forested corridors between cut areas; forested stands around nest sites or potential nest sites; and hunting perches (large trees, large snags, or artificial platforms) in harvest patches.

6.2.3 Persistence Evaluation

This section presents the persistence evaluation for the species, which includes a discussion of the species' currently known distribution within the NSO range based on new site information, an evaluation of the impacts of the PCGP Project on sites and habitat, a discussion of sites remaining in the NSO range following project implementation, and a summary of the factors considered in the persistence evaluation to support the conclusions in the following section.

Species Distribution

The distribution of *S. nebulosa* across the NSO range and in and near the project area is discussed below. This discussion is based on the recorded observations of the species stored in geodatabases maintained by BLM and the Forest Service (Oregon/Washington regional offices) and converted into sites in accordance with the methodology described in Chapter 1. Table STNE-1 shows the total number of sites in the regional (NSO range), local (18 5th-field watersheds that encompass the project area), analysis (0.25- to 1-mile spatial buffer around the project area), and project areas (PCGP Project corridor, associated work areas, and roads). An estimated 1,288 observations from BLM and Forest Service geodatabases were converted into 179 sites in the NSO range (region); only observations that met the definition of "site" in the great gray owl survey protocol (Huff and Goodwin 2016) were converted. Table STNE-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table STNE-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMPs across the regional, local, and analysis areas. Figure STNE-1 displays the regional distribution of the species across NFS lands, Figure STNE-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure STNE-3 displays the species' regional distribution as well as the extent of coniferous and mixed hardwood-coniferous forests and LSOG forests on BLM and NFS lands across the NSO range.

TABLE STNE-1

Number of *Strix nebulosa* Sites (2017)

Location*	Number of Sites
Regional Area	177
Local Area	67
Analysis Area (Project Area)	6 (1)

Data source: Processed BLM and Forest Service GIS data, August 2, 2017
*Definitions of regional, local, analysis, and project areas are provided in Chapter 1.

TABLE STNE-2

Distribution of *Strix nebulosa* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	55	16	1
BLM	126	52	5
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	3*	-	-

Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Notes: Columns are not additive because some sites occur on lands in multiple ownerships.
*****Three sites are located entirely on private lands. Many more sites are located on both federal and private lands due to the large site buffer, but are not included in this total because they originate on federal lands.

TABLE STNE-3

Distribution of *Strix nebulosa* across 1994 ROD and 2016 RMPs Land Allocations

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	1	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	6	1	-
Congressionally Reserved (CR)	**-**	**-**	**-**
Late Successional Reserve (LSR)	**6**	**3**	**1**
Marbled Murrelet Area (LSR3)	**-**	**-**	**-**
Northern Spotted Owl Activity Center (LSR4) a/	**-**	**-**	**-**
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	38	13	-
Riparian Reserve	**-**	**-**	**-**
Bureau of Land Management	**Regional Sites**	**Local Sites**	**Analysis Area Sites**
Administratively Withdrawn (AW)	7	-	-
Congressional Reserve	**-**	**-**	**-**
District Designated Reserve	**71**	**28**	**3**
Harvest Land Base	68	30	4
Late Successional Reserve	**94**	**37**	**3**
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	**108**	**46**	**5**

Data sources: 1994 ROD land allocation data, December 2002; U.S. Geological Survey National Hydrography Dataset, v. 2.1.0; 2016 RMP land allocation data, August 2016.
Notes: Columns are not additive because of overlap between some allocations, some sites may occur in multiple allocations, and the allocations only apply to BLM and NFS lands. **Bolded** allocations are designated reserve areas.
a/ Northern Spotted Owl Activity Center is currently referred to as Known Owl Activity Center (KOAC).

Regional Distribution

Strix nebulosa has a somewhat limited distribution across four physiographic provinces in Oregon (Cascades West and East, Klamath Mountains, and Coast Range) (see Figure STNE-1). Most sites are found in a large group in the southern Cascade Range and eastern Klamath Mountains. Other sites are scattered across the northern Cascade Range in Oregon and an isolated site is located in the Coast Range. *S. nebulosa* appears to be well distributed in its range in the eastern Klamath Mountains and western Cascade Range in Oregon based on the relative abundance of sites and proximity of sites to one another in the mountain ranges.

Three sites of the 177 sites are located on private lands, 55 sites are at least partially on NFS lands, and 126 sites are at least partially on BLM lands across the region. Sites located on the National Forests that encompass the project area include two sites on the Fremont-Winema National Forest, 21 sites on the Rogue River-Siskiyou National Forest, and two sites on the Umpqua National

Forest. The remaining 30 sites on NFS lands are on the Deschutes and Willamette National Forests.

Across the NSO range, six sites are at least partially located in LSRs managed by the Forest Service (see Figure STNE-2). These sites represent 12 percent of the total NFS sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 52 sites are located entirely in reserve lands managed by BLM, which represents 41 percent of the total number of BLM sites in the region. While the 52 sites in BLM reserves are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management.

Strix nebulosa is more common in LSOG forests based on available data (144 of 177 total sites are in LSOG); however, it is fairly common in younger forests with suitable nesting trees and nearby meadows or open areas for foraging. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous forests across a wide elevation range, but is mainly found in the Cascade Range and Klamath Mountains in Oregon. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve lands, both land ownerships are included in this potential habitat discussion. Coniferous and mixed hardwood-coniferous forests, including the LSOG component of these forests, across the NSO range could provide habitat for *S. nebulosa* and support additional sites. These forests encompass an estimated 19.2 million acres on BLM and NFS lands in the NSO range, including an estimated 11.6 million acres in reserve land allocations (60 percent of the forests; Table STNE-4). Of this acreage, an estimated 6.1 million acres are LSOG (see Figure STNE-3), including 4 million acres in reserve land allocations (66 percent of the forests). Coniferous and mixed hardwood-coniferous forests are widespread across the NSO range, and LSOG forests are somewhat widespread.

TABLE STNE-4

Extent of Forests that Could Provide Habitat for *Strix nebulosa* on BLM and NFS Lands a/

Location	Coniferous/Mixed Forests		LSOG Coniferous/Mixed Forests	
	Total	Reserves	Total	Reserves
Regional Area	19,220,427	11,550,638	6,063,902	3,995,392
Local Area	580,116	377,603	183,215	134,758
Project Area	1,411	975	318	225

Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011
Note: Areas are presented in acres.
a/ The area estimates are based on available data for forest types that have been mapped across the NSO range. The species' specific habitat requirements are narrower than the general forest types, and potential habitat is actually a subcomponent of the forests and is much smaller.

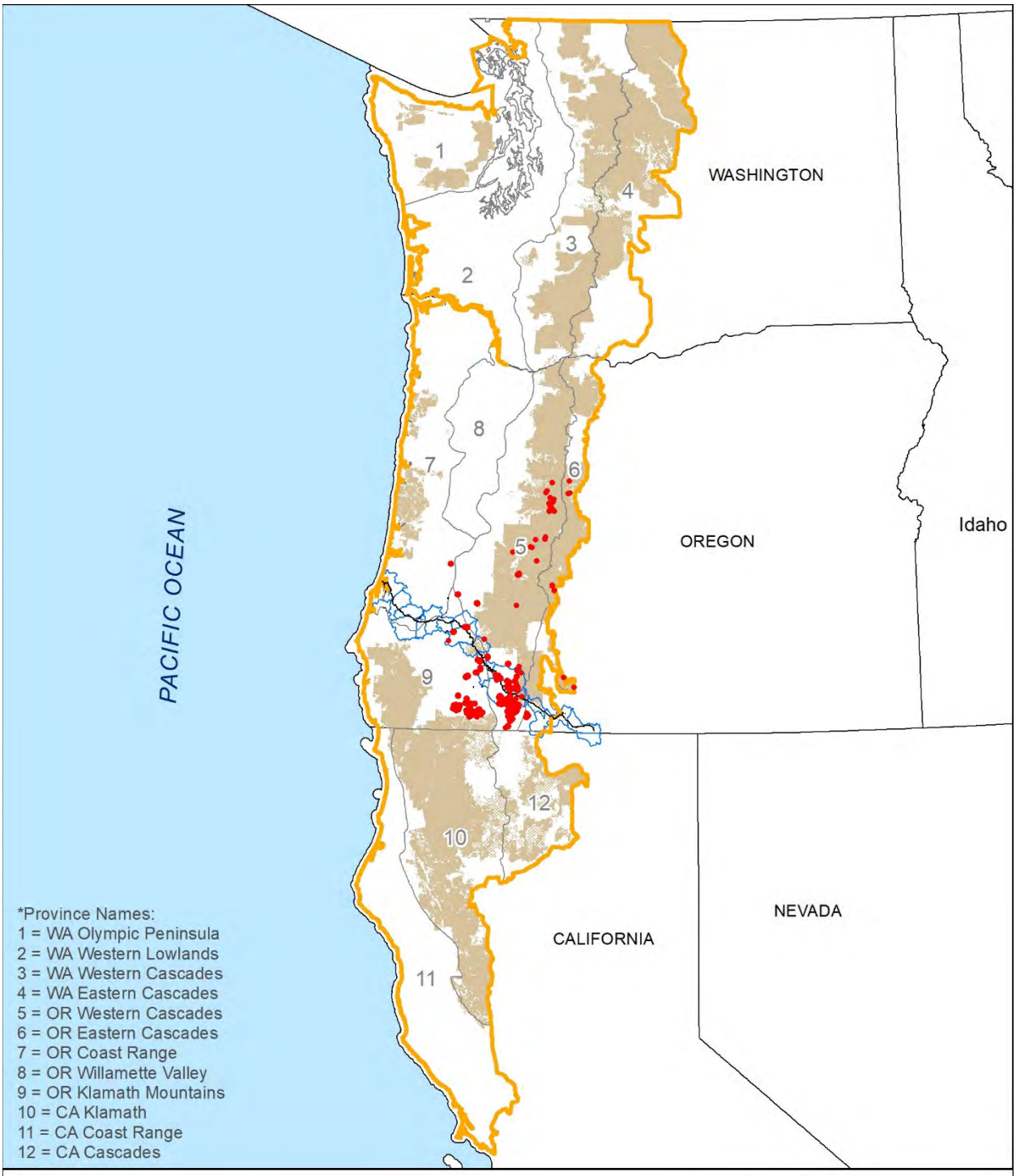


Figure STNE-1
Regional Distribution of *Strix nebulosa*

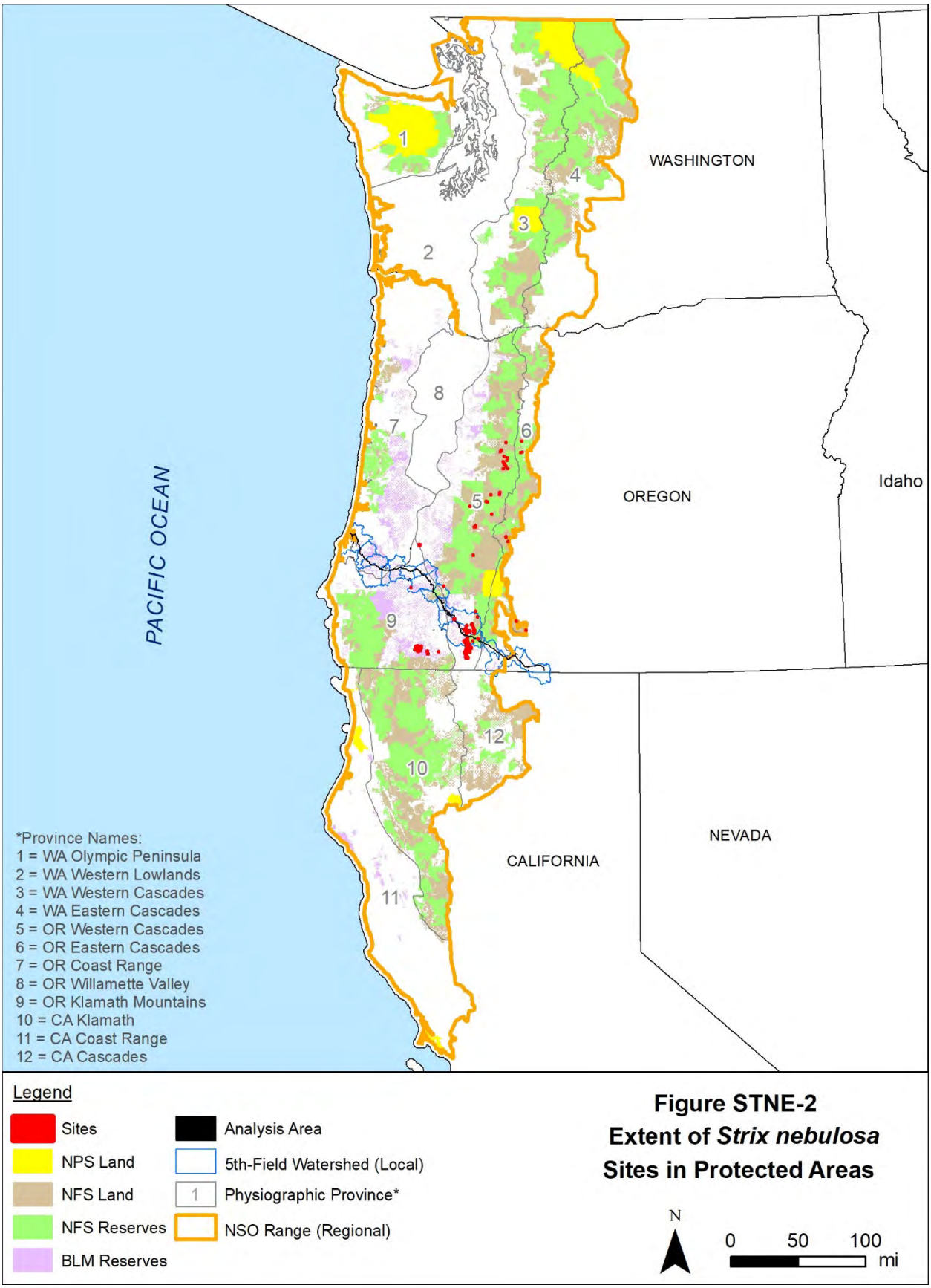
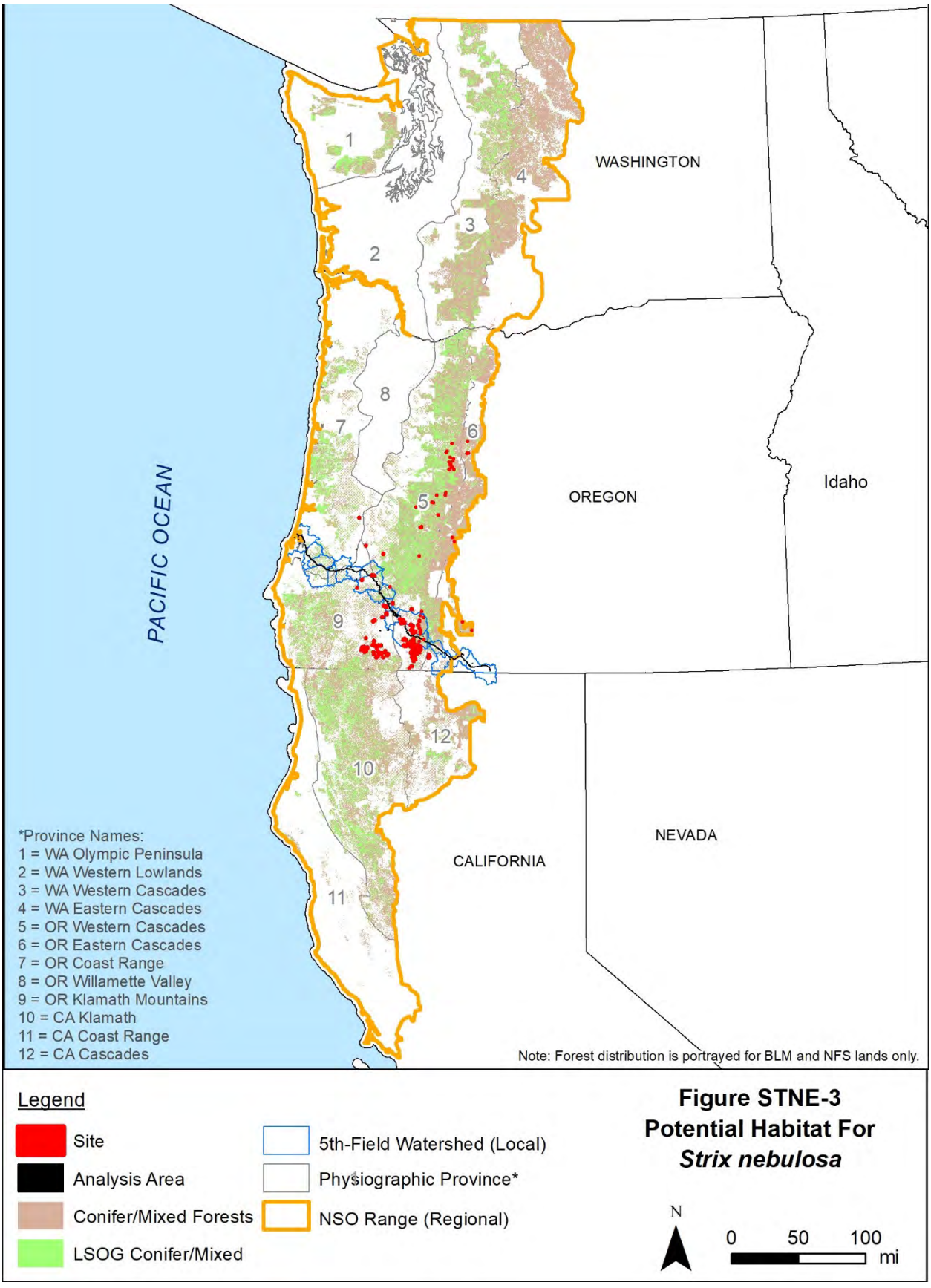


Figure STNE-2
Extent of *Strix nebulosa* Sites in Protected Areas


WASHINGTON
OREGON
Idaho
NEVADA
CALIFORNIA
PACIFIC OCEAN
1
2
3
4
5
6
7
8
9
10
11
12
*Province Names:
1 = WA Olympic Peninsula
2 = WA Western Lowlands
3 = WA Western Cascades
4 = WA Eastern Cascades
5 = OR Western Cascades
6 = OR Eastern Cascades
7 = OR Coast Range
8 = OR Willamette Valley
9 = OR Klamath Mountains
10 = CA Klamath
11 = CA Coast Range
12 = CA Cascades
Note: Forest distribution is portrayed for BLM and NFS lands only.
Legend
Site
Analysis Area
Conifer/Mixed Forests
LSOG Conifer/Mixed
5th-Field Watershed (Local)
Physiographic Province*
NSO Range (Regional)
Figure STNE-3
Potential Habitat For
Strix nebulosa
N
0
50
100
mi

Local Distribution

Within the local area, *S. nebulosa* is distributed across six 5th-field watersheds that overlap the project area (see Table STNE-5 and Figure STNE-4). The sites are primarily in the Cascade Range as part of the larger group of regional sites, with a few clustered sites in the Klamath Mountains. Many regional sites are located within 30 miles to the south and southwest, including many sites located entirely in BLM reserves.

Of the 67 sites in the local area, 16 sites are at least partially on NFS lands and are located on lands designated as Other (Matrix), LSR, and Administratively Withdrawn. A total of 52 sites are at least partially on BLM lands. Of the sites in the local area, three sites are within NFS reserves (LSR), and 22 sites are entirely in BLM reserve lands, representing 37 percent of the NFS and BLM sites.

Coniferous and mixed hardwood-coniferous forests encompass approximately 580,116 acres on BLM and NFS lands in the local area, including 377,603 acres in reserve land allocations (65 percent of the forests). Of this acreage, an estimated 183,215 acres are LSOG, including 134,758 acres in reserve land allocations (74 percent of the forests). Other sites may also exist in the local area where surveys have not been completed, particularly in the Cascade Range and Klamath Mountains, based on the number of sites in the local area, distribution of those sites, and the extent of forests that may provide suitable habitat (see Figures STNE-3 and STNE-4).

TABLE STNE-5

Distribution of *Strix nebulosa* in Local 5th-Field Watersheds

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	22 a/	-	7
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	39 a/	3	35
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	1 b/	-	1
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	2	-	2
South Umpqua River (781)	4 b/	-	4
Spencer Creek (865)	-	-	-
Trail Creek (804)	3	-	3
Upper Cow Creek (801)	-	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
Note: Number of sites in reserves may include sites that are only partially in reserves.
a/ Three sites occur on both the Big Butte Creek and Little Butte Creek watershed.
b/ One site occurs on both the Myrtle Creek and South Umpqua River watershed.

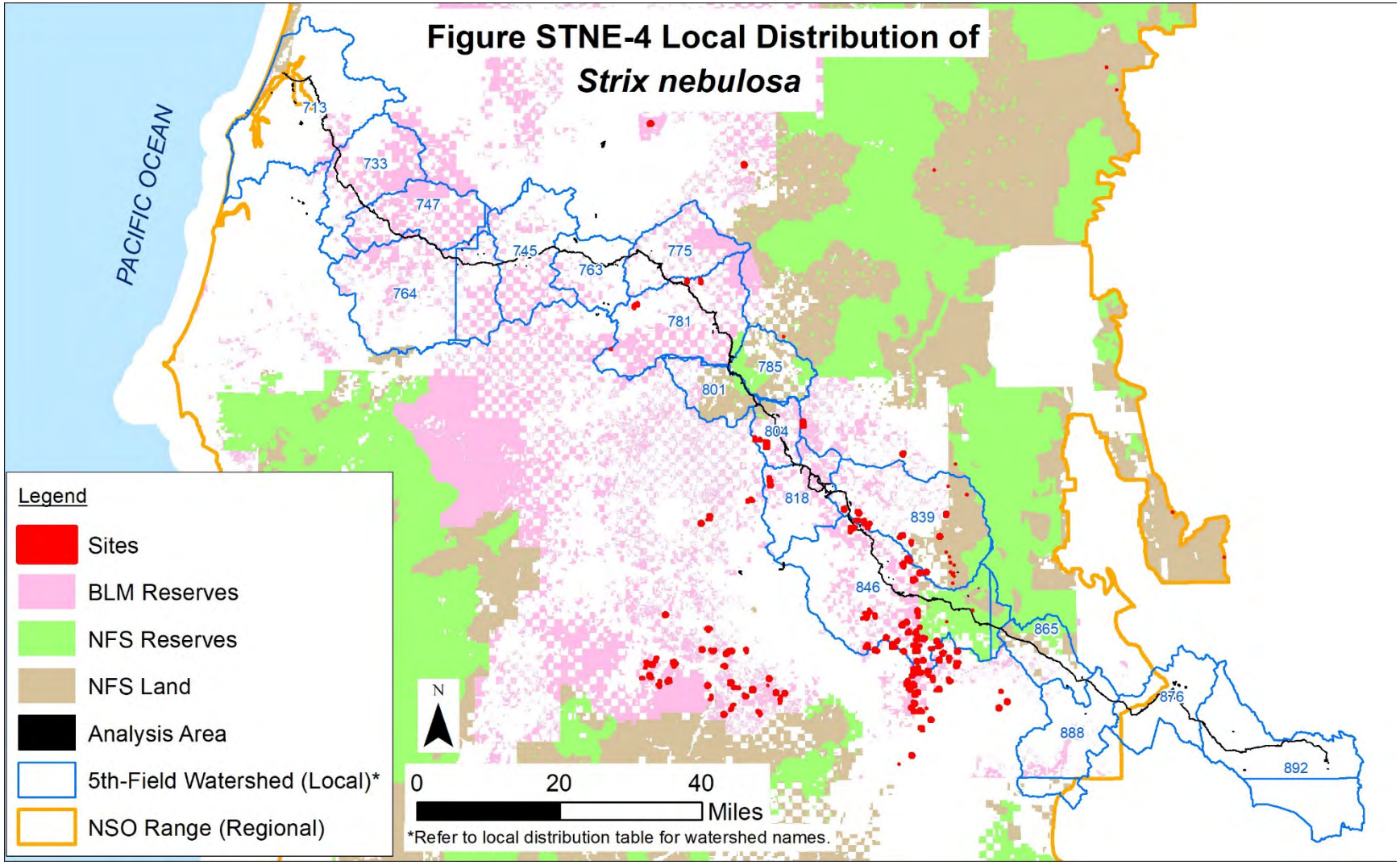


Figure STNE-4 Local Distribution of
Strix nebulosa
PACIFIC OCEAN
713
733
747
745
763
775
764
781
785
801
804
818
839
846
865
876
888
892
Legend
Sites
BLM Reserves
NFS Reserves
NFS Land
Analysis Area
5th-Field Watershed (Local)*
NSO Range (Regional)
N
0
20
40
Miles
*Refer to local distribution table for watershed names.

Analysis/Project Area Distribution

The analysis area contains six sites of *S. nebulosa*, including one site on NFS lands and five sites on BLM lands. No sites are located in the project area. The analysis area sites are distributed across three 5th-field watersheds, with one site in the South Umpqua River watershed in the Klamath Mountains, and five sites in the Little Butte Creek and Big Butte Creek watersheds in the Cascade Range. Many sites are also located within the vicinity of the analysis area, including several sites on NFS lands and many sites located entirely in BLM reserves (see Local Distribution discussion above). The analysis area sites are part of a large group of sites in southern Oregon.

The site on NFS land is in lands designated as LSR, on the Rogue River-Siskiyou National Forest. The five sites on BLM lands cross multiple land use allocations, with one site located entirely in reserves (District Designated Reserves, Riparian Reserves, and LSRs).

Surveys for the PCGP Project resulted in 51 detections of the species near the project area (Siskiyou BioSurvey LLC 2008a, 2011b). An estimated four of these recorded observations in combination with six other observations in agency databases comprise the six sites in the analysis area; the other detections are in sites outside the analysis area or are not considered sites (i.e., do not meet the definition of site provided in the great gray owl survey protocol). The site on NFS lands is located approximately 0.25 mile east of the project area at MP 162.4.

Project Impacts

Analysis

The PCGP Project could affect one site out of the 55 sites on Forest Service-managed lands in the region, representing approximately 2 percent of the sites. Site impacts on other land ownerships include five sites out of the 126 sites on BLM lands. The site on NFS lands could be indirectly affected by activities within the project area, but no direct impacts are anticipated (e.g., removal of active nest trees or nests). Project related impacts are located approximately 0.25 mile from the NFS site, and includes blasting, corridor construction, TEWAs and UCSAs.

The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

The site on NFS land may be subject to indirect effects from construction activities in the corridor and associated work and storage areas, as well as potential blasting along the corridor. The site is located 0.25 mile from the edge of the construction corridor, and the intensity of potential disturbances would be considerably less compared to adjacent to the project source. In addition, the area around the site and between the site and the project area is heavily forested, which would mask noise levels and reduce disturbance-related effects associated with the PCGP Project.

Activities within the 95-foot wide corridor and TEWAs would result in extensive noise disturbance during vegetation clearing, grading, and pipeline installation. Disturbance during the nesting season could result in nest abandonment and loss of young. Blasting may be necessary along segments of the corridor that contain hard, non-rippable bedrock (e.g., volcanic and metavolcanic rocks) and could result in noise levels up to 92 decibels at 200 feet from the source (Michael Minor & Associates 2008). Helicopter use could also result in high noise levels of 92 decibels up to 700 feet from the helicopter. These activities would also result in disturbance to nesting owls if implemented during the nesting season, which could lead to nest abandonment and loss of young.

Impacts to nest sites during the nesting season could result in nest failure, which would affect the persistence of great gray owl in the site. However, given the distance between the project area and the site, persistence may be maintained despite the indirect effects associated with project activities, especially if work occurs outside the breeding period (March 15-July 15).

Across the project area, the PCGP Project would remove an estimated 1,138 acres of coniferous and mixed hardwood-coniferous forests, including 246 acres of LSOG forests. These impacts would result in a reduction of nesting habitat that may be suitable for *S. nebulosa*. Within this impact area, about 565 acres (about 50 percent) of the forests would be restored to forests or shrublands in portions of the corridor and in TEWAs, resulting in a long-term reduction in potential nesting habitat, although some of the restored areas may provide foraging habitat for the species. A 30-foot wide corridor would be maintained in low-growing vegetation across the project area, resulting in a loss of about 245 acres of coniferous and mixed forests. The corridor could, however, provide a foraging area for the owl. The loss of forests represents less than 1 percent of the total estimated area of coniferous and mixed hardwood-coniferous forests across the species' range.

Discussion

It is possible that site persistence cannot be maintained at the single site on NFS lands due to indirect effects associated with the PCGP Project. Assuming site persistence cannot be maintained, 15 sites of *S. nebulosa* would remain on NFS lands in the local area, including two in reserves, and 54 sites, including five in reserves, would remain on NFS lands in the NSO range. The remaining sites could be affected by natural hazards (e.g., fire, drought), but they would be subject to the protections of the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The five sites in reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. Based on these site counts, approximately 9 percent of the remaining *S. nebulosa* sites on NFS lands in the NSO range would be protected in reserves.

The PCGP project may also affect five sites on BLM lands. Assuming persistence cannot be maintained at the five sites, 47 sites would remain on BLM lands in the local area, including 21 entirely in reserves, and 121 sites, including 51 entirely in reserves would remain on BLM lands in the NSO range. While sites on BLM lands are not subject to S&M Standards and Guidelines protections, sites in reserves would likely receive some level of protection under BLM management.

Summary

The NWFP ROD and the 2001 ROD do not prescribe a well-defined process for evaluating impacts to species persistence or viability from a proposed activity. The 2001 ROD states "instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision" (Standards and Guidelines, pg. 4). The Forest Service has embraced this approach for evaluating impacts of the PCGP Project on the persistence of affected S&M species in the NSO range. The preceding discussions present this evaluation, as summarized below:

- *Strix nebulosa* is a Category A (rare) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category A species are likely to be necessary to provide reasonable assurance of species persistence in the range of the NSO. New information

received since the species was listed in the 2001 ROD, however, indicates that the species appears to be more common than previously documented, as described below:

  - *Strix nebulosa* has a somewhat limited distribution across four physiographic provinces and one state in the region, with a moderate-high number of overall sites (55 on NFS lands, 177 on all lands). The species appears to be well distributed in the western Cascade Range and eastern Klamath Mountains in Oregon, but it has a more scattered distribution in other parts of its range in Oregon. The currently known number of sites on federal lands is an increase of 58 sites since 2007, with some sites documented during the PCGP Project surveys.

  - An estimated 33 percent of the sites (58 sites) are in NFS or BLM reserves.

- Coniferous and mixed hardwood-coniferous forests (general habitat for the species) are widely distributed across the species' range and encompass approximately 19.2 million acres on BLM and NFS lands with an estimated 60 percent in reserves. A subcomponent of these forests likely provides habitat for *S. nebulosa*.

- The PCGP Project would affect one of 55 *S. nebulosa* sites on NFS lands, representing approximately 2 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the single site, a moderate number of sites (54) would continue to be documented on NFS lands in the region with a somewhat limited distribution across Oregon. Several sites (15 sites) would remain in the local vicinity of the analysis area. An additional 51 sites would remain entirely in BLM reserves across the NSO range. The distribution of sites and extent of the species' range within the NSO range following implementation of the PCGP Project would be similar to the currently documented distribution and range.

- The PCGP Project would affect site persistence of one site in NFS reserves, and the percentage of sites in reserves would remain about the same (9 percent). Of the remaining NFS sites, five are in LSRs where management actions are restricted to those activities that benefit LSOG forests. The PCGP Project would also affect one site entirely in BLM reserves. A total of 51 sites would remain entirely within BLM reserves, including LSRs where management actions are restricted to those activities that benefit LSOG forests, District Designated Reserves where management activities that may adversely affect *S. nebulosa* are unlikely, and Riparian Reserves where management actions are restricted to those activities that benefit the conservation of riparian areas and riparian-associated species.

- The PCGP Project would result in a permanent loss of an estimated 245 acres of coniferous and mixed hardwood-coniferous forests (less than 1 percent of the total acreage in the species' range). An estimated 11.6 million acres (60 percent) of the forests and 4 million acres (66 percent) of LSOG forests would remain in reserves in the NSO range.

- The remaining forests could support additional populations of *S. nebulosa*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. This is a Category A species for which pre-disturbance surveys are practical and have been conducted in parts of the NSO range, and

it is reasonable to conclude that additional sites exist in the range of the NSO that have not been discovered based on the increased number of sites documented during pre-disturbance and other surveys, including surveys associated with the PCGP Project.

6.2.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *S. nebulosa* at one site on NFS lands and five sites on BLM lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 54 sites would remain on NFS lands across the region, including five sites in reserves, and 15 sites would remain on NFS lands in the local area, including two sites in reserves. Additionally, 121 sites would remain on BLM lands across the region, including 51 sites entirely in reserves, and 47 sites would remain on BLM lands in the local area, including 21 sites entirely in reserves. Although the PCGP Project could affect site persistence of *S. nebulosa* at one site on NFS land, this site is a part of the many sites in the Klamath Mountains and Cascade Range in Oregon where the species is well distributed. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *S. nebulosa* would persist in the region without considering the nine sites as part of the population.

- An estimated 11.6 million acres (60 percent) of the forests and 4 million acres (66 percent) of LSOG forests would remain in reserves in the NSO range.

- The PCGP Project would remove approximately 1,138 acres of coniferous and mixed hardwood-coniferous forests and 246 acres of LSOG forests (a negligible amount of the forests). An estimated 50 percent of the forests would be restored to similar conditions or shrublands and a 30-foot wide early-successional corridor would remain across the project area, which could provide foraging habitat for the owl.

- Other sites may be located in unsurveyed areas where suitable habitat exists based on the increased number of sites documented with increased surveys since 2007.

- The remaining sites on NFS lands are expected to continue to receive the protections of the S&M Standards and Guidelines under current land management plans for the foreseeable future. Additionally, the remaining sites that are entirely on BLM reserves are expected to receive some level of protection under the 2016 BLM RMPs. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is widely distributed.

The PCGP Project would not be able to avoid indirect impacts to all *S. nebulosa* sites in the analysis area, although the site may persist following project implementation. Based on the above conclusions, avoidance of impacts to the singe *S. nebulosa* site on NFS land is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence. Amendments to the NFS land management plan would waive implementation of Management Recommendations for the *S. nebulosa* site affected by the PCGP Project. The applicant shall prepare and implement a monitoring plan that describes specific protocols to monitor the species and adjacent habitat near affected sites over the long term. The monitoring plan shall be approved by the Forest Service.

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ATTACHMENT A

Survey and Manage Species List

Table A-1. 2003 Survey and Manage Species List		
Species	**Category**	**Evaluated in Document?**
Fungi		
Acanthophysium farlowii	B	No
Albatrellus avellaneus	B	No
Albatrellus caeruleoporus	B	No
Albatrellus ellisii	**B**	**Yes**
Albatrellus flettii (WA and CA)	B	No
Alpova alexsmithii	B	No
Alpova olivaceotinctus	B	No
Arcangeliella camphorata	B	No
Arcangeliella crassa	**B**	**Yes**
Arcangeliella lactarioides	B	No
Asterophora lycoperdoides	B	No
Asterophora parasitica	B	No
Baeospora myriadophylla	B	No
Balsamia nigrens	B	No
Boletus haematinus	B	No
Boletus pulcherrimus	**B**	**Yes**
Bondarzewia mesenterica (WA and CA)	B	No
Bridgeoporus nobilissimus	A	No
Cantharellus subalbidus (WA and CA)	D	No
Catathelasma ventricosa	B	No
Chalciporus piperatus	D	No
Chamonixia caespitosa	B	No
Choiromyces alveolatus	**B**	**Yes**
Choiromyces venosus	B	No
Chroogomphus loculatus	B	No
Chrysomphalina grossula	B	No
Clavariadelphus ligula	B	No
Clavariadelphus occidentalis	**B**	**Yes**
Clavariadelphus sachalinensis	**B**	**Yes**
Clavariadelphus subfastigiatus	B	No
***Clavariadelphus truncatus* (Jackson County, OR)**	**D**	**Yes**

Table A-1. 2003 Survey and Manage Species List		
Species	**Category**	**Evaluated in Document?**
***Clavariadelphus truncatus* (outside Jackson County, OR)**	**B[1]**	**Yes**
Clavulina castanopes var. *lignicola*	B	No
Clitocybe senilis	B	No
Clitocybe subditopoda	B	No
Collybia bakerensis	**F**	**Yes**
Collybia racemosa	**B**	**Yes**
Cordyceps ophioglossoides	B	No
Cortinarius barlowensis	B	No
Cortinarius boulderensis	B	No
Cortinarius cyanites	B	No
Cortinarius depauperatus	B	No
Cortinarius magnivelatus	**B**	**Yes**
Cortinarius olympianus	**B**	**Yes**
Cortinarius verrucisporus	**B**	**Yes**
Cortinarius speciosissimus	B	No
Cortinarius tabularis	B	No
Cortinarius umidicola	B	No
Cortinarius valgus	B	No
Cortinarius variipes	B	No
Cortinarius verrucisporus	B	No
Cortinarius wiebeae	B	No
Craterellus tubaeformis (WA, CA)	D[1]	No
Cudonia monticola	**B**	**Yes**
Cyphellostereum laeve	B	No
Dermocybe humboldtensis	B	No
Destuntzia fusca	B	No
Destuntzia rubra	B	No
Dichostereum boreale	B	No
Elaphomyces anthracinus	B	No
Elaphomyces subviscidus	B	No
Endogone acrogena	B	No
Endogone oregonensis	B	No

Table A-1. 2003 Survey and Manage Species List		
Species	**Category**	**Evaluated in Document?**
Entoloma nitidum	B	No
Fayodia bisphaerigera	B	No
Fevansia aurantiaca	B	No
Galerina atkinsoniana	**B[1]**	**Yes**
Galerina cerina	B	No
Galerina heterocystis	E	No
Galerina sphagnicola	E	No
Gastroboletus imbellus	B	No
Gastroboletus ruber	B	No
Gastroboletus subalpinus	**B**	**Yes**
Gastroboletus turbinatus	B	No
Gastroboletus vividus	B	No
Gastrosuillus amaranthii	E	No
Gastrosuillus umbrinus	B	No
Gautieria magnicellaris	B	No
Gautieria otthii	B	No
Gelatinodiscus flavidus	B	No
Glomus radiatum	B	No
Gomphus bonarii	B	No
Gomphus clavatus	**F**	**Yes**
Gomphus floccosus	F[1]	No
Gomphus kauffmanii	**E**	**Yes**
Gymnomyces abietis	**B**	**Yes**
Gymnomyces nondistincta	B	No
Gymnopilus punctifolius (CA)	B	No
Gyromitra californica	B	No
Hebeloma olympianum	B	No
Helvella crassitunicata	B	No
Helvella elastica	B	No
Helvella maculata	B	No
Hydnotrya inordinata	B	No
Hydnotrya subnix	B	No

Table A-1. 2003 Survey and Manage Species List		
Species	**Category**	**Evaluated in Document?**
Hydropus marginellus	B	No
Hygrophorus caeruleus	**B**	**Yes**
Hygrophorus karstenii	B	No
Hygrophorus vernalis	B	No
Hypomyces luteovirens	B	No
Leucogaster citrinus	B	No
Leucogaster microsporus	B	No
Macowanites chlorinosmus	B	No
Macowanites lymanensis	B	No
Macowanites mollis	B	No
Marasmius applanatipes	B	No
Martellia fragrans	B	No
Martellia idahoensis	B	No
Mycena hudsoniana	B	No
Mycena overholtsii	**D**	**Yes**
Mycena quinaultensis	B	No
Mycena tenax	B	No
Mythicomyces corneipes	B	No
Neolentinus adhaerens	B	No
Neolentinus kauffmanii	B	No
Nivatogastrium nubigenum	B	No
Octaviania cyanescens	B	No
Octaviania macrospora	B	No
Octavianina papyracea	B	No
Otidea leporina	D	No
Otidea smithii	B	No
Phaeocollybia attenuata	D	No
Phaeocollybia californica	B	No
Phaeocollybia dissiliens	B	No
Phaeocollybia fallax	D	No
Phaeocollybia gregaria	B	No
Phaeocollybia kauffmanii	D	No

Table A-1. 2003 Survey and Manage Species List		
Species	**Category**	**Evaluated in Document?**
Phaeocollybia olivacea	B[1]	No
Phaeocollybia oregonensis	B	No
Phaeocollybia piceae	B	No
Phaeocollybia pseudofestiva	B	No
Phaeocollybia scatesiae	B	No
Phaeocollybia sipei	B	No
Phaeocollybia spadicea	B	No
Phellodon atratus	B	No
Pholiota albivelata	B	No
Podostroma alutaceum	B	No
Polyozellus multiplex	**B**	**Yes**
Pseudaleuria quinaultiana	B	No
Ramaria abietina	B	No
Ramaria amyloidea	B	No
Ramaria araiospora	**B**	**Yes**
Ramaria aurantiisiccescens	B	No
Ramaria botryis var. aurantiiramosa	B	No
Ramaria celerivirescens	B	No
Ramaria claviramulata	B	No
Ramaria concolor f. marrii	B	No
Ramaria concolor f. tsugina	B	No
Ramaria conjunctipes var. sparsiramosa	B	No
Ramaria coulterae	**B**	**Yes**
Ramaria cyaneigranosa	B	No
Ramaria gelatiniaurantia	B	No
Ramaria gracilis	B	No
Ramaria hilaris var. olympiana	B	No
Ramaria largentii	B	No
Ramaria lorithamnus	B	No
Ramaria maculatipes	B	No
Ramaria rainierensis	B	No
Ramaria rubella var. blanda	B	No

Table A-1. 2003 Survey and Manage Species List		
Species	**Category**	**Evaluated in Document?**
Ramaria rubribrunnescens	B	No
Ramaria rubrievanescens	**B**	**Yes**
***Ramaria rubripermanens* (OR)**	**D**	**Yes**
Ramaria rubripermanens (WA and CA)	B	No
Ramaria spinulosa var. diminutiva	B	No
Ramaria stuntzii	B	No
Ramaria suecica	B	No
Ramaria thiersii	B	No
Ramaria verlotensis	B	No
Rhizopogon abietis	B	No
Rhizopogon atroviolaceus	B	No
Rhizopogon brunneiniger	B	No
Rhizopogon chamaleontinus	B	No
Rhizopogon ellipsosporus	B	No
Rhizopogon evadens var. subalpinus	B	No
Rhizopogon exiguus	B	No
Rhizopogon flavofibrillosus	B	No
Rhizopogon inquinatus	B	No
Rhizopogon truncatus	**D**	**Yes**
Rhodocybe speciosa	B	No
Rickenella swartzii	B	No
Russula mustelina	B	No
Sarcodon fuscoindicus	**B**	**Yes**
Sedecula pulvinata	**B**	**Yes**
Sowerbyella rhenana	B	No
Sparassis crispa	**D**	**Yes**
Spathularia flavida	**B**	**Yes**
Stagnicola perplexa	B	No
Thaxterogaster pavelekii	B	No
Tremiscus helvelloides	**D**	**Yes**
Tricholoma venenatum	B	No
Tricholomopsis fulvescens	B	No

Table A-1. 2003 Survey and Manage Species List		
Species	**Category**	**Evaluated in Document?**
Tuber asa	B	No
Tuber pacificum	B	No
Tylopilus porphyrosporus	D	No
Lichens		
Bryoria pseudocapillaris	A	No
Bryoria spiralifera	A	No
Bryoria subcana	B	No
Buellia oidalea	E	No
Calicium abietinum	B	No
Calicium adspersum	E	No
Cetrelia cetrarioides	E	No
Chaenotheca chrysocephala	B	No
Chaenotheca ferruginea	B	No
Chaenotheca furfuracea	F[1]	No
Chaenotheca subroscida	**E**	**Yes**
Chaenothecopsis pusilla	E	No
Cladonia norvegica	B[1]	No
Collema nigrescens (WA and OR, outside OR Klamath)	F	No
Dendriscocaulon intricatulum (CA)	E	No
Dendriscocaulon intricatulum (OR outside of Coos, Curry, Douglas, Josephine, and Jackson Counties; WA)	A	No
Dermatocarpon luridum	E	No
Fuscopannaria (Pannaria) saubinetii	E	No
Heterodermia sitchensis	E	No
Hypogymnia duplicata	C	No
Hypogymnia vittata	E	No
Hypotrachyna revoluta	E	No
Leptogium burnetiae var. hirsutum	E	No
Leptogium cyanescens	A	No
Leptogium rivale	E	No
Leptogium teretiusculum	**E**	**Yes**
Lobaria linita var. tenuoir (WA WL, WA WC south of Snoqualmie Pass, WA EC; OR)	A	No

Table A-1. 2003 Survey and Manage Species List		
Species	**Category**	**Evaluated in Document?**
Lobaria oregana (CA)	A	No
Microcalicium arenarium	B	No
Nephroma bellum (OR; Klamath, Willamette Valley, Eastern Cascades; WA; Western Cascades outside GPNF, Eastern Cascades, Olympic Peninsula)	E	No
Nephroma bellum (OR; Western Cascades, Coast; WA; Western Cascades within GPNF)	F[1]	No
Nephroma isidiosum	E	No
Nephroma occultum	B[1]	No
Niebla cephalota	A	No
Pannaria rubiginosa	E	No
Peltigera pacifica	E	No
Platismatia lacunosa (except OR CR)	E	No
Pseudocyphellaria perpetua (sp. 1)	A	No
Pseudocyphellaria rainierensis	A	No
Stenocybe clavata	E	No
Teloschistes flavicans	A	No
Tholurna dissimilis (south of the Columbia River)	B	No
Usnea hesperina	E	No
Usnea longissima (Curry, Josephine, and Jackson Counties, OR; CA)	A	No
Usnea longissima (Outside Curry, Josephine, and Jackson Counties, OR; WA)	F	No
Mosses and Liverworts		
Brotherella roellii	E	No
Buxbaumia viridis (CA)	E	No
Diplophyllum plicatum	B	No
Herbertus aduncus	E	No
Iwatsukiella leucotricha	B	No
Kurzia makinoana	B	No
Marsupella emarginata var. aquatica	B	No
Orthodontium gracile	B	No
Ptilidium californicum (CA)	A	No
Racomitrium aquaticum	E	No

Table A-1. 2003 Survey and Manage Species List		
Species	**Category**	**Evaluated in Document?**
Rhizomnium nudum (OR)	B	No
Schistostega pennata	A	No
Tetraphis geniculata	A	No
Tritomaria exsectiformis	B	No
Tritomaria quinquedentata	B	No
Vascular Plants		
Arceuthobium tsugense mertensianae (WA)	F	No
Bensoniella oregana (CA)	A	No
Botrychium minganense (OR and CA)	A	No
Botrychium montanum	A	No
Coptis asplenifolia	A	No
Coptis trifolia	A	No
Corydalis aquae-gelidae	A	No
***Cypripedium fasciculatum* (WA outside the Eastern Cascades; OR; CA)**	**C**	**Yes**
Cypripedium montanum (Except WA Eastern Cascades)	C	No
Eucephalus vialis	A	No
Galium kamtschaticum (WA Western Cascades (south of Snoqualmie Pass), Olympic Peninsula, and Eastern Cascades; OR Western Cascades)	A	No
Platanthera orbiculata var. orbiculata	C	No
Mollusks		
Ancotrema voyanum	E[1,3,4]	No
Cryptomastix devia	A	No
Cryptomastix hendersoni	A	No
Deroceras hesperium	**B[4]**	**Yes**
Fluminicola n. sp. 3	A[3]	No
Fluminicola n. sp. 11	A[3]	No
Fluminicola n. sp. 14	A	No
Fluminicola n. sp. 15	A	No
Fluminicola n. sp. 16	A	No
Fluminicola n. sp. 17	A	No
Fluminicola n. sp. 18	A	No

Table A-1. 2003 Survey and Manage Species List		
Species	**Category**	**Evaluated in Document?**
Fluminicola n. sp. 19	A[3]	No
Fluminicola n. sp. 20	A[3]	No
Fluminicola seminalis	A[3]	No
Helminthoglypta talmadgei	D[2]	No
Hemphillia burringtoni	E	No
Hemphillia glandulosa (WA Western Cascades)	E	No
Hemphillia malonei (WA)	C	No
Hemphillia pantherina	B[4]	No
Juga (o) n. sp. 2	A	No
Juga (o) n. sp. 3	A	No
Lyogyrus n. sp. 1	A	No
Lyogyrus n. sp. 2	A	No
Lyogyrus n. sp. 3	A	No
Megomphix hempilli (outside of OR Coast)	A[1]	No
Monadenia chaceana	**B[4]**	**Yes**
Monadenia fidelis minor	A	No
Monadenia troglodytes troglodytes	A	No
Monadenia troglodytes wintu	A	No
Oreohelix n. sp.	A	No
Pristiloma arcticum crateris	A[3]	No
Prophysaon coeruleum (CA and WA)	A	No
Trilobopsis roperi	A	No
Trilobopsis tehamana	A	No
Vertigo n. sp.	A	No
Vespericola pressleyi	A	No
Vespericola shasta	A	No
Vorticifex n. sp. 1	E	No
Vertebrates		
Arborimus longicaudus	**C**	**Yes**
Hydromantes shastae	A	No
Plethodon larselli	A	No
Plethodon stormi (North Range)	D[2]	No

Table A-1. 2003 Survey and Manage Species List		
Species	**Category**	**Evaluated in Document?**
Plethodon stormi (South Range)	A	No
Plethodon vandykei (Cascade population)	A	No
Strix nebulosa	**A**	**Yes**
Others		
Canopy herbivores (south range)	F	No
Coarse wood chewers (south range)	F	No
Litter and soil dwelling species (south range)	F	No
Understory and forest gap herbivores (south range)	F	No

Source: Survey and Manage Species List, 2003 Annual Species Review Modifications of the 2001 Record of Decision

Notes:

[1]These species are special consideration species and are assigned the category under the 2001 species list.

[2] Although Pre-Disturbance Surveys are deemed practical for this species, continuing pre-disturbance surveys is not necessary in order to meet management objectives.

[3] For these species, until Management Recommendations are written, the following language will be considered part of the Management Recommendation: "Known and newly discovered sites of these species will be protected from grazing by all practical steps to ensure that the local population of the species will not be impacted."

[4] Based upon direction contained in the ROD, equivalent-effort pre-disturbance surveys are required for these mollusk species.

ATTACHMENT B

Glossary

Glossary

Note: Most of these terms are incorporated from the 1994 ROD, 2001 ROD, or 2007 Final SEIS and adapted or expanded as appropriate to fit this report. New terms or modifications from previous agency glossary terms are underlined.

Analysis Area – The spatial buffer used in GIS to identify potentially affected sites.

- Analysis Area buffer for fungi, mollusks, lichens, bryophytes and vascular plants is 50 meters.
- Analysis Area buffer for great gray owls is ¼ mile from the project area except where blasting may take place; the buffer around potential blasting areas is 1 mile.
- Analysis Area buffer for red tree voles is 100 meters.

The intent is to ensure that recorded observations of species that could be indirectly affected by the PCGP Project are considered as part of the group of potentially affected sites in the analysis. As an example, using this definition for fungi, bryophytes, lichens and vascular plants, any observation that is within 100 meters of the project area would fall within a site evaluated in the analysis. This is consistent with other definitions of indirect effects for the PCGP Project.

Bryophytes – Plants of the phylum Bryophyta, including mosses, liverworts, and hornworts; characterized by the lack of true roots, stems, and leaves (USDA and USDI 1994, cited in USDA and USDI 2001, 2007).

Bureau of Land Management (BLM) – An agency within the United States Department of the Interior that administers a portion of America's public lands.

Category – Groupings of species by relative rarity, practicality of pre-disturbance surveys, and information status. Management direction is generally the same for all species within a category and differs between categories (USDA and USDI 2001, 2007).

Direct effect or impact – Direct effects are those that occur at the time and place that a project is implemented. For purposes of the analysis contained in this document, a direct effect is one that takes place within the project area as a direct result of the construction activities associated with establishment of the construction corridor, TEWAs, UCSAs, or other project features.

Effects – Effects, impacts, and consequences are synonymous. Effects may be direct, indirect, or cumulative and may fall in one of these categories: aesthetic, historic, cultural, economic, social, health, or ecological (such as effects on natural resources and on the components, structures, and functioning of affected ecosystems) (USDA and USDI 1994, cited in USDA and USDI 2001, 2007). Effects may be direct or indirect (refer to those definitions) and address how the project would affect Survey and Manage species.

Element Occurrence – An element occurrence is an area of land and/or water in which a species or ecological community is, or was, present. An occurrence should have practical conservation value for the species or ecological community as evidenced by historical or potential continued presence and/or regular recurrence at a given location. For species, the occurrence often corresponds with the local population, but when appropriate may be a portion of a population (e.g., long distance dispersers) or a group of nearby populations (e.g., metapopulation). This definition is based on the NatureServe definition of "Occurrence."

Endemic or endemism – Unique to a specific locality or the condition of being unique to a specific locality (USDA and USDI 2001, 2007).

Equivalent-effort surveys – Pre-disturbance surveys for species whose characteristics, such as small size or irregular fruiting, prevent it from being consistently located during site-specific surveys (USDA and USDI 2001, 2007). These surveys are conducted similarly to practical surveys (to the same intensity and effort), according to written Survey Protocols, and during the times when the likelihood of detecting the species is highest. The difference between equivalent-effort and practical surveys is that equivalent-effort surveys are not expected to meet the description of "likely to determine the presence" of a species because the characteristics of these species make finding sites less certain.

Fifth-field watershed – The standard sized watershed used for research and projects by the BLM and Forest Service. A watershed is the area of land where all surface and groundwater drains into the same body of water, such as a river, wetland, or the ocean. Since the term "watershed" can be used for drainage areas of any size, the U.S. Geological Survey has divided watersheds into distinct units, or "fields," based on size.

Forest Service – An agency within the United States Department of Agriculture that administers a portion of America's public lands.

Fungi – Saprophytic and parasitic spore-producing organisms usually classified as plants that lack chlorophyll and include molds, rusts, mildews, smuts, mushrooms, and yeasts (USDA and USDI 2001, 2007).

GeoBOB (Geographic Biotic Observations) – A relational geodatabase used by the Oregon and Washington offices of the BLM, which stores spatial and attribute data on species of interest to the BLM and Region 6 of the Forest Service. This database currently holds legacy Survey and Manage species locations for both the BLM and the Forest Service. The data on Survey and Manage species on lands administered by the Forest Service are being moved to the Forest Service databases.

Habitat – Place or environment where a plant or animal naturally or normally lives and grows (USDA and USDI 2001, 2007).

High-priority sites – A site or group of sites deemed necessary for species persistence. The high-priority sites may be identified as specific locations, sites meeting specific criteria, or as a distribution of populations or sites over a geographic area that may change over time. High-priority sites are designated through the Management Recommendations for the species. High-priority sites are generally a subset of known sites; however, in some cases, all known sites may be determined to be high-priority sites. Management of high-priority sites is necessary to ensure species persistence (USDA and USDI 2001, 2007).

Historical distribution – The distribution of a species as determined by its habitat associations and by the frequency, magnitude, and patterns of natural and human-caused disturbance and ecological processes characteristic of the Northwest Forest Plan area before European settlement. Historical distribution should be estimated over a long-enough period of time to encompass the limits of variability resulting from disturbance and ecological processes.

Indirect effect or impact – Indirect effects are those caused by a project that are reasonably foreseeable (i.e. not speculative in nature), but that occur later in time or are farther removed in distance. For purposes of the analysis contained in this document, an indirect effect is one that changes the microclimate or results in other impacts (e.g., noise disturbance) outside of the project area, but within a reasonable distance of the project area (e.g., 100 meters for fungi, lichens, bryophytes, and vascular plants).

Known site – Historical and current location of a species reported by a credible source, available to field offices, and that does not require additional species verification or survey by the Agency to locate the species. Known sites include those known prior to the signing of the Northwest Forest Plan Record of Decision (USDA and USDI 1994), as well as sites located in the future. Known sites can be based on any documented and credible source (such as herbaria/museum records, published documents, Agency records, species expert records, and documented public information). Historical locations where it can be demonstrated that the species and its habitat no longer occur do not have to be considered known sites. A credible source is a professional or amateur person who has academic training and/or demonstrated expertise in identification of the taxon of interest sufficient for the Agency to accept the identification as correct. These can include Agency staff and private individuals (USDA and USDI 2001, 2007). This term is only used in reference to background information compiled for each species and is not specifically used for the persistence evaluation; refer to "site" below.

The known site identification should be precise enough to locate the species by geographic coordinates, maps, or descriptions sufficient to design specific management actions or to be located by other individuals. Also see "site" for description of size or components (USDA and USDI 2001, 2007).

Land allocation – Commitment of a given area of land or a resource to one or more specific uses (such as campgrounds or Wilderness). In the Northwest Forest Plan, one of the seven allocations of Congressionally Withdrawn Areas, Late-Successional Reserves, Adaptive Management Areas, Managed Late-Successional Reserves, Administratively Withdrawn Areas, Riparian Reserves, or Matrix (USDA and USDI 2001, 2007). Under the 2016 BLM RMPs, land use allocations include Congressionally Reserved Lands, District-Designated Reserves, Harvest Land Base, Late-Successional Reserves, and Riparian Reserves (USDI 2016a, 2016b).

Late-successional forest – Forest stand consisting of trees, structural attributes, supporting biological communities, and processes associated with old-growth and/or mature forests. Forest seral stages that include mature and old-growth age classes. Age is not necessarily a defining characteristic but has been used as a proxy or indicator in some usages. Minimum ages are typically 80 to 130 years, more or less, depending on the site quality, species, rate of stand development, and other factors (USDA and USDI 1994, cited in USDA and USDI 2001, 2007).

Late-Successional Reserves (LSR) – Land allocation under the Northwest Forest Plan with the objective to protect and enhance conditions of late-successional and old-growth forest ecosystems that serve as habitat for late-successional and old-growth forest related species, including the northern spotted owl. Limited stand management is permitted, subject to review by the Regional Ecosystem Office (USDA and USDI 1994, cited in in USDA and USDI 2001, 2007). Under the 2016 BLM RMPs, the objective for LSRs is to maintain nesting-roosting

habitat for the northern spotted owl and nesting habitat for the marbled murrelet (USDI 2016a, 2016b).

Lichens – Organisms consisting of a fungus and a photosynthetic partner (green algae, cyanobacteria, or both) growing together in a mutually beneficial relationship. The composite form is strongly altered in appearance, physiology, reproduction, and chemistry, compared to free living fungi, algae, or bacteria (USDA and USDI 2007)

Local area – The local area was defined as the following 18 5th-field watersheds that overlap the PCGP Project area (presented alphabetically in this report): Big Butte Creek, Coos Bay Frontal, East Fork Coquille River, Elk Creek-South Umpqua, Klamath River-John C. Boyle Reservoir, Lake Ewauna-Upper Klamath River, Little Butte Creek, Lower Lost River, Middle Fork Coquille River, Middle South Umpqua River, Myrtle Creek, North Fork Coquille River, Olalla Creek-Lookingglass Creek, Rogue River-Shady Cove, South Umpqua River, Spencer Creek, Trail Creek, Upper Cow Creek.

Management Recommendation – An interagency document that addresses how to manage known sites and that provide guidance to Agency efforts in conserving Survey and Manage species. They describe the habitat parameters that will provide for maintaining the taxon at that site. They may also identify high-priority sites for uncommon species or provide other information to support management direction (USDA and USDI 2001, 2007). (The proposed LMP amendment associated with this project waives application of management recommendations.)

Management requirement – Minimum standards for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, wildlife population viability, soil and water protection, and diversity to be met in accomplishing National Forest System goals and objectives (36 CFR 219 National Forest Management Act Regulations[1]).

Matrix – National Forest System lands outside of reserves, withdrawn areas, Managed Late-Successional Areas, and Adaptive Management Areas (USDA and USDI 1994, cited in USDA and USDI 2001, 2007).

Mature forest – A subset of late-successional forests. Mature forests are characterized by the onset of slowed height growth, crown expansion, heavier limbs, gaps, some mortality in larger trees, and appearance of more shade-tolerant species or additional crown layers. In Douglas-fir west of the Cascades, this stage typically begins between 80 and 130 years, depending on site conditions and stand history (USDA and USDI 2001).

Mollusks – Invertebrate animals (such as slugs, snails, clams, or squids) that have a soft unsegmented body usually enclosed in a calcareous shell (USDA and USDI 2001, 2007).

Northern spotted owl (NSO) – A bird listed as threatened under the Endangered Species Act in Washington, Oregon, and California. The Northwest Forest Plan created a forest reserve-based system to conserve and manage lands for the northern spotted owl and other old-growth dependent species.

[1] The NWFP was developed under 1982 planning regulations rather than the current 2012 planning rule.

Northwest Forest Plan – Coordinated ecosystem management direction incorporated into land management plans for lands administered by the Bureau of Land Management and the Forest Service within the range of the northern spotted owl. In April 1993, President Clinton directed his cabinet to craft a balanced, comprehensive, and long-term policy for management of over 24 million acres of public land within the range of the northern spotted owl. A Forest Ecosystem Management Assessment Team (FEMAT) was chartered to develop a series of options. These options were modified in response to public comment and additional analysis and then analyzed in a Final Supplemental Environmental Impact Statement. A Record of Decision was signed on April 13, 1994, by the Secretaries of the Department of Agriculture and the Department of Interior to adopt *Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USDA and USDI 1994). The Record of Decision, including the *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* is referred to as the "Northwest Forest Plan." The Northwest Forest Plan is not a "plan" in the agency planning regulations sense; the term instead refers collectively to the 1994 amendment to existing agency unit plans or to the specific standards and guidelines for late successional species incorporated into subsequent administrative unit plans (USDA and USDI 2001, 2007).

Observation or record observation – The points or polygons where individuals or small groups of a given species were located as entered into the NRIS and GeoBOB databases. Unless other information exists to the contrary, this constitutes "best available information" about the actual locations of the species in question.

Old-growth forest – An ecosystem distinguished by old trees and related structural attributes. Old-growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species, composition, and ecosystem function. More specific parameters applicable to various species are available in the USFS, Region 6, 1993 Interim Old Growth Definitions (USDA Forest Service Region 6, 1993). The Northwest Forest Plan SEIS and FEMAT describe old-growth forest as a forest stand usually at least 180 to 220 years old with moderate-to-high canopy closure; a multi-layered, multi-species canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground (USDA and USDI 1994, cited in USDA and USDI 2001, 2007).

Oregon Biodiversity Information Center (ORBIC) – ORBIC is part of the Oregon State University Institute for Natural Resources in the Research Office. Their mission is to identify the plant, animal, and ecological community resources of Oregon. As part of the Natural Heritage Network and NatureServe, the ORBIC contributes to an understanding of global biodiversity and provides tools for managers and the public to better protect vanishing species and communities.

Pacific Connector Gas Pipeline Project (PCGP Project) – The construction, operation, maintenance and termination of a 230-mile-long, 36-inch diameter high pressure natural gas pipeline that would extend from interconnections with other interstate pipelines near Malin, Oregon to the proposed Jordan Cove natural gas liquefaction and terminal at Coos Bay, Oregon.

Persistence (as in persistence objective for a species) – An abbreviated expression of the species management objectives for these standards and guidelines. Generally the persistence objective for vertebrates is based on the Forest Service viability provision in the regulations implementing the National Forest Management Act. For non-vertebrates, it is a similar standard to the extent practicable. See "Species Persistence Objective" in these standards and guidelines for more details. Use in standards and guidelines such as "..sites not needed for persistence" includes an understood "reasonable assurance of" or "to the extent practicable." (USDA and USDI 2001, 2007).

"…the Forest Service must use common sense and apply its fish and wildlife expertise in implementing these requirements." (USDA and USDI 1994)

Persistence (as in persistence at a site) – Continued occupancy by a species at a known site (USDA and USDI 2001, 2007).

Physiographic province – A geographic area having a similar set of biophysical characteristics and processes due to effects of climate and geology that result in patterns of soils and broad-scale plant communities. Habitat patterns, wildlife distributions, and historical land use patterns may differ significantly from those of adjacent provinces (USDA and USDI 1994, cited in USDA and USDI 2001, 2007).

Practical surveys (relative to surveys prior to habitat-disturbing activities) – Surveys are practical if characteristics of the species (such as size, regular fruiting) and identifying features result in being able to reliably locate the species, if the species is present, within one or two field seasons and with a reasonable level of effort.

Characteristics determining practicality of surveys include: individual species must be of sufficient size to be detectable; the species must be readily distinguishable in the field or with no more than a simple laboratory or office examination for verification of identification; and the surveys must not pose a health and safety risk (USDA and USDI 2001, 2007).

Potentially affected site – A "site" as created by the FME process that is clipped by the spatial buffer used for the Analysis Area is considered as a potentially affected site and is included in the analysis.

Project area (or PCGP Project area) –

- Construction clearing. This is the 95 foot (average) corridor.
- Temporary Extra Work Areas (TEWAs). These are cleared areas used in construction.
- Uncleared Storage Areas (UCSAs). These are areas that are not cleared and are used to store rocks and stumps. The material may or may not be returned to the corridor after construction.
- Roads that may be constructed or reconstructed for the project.

Proportion of sites or habitat in reserves – The proportion of sites and habitat in reserve land allocations was calculated using GIS to obtain a percentage of the sites or habitat on Forest Service and BLM lands that are protected by the regionally mapped reserves (see definition of "Reserves").

Range of the northern spotted owl or NSO range – Area generally comprised of lands in western portions of Washington, Oregon, and northern California (USDA and USDI 1994). As part of the Northwest Forest Plan, Forest Service and BLM adopted standards and guidelines for the management of habitat for late-successional and old-growth forest associated species within this range.

Rare – A species is considered to be rare when: there are a low number of extant known sites with low numbers of individuals present at each site and populations are not well-distributed within its natural range. "Low" numbers and "not well distributed" are relative terms that must be considered in the context of other criteria such as distribution of habitat, fecundity, and so forth. See complete list of criteria under "Relative Rarity" in the standards and guidelines (USDA and USDI 2001, 2007).

Record of Decision – A document separate from, but associated with, an environmental impact statement that: states the management decision, states the reason for that decision, identifies all alternatives including the environmentally preferable and selected alternatives, and also states whether all practicable measures to avoid environmental harm from the selected alternative have been adopted, and if not, why not (USDA and USDI 1994).

Region or regional area (in the Persistence Evaluation) – The region is bounded by the NSO range, as defined above.

Reserves or reserve lands – Forest Service lands with a land allocation of Congressionally Reserved, Late Successional Reserve, Managed Late Successional Area (i.e., Marbled Murrelet Area and Known Owl Activity Centers), or Riparian Reserves. BLM lands with a land allocation of Congressional Reserve, Districted Designated Reserve, Late Successional Reserve, or Riparian Reserve. Reserves help to protect and enhance conditions of late-successional and old-growth forest ecosystems. Stand management actions are either prohibited or limited within these allocations. The likelihood of maintaining a connected, viable late-successional ecosystem was found to be directly related to the amount of late-successional forest in reserve status (USDA and USDI 2001, 2007).

Riparian Reserves – Areas along perennial and intermittent streams, wetlands, ponds, lakes, and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis. Riparian Reserves are important to the terrestrial ecosystem as well, serving, for example, as dispersal habitat for certain terrestrial species (USDA and USDI 1994, cited in USDA and USDI 2001, 2007). The extent of Riparian Reserves is defined by the National Forest and BLM District land and resource management plans. Regionally mapped Riparian Reserves on NFS lands were not available for the analysis. On NFS lands, the National Hydrography Dataset was used to define Riparian Reserves across the region and was clipped to the land allocation of Other (Matrix). The BLM 2016 RMPs provided regionally mapped Riparian Reserves; these data were used for Riparian Reserve boundaries on BLM lands.

Site (as in occupied site) – The location where a specimen or population of the target species (taxonomic entry) was located, observed, or presumed to exist (occasionally used as a local option to pre-disturbance surveys for certain vertebrates) based on indicators described in the Survey Protocol or Management Recommendations. Also, the polygon described by connecting nearby or functionally contiguous detections at the same location.

Site (as used in manage known sites) – The occupied site plus any buffer needed to maintain the habitat parameters described in the Management Recommendations.

Site (as in FME site) – Site is a spatial polygon where a species is known to occur and is based on definitions of sites used for the purposes of the Annual Species Reviews and estimates of regional populations. According to the 2001 ROD, for a variety of reasons relative to site management and the species biology, the definition of a "site" or record for entry into the agency geodatabases varies by taxa group. The most striking example was for terrestrial mollusks. For these species, a site was defined as all locations within 30 feet of each other, so individual records in the ISMS database could be as close together as 31 feet. For other species, the distance between locations to define sites was 100 meters. (Page 71, 2001 ROD).

The FME tool (see FME Data Process in Attachment C) applies a spatial buffer to the observation data, as described in the NRIS or GeoBOB databases, using certain criteria for some species. Wherever the original observation occurs on BLM or NFS lands the FME tool dissolves overlaps in spatial buffers to create a discrete polygon that defines a site as described using the definition on page 71 of the ROD. The following buffers were applied to the different taxa groups:

- Buffers for fungi, lichens, bryophytes, vascular plants, and red tree voles are 50 meters.
- No buffer is applied to mollusks or great gray owls because the original data already include a 10-meter buffer around the original point data.

Standards and guidelines – The rules and limits governing actions, as well as the principles specifying the environmental conditions or levels to be achieved and maintained (USDA and USDI 1994, cited in USDA and USDI 2001, 2007). Definitions used here are general terms from the NWFP, which slightly differ from the current definitions for these terms, as provided in the 2012 planning rule (36 CFR 219).

Survey and Manage – Mitigation measure adopted as a standard and guideline within the Northwest Forest Plan Record of Decision and replaced with the 2001 standards and guidelines that are intended to mitigate impacts of land management efforts on those species that are closely associated with late-successional or old-growth forests whose long-term persistence is a concern. These measures apply to all land allocations and require land managers to take certain actions relative to species of plants and animals, particularly some amphibians, bryophytes, lichens, mollusks, vascular plants, fungi, and arthropods, which are rare or about which little is known. These actions include: (1) manage known sites; (2) survey prior to ground-disturbing activities; (3) conduct extensive and general regional (strategic) surveys (USDA and USDI 2001, 2007).

Uncommon (species) – Species that does not meet the definition for rare, but where concerns for its persistence remain. See criteria under "Relative Rarity" in the standards and guidelines (USDA and USDI 2001, 2007).

Vascular plants – Plants that contain conducting or vascular tissue. They include seed-bearing plants (flowering plants and trees) and spore-bearing plants (ferns, horsetails, and clubmosses) (USDA and USDI 2001, 2007).

Vertebrate species – A species that has a backbone or spinal column (includes fishes, amphibians, reptiles, birds, and mammals, all of which have a segmented bony or cartilaginous spinal column) (USDA and USDI 2001, 2007)

Viability – Ability of a wildlife or plant population to maintain sufficient size to persist over time in spite of normal fluctuations in numbers, usually expressed as a probability of maintaining a specific population for a specified period (USDA and USDI 1994, cited in USDA and USDI 2001, 2007).

Viability Provision – A provision contained in the National Forest System Land and Resource Management Planning Regulation of 1982, pursuant to the National Forest Management Act. This provision is found in 36 CFR 219.19 and reads as follows: "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area." (USDA and USDI 2001, 2007)

Viable population – A wildlife or plant population that contains an adequate number of reproductive individuals appropriately distributed in the planning area to ensure the long-term existence of the species (USDA and USDI 1994, cited in USDA and USDI 2001, 2007).

Well distributed – Distribution sufficient to permit normal biological function and species interactions, considering life history characteristics of the species and the habitats for which it is specifically adapted (USDA and USDI 2001, 2007). For purposes of this report, a species is considered to be well distributed in at least part of its range in the NSO range if sites are relatively abundant, mostly clustered, and widespread across potentially suitable habitat.

ATTACHMENT C

Spatial Analysis Process for Persistence Evaluation

Spatial Analysis Process for Persistence Evaluation

This attachment presents additional details on the spatial analysis process used to evaluate the persistence of the Survey and Manage (S&M) species that could be affected by the Pacific Connector Gas Pipeline Project (PCGP Project). The overall process entailed identification of appropriate spatial data sources to use; collection of the data; processing of the data to fit the needs of the analysis; and analysis of the data to describe distribution patterns, abundance of the S&M species, and effects of the PCGP Project on the S&M species.

Spatial Data Sources

The key spatial data sources used for the persistence evaluation are listed in Table C-1 below. These data were collected from a variety of sources, including the U.S. Forest Service (Forest Service), U.S. Bureau of Land Management (BLM), U.S. Geological Survey, State of Oregon, and Oregon State University. The primary site data used for the analysis were provided by the Forest Service and BLM and were a product of the Feature Manipulation Extraction (FME) tool; additional details on the use of this tool can be obtained from the agencies upon request. Sample images of the site polygons, observation data associated with those polygons, analysis area boundaries, and red tree vole Habitat Areas are depicted in Figures C-1 through C-3 following the table.

Table C-1

List of Key Spatial Data

File Name	Type of Information	Source	Use in Analysis
General Data			
NSR_NWFP_Bndry.shp	Boundary of the NSO range	Forest Service	Regional area boundary
Provinces.shp	Physiographic provinces as defined in the 2001 ROD	Regional Ecosystem Office	Province boundaries used for discussion of species' distribution
NSR_HUC5_Crossed_2017.shp	5th field watershed boundaries for those watersheds that encompass the project area	Edge/NSR	Local area boundary
NSR_Lands_NWFP.shp	Land ownership	BLM/NSR	Distribution of sites across different ownerships
NWFP_LUA_FS_2013.shp	Land use allocations per 2001 ROD; includes regional dataset combined with local Forest data in Oregon	Regional Ecosystem Office; local Forest Service offices	Distribution of sites across different land allocations
BLM_LUA_2016_NWFP_revised.shp	Land use allocations per BLM 2016 RMPs in Oregon combined with local BLM data in California	BLM	Distribution of sites across different land allocations
NHD_Other_2013.shp	National Hydrography Dataset intersected with the Other (Matrix) land allocation from the 2013 land use data	NSR/USGS	Distribution of sites in Riparian Reserves, regionally mapped
Reserves_FS_2013.shp	Reserves combined from NFS land allocation data and Riparian Reserve data	NSR	Distribution of sites in Reserves

Table C-1

List of Key Spatial Data

File Name	Type of Information	Source	Use in Analysis
FSForests_ROW.shp	National Forest boundaries that encompass the project area	Forest Service	Distribution of sites in the National Forests
mr200_sppsz_2006.grd	Vegetation data (forest cover, structure, age) for 15-year monitoring report	Forest Service and Oregon State University	Habitat (coniferous, mixed hardwood-coniferous, or hardwood forests)
LSOG.shp	Late-successional and old-growth forests, as mapped for the 15-year monitoring report	Forest Service and Oregon State University	LSOG habitat and distribution of sites in LSOG forests
contour_100X.shp (ce, w, sw, nw, n, s)	100-foot contours for Oregon	State of Oregon	Contours used for habitat data processing and elevation of sites
n39w123.grd – n49w125.grd	Digital Elevation Models for parts of CA, OR, and WA	U.S. Geological Survey	DEMs converted to contour data and used for habitat data processing and elevation of sites
F_BARC	Fire Intesity in the Stouts Creek Fire Area (Burned Area Emergency Resonse)	Forest Service	Includes four levels of fire impact: Unburned/Very Low, Low, Moderate, and High
R_LSOG_Impacted	LSOG crossed by the PCGP Project impacted by the Stouts Creek Fire	NSR	Field verification data used to supplement the BARC data
BARC_Stouts_Fire_Impacted	Area impacted by the Stouts Creek Fire. Includes moderate and high intensity areas supplemented by field verification of LSOG.	Forest Service and NSR	Used to determine which sites still persist in the 2015 Stouts Fire perimeter.
Project-Related Data			
Analysis_Area_50m_0817.shp	50-meter buffer of project area	NSR	Analysis area used for fungi, lichens, bryophytes, plants, and mollusks
Analysis_Area_RTV_100m_0817.shp	100-meter buffer of project area	NSR	Analysis area used for red tree vole
Analysis_Area_STNE_1117.shp	0.25-mile and 1-mile buffer (combined) of project area	NSR	Analysis area used for great gray owl
Combined_ROW_Roads_0817.shp	Combined project area data (roads and corridor with associated features)	NSR	Project area boundary and project features that could affect sites.
Right_of_Way_07072017.shp	PCGP Project features	Edge	Project features that could affect sites
Roads_disturbance_poly_v032113.shp	PCGP Project Transportation Management Plan	Edge/NSR	Roads that could affect sites
Blastng_High	Corridor segments with high potential to be subject to blasting during construction	NSR	Used to create 1-mile buffer analysis area for great gray owl.
Milepost_07072017.shp	Mileposts along construction corridor for PCGP Project	Edge	Milepost numbers for locations of sites in or near project area
contour_20.shp	20-foot contours around the project area	Edge	Elevation and topography around sites in and near the project area
Species Data			
SMKnownSites_2017_NWFP in SM_KnownSites_Aug_2017.mdb	FME site output for all species	Forest Service	Original “Sites” for each species

Table C-1

List of Key Spatial Data

File Name	Type of Information	Source	Use in Analysis
Original_Obs in SW_KnownSites_Aug_2017.mdb	Original observation data for all species	Forest Service	Original observation data for each species.
SMKnownSites_2017_NWFP_SoutsRemoved	FME site output excluding those sites removed by the Stouts Fire.	Forest Service and NSR	Final "Sites" for each species except great gray owl.
GGO_NRIS_GEOBOB	Polygon and buffered point data, limited to observations that meet the definition of a GGO site.	BLM and NSR	Final "Sites" for great gray owl.
ARLO_Habitat_Areas_1117.shp	Habitat Areas for red tree vole	NSR	Habitat Areas for analysis of impacts to red tree vole

Figure C-1: Sample Site and Observation Data

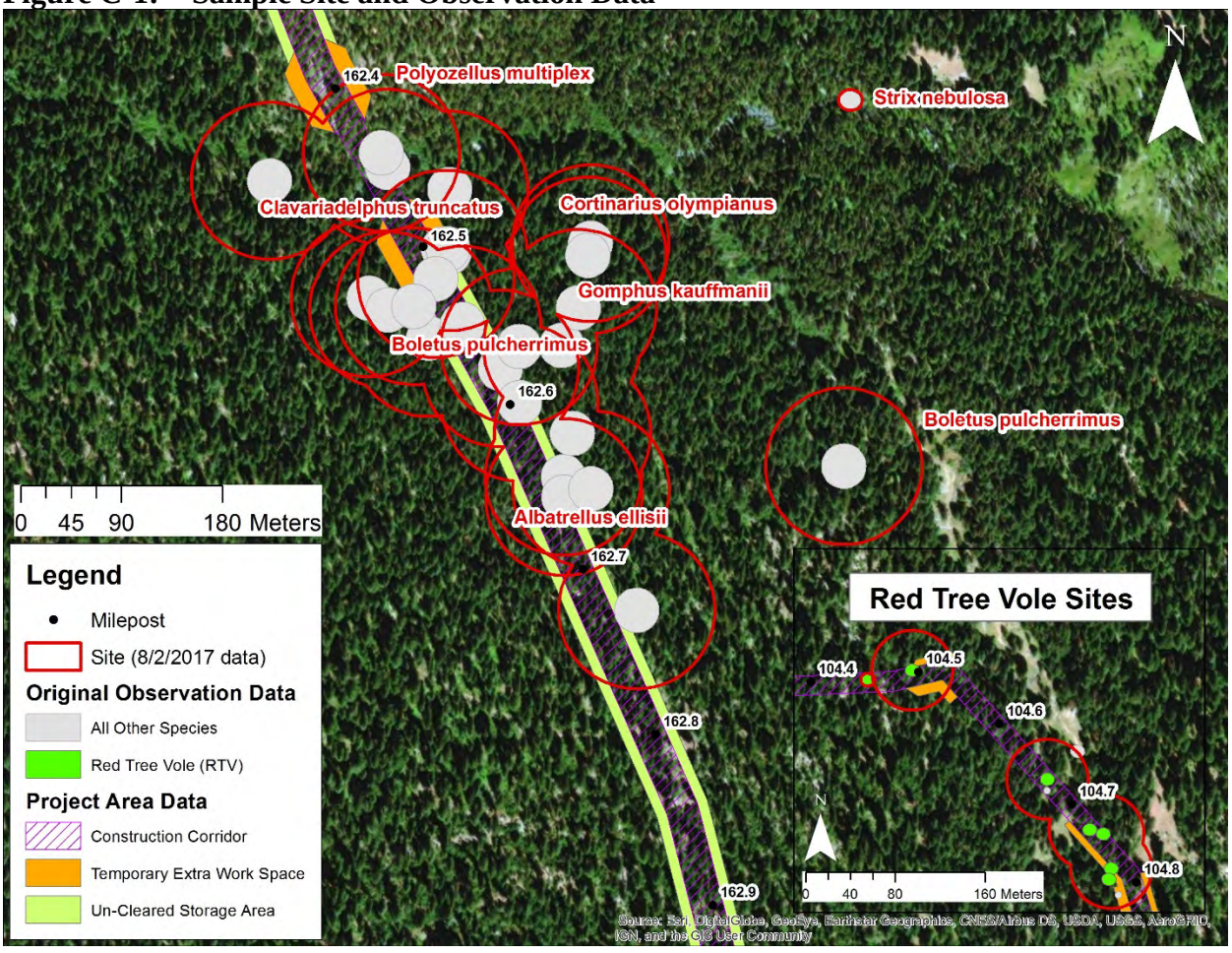


Figure C-2: Analysis Area Boundaries

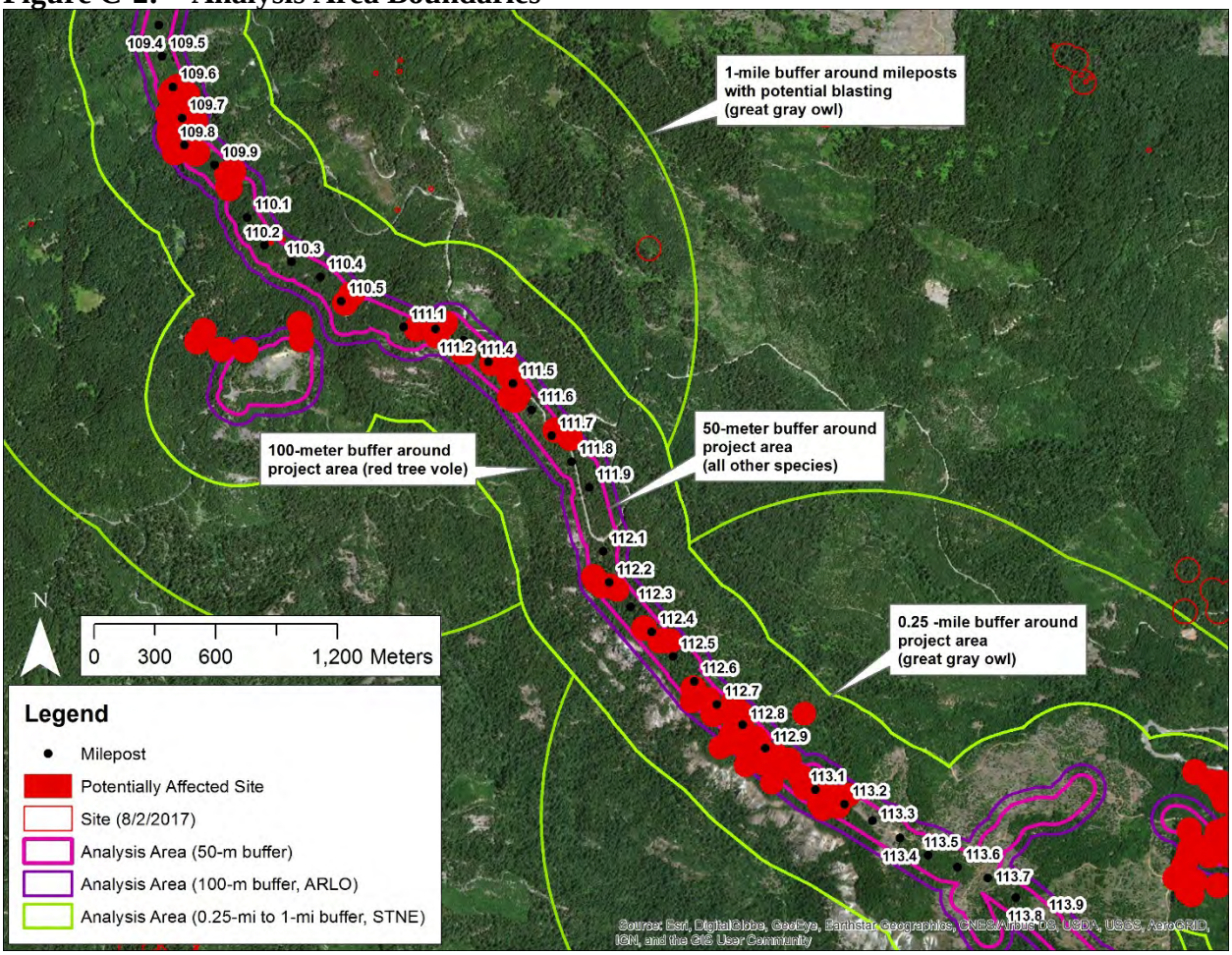
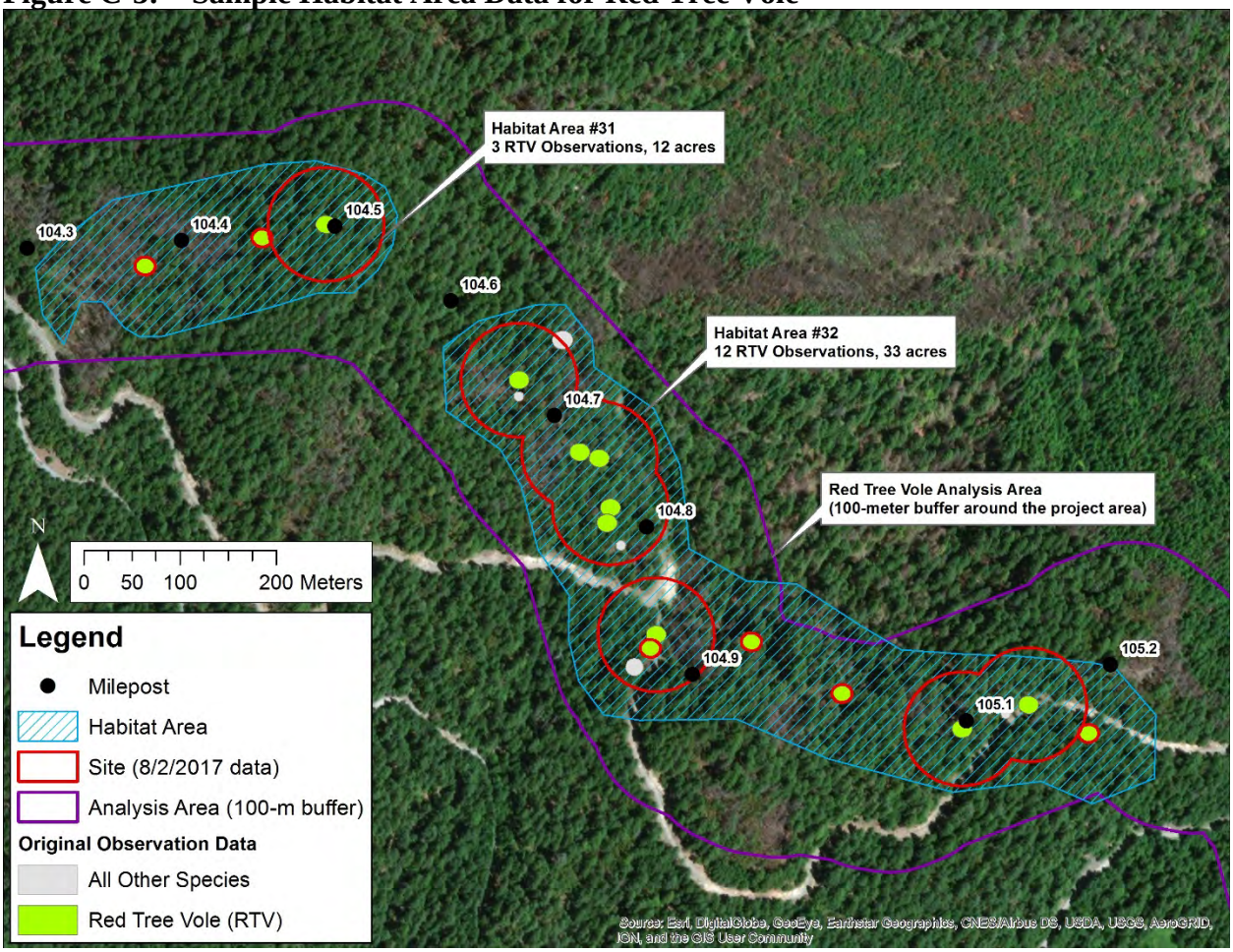


Figure C-3: Sample Habitat Area Data for Red Tree Vole



Data Processing

The data obtained in Table C-1, as well as other necessary data (e.g., state and county boundaries), were processed to support the persistence evaluation. All datasets that covered an extent greater than the range of the northern spotted owl (NSO) were clipped to the "NSR_NWFP_Bndry" shapefile. Other specific processes that were run are detailed below.

Lands Data Processing

The land ownership and allocation data were processed to produce subsets of the data for analysis purposes, as follows:

- A Select by Attributes process was used for the "NSR_Lands_NWFP" shapefile to select those lands with an "NSR_Own" attribute of "USFS" or "US Forest Service" to produce a layer with only National Forest System lands (NSR_Lands_NWFP_FS.shp).
- A Select by Attributes process was used for the "NSR_Lands_NWFP" shapefile to select those lands with an "NSR_Own" attribute of "BLM" or "Bureau of Land Management" to produce a layer with only BLM lands (NSR_Lands_NWFP_BLM.shp).

- A comprehensive BLM LUA layer was created by combining the LUA layer provided by the BLM 2016 RMPs in Oregon, and local BLM office's LUA data for all areas outside the BLM 2016 RMP boundaries (BLM_LUA_2016_NWFP_revised.shp).
- A Forest Service and BLM reserve lands layer was produced from a subset of the "NWFP_LUA_FS_2013" and "BLM_LUA_2016_NWFP_revised" shapefile combined with the subset of the National Hydrography Dataset. A Select by Attributes process was used for the "NWFP_LUA_FS_2013" shapefile to extract only those features with reserve land allocations (LUA = CR, LSR, LSR3, or LSR4). A Select by Attributes process was used for the "BLM_LUA_2016_NWFP_revised" shapefile to extract only those features with reserve land allocations (LUA = CR, DD, LSR, RR). The National Hydrography Dataset was clipped to the features with the "Other" attribute in the land allocation dataset (LUA = Other) to produce the regionally mapped Riparian Reserves (NHD_Other_2013.shp). These datasets were merged to produce the regional reserve lands (Reserves_FS_BLM_2017.shp). The data were further clipped using the "NSR_Lands_NWFP_FS" shapefile to produce reserve lands only on National Forest System lands (Reserves_2013_FS.shp) and they were clipped to the "NSR_Lands_NWFP_BLM" shapefile to produce reserve lands only on BLM lands (Reserves_2016_BLM.shp).
- National Forest boundaries were processed to create layers depicting only the National Forest System lands in each management unit. The "FSForests_ROW" shapefile was intersected with the "NSR_Lands_NWFP_FS" shapefile to produce the "FSForests_ROW_FSland" shapefile.

Project Data Processing

The project data obtained from Edge and the project applicant were combined and buffered for use in the analysis. The following steps were used to process the data:

- The project features (Right_of_Way_07072017) and roads (Road_disturbance_poly_v032113.shp) layers were merged and dissolved to produce a project area boundary (Combined_ROW_Roads_0817.shp).
- Potential blasting areas included segments of the proposed corridor by milepost (Milepost_07072017.shp) where the potential to use blasting during construction is high based on the substrate (e.g., volcanic rocks, intrusive rocks). The locations with high blasting potential are provided in PCGP's Geological Resource Report No.6 and digitized by NSR into the "Blasting_High" shapefile.
- The project area was buffered to create analysis area boundaries for the S&M species. The analysis area for all species except great gray owl and red tree vole was established by creating a 50-meter buffer around the project area. For red tree vole, the project area was buffered by 100 meters. The analysis area for great gray owl included a 1-mile buffer around the "Blasting_High" shapefile merged with a 0.25-mile buffer around the entire project area. Figure C-2 displays the three analysis areas.
- Fire intensity in the boundary of the 2015 Stouts Creek Fire was obtained from the Forest Service (F_BARC.shp). The "moderate" and "high" fire intensity areas were selected from the "F_BARC" layer and modified by the field verification "R_LSOG_Impacted"

layer. The result is the "BARC_Stouts_Fire_Impacted" layer, which includes all forests removed by the Stouts Creek Fire. .

Site Data Processing

The site data produced by the FME tool was processed to identify those sites that could be affected by the PCGP Project (potentially affected sites) and to estimate the extent of impacts to the sites. The FME tool was used for all species except great gray owl; the great gray owl process is detailed below. The following steps were used to process the site data:

- A Select by Location process was used to remove the sites that were within the BARC4_Moderate_High_LSOG_Impcated.shp layer, and the resulting selection of sites located outside the fire impact area was exported as SMKnownSites_NWFP_StoutsRemoved.shp. The same process occurred for the Original Observation layer, resulting in Original_Obs_NWFP_StoutsRemoved.shp.
- A Select by Location process was used to extract out the sites that intersect, or fall within, the analysis area appropriate for the species (50-meter buffer of the project area for fungi, lichens, bryophytes, plants, and mollusks; 100-meter buffer of the project area for red tree vole; and 0.25–1-mile buffer of the project area for great gray owl). The extracted sites using the 50-meter analysis area were exported as: "SMKnownSites_2017_StoutsRemoved_AnalysisArea50m." The extracted red tree vole and great gray owl sites were also exported as SMKnownSites_2017_StoutsRemoved_STNE_AnalysisArea.shp and SMKnownSites_2017_Stouts_Removed_RTV_AnalysisArea100m.shp.
- For the non-vertebrate species, the analysis area sites layers were queried for the species, then the selected sites were clipped to the project area and intersected with the project features and road layers. The acreage of each clipped or intersected site was calculated to estimate the extent of the site subject to impacts. The resulting layers were labeled with the species' alpha code and part of the clipped or intersected file's name (e.g., alel_project_clip, alel_project_inter, alel_road_inter).
- For red tree vole (ARLO), the analysis area sites were further modified to create Habitat Areas using guidance from the species' Management Recommendations (Forest Service and BLM 2001). Each site within the 100 meter buffer was reviewed in ArcGIS with the locations of original observations (active and undetermined nest sites) from GeoBOB and NRIS. Sites and observations that were determined to have been destroyed during the Stouts Creek fire were removed from further analysis. The remaining sites were manually modified to create polygons that encompass all nest sites (active and undetermined, per the guidance) and an appropriate habitat area (i.e., older forests, as visible on aerial imagery) around those sites using the guidance (i.e., 1 acre per nest site if more than 10 nests; 10 acres for less than 10 nests; include the site potential distance of at least 200 feet between the sites and the perimeter of the polygon; and combine overlapping Habitat Areas or include nest sites within 330 feet of one another). The "ARLO_Habitat_Areas_1117" shapefile was then processed as with the other analysis area site data to estimate the extent and types of impacts to each Habitat Area. Figure C-3 shows examples of the Habitat Areas.

- For great gray owl (STNE), the original observation data from both GEOBOB and NRIS was queried to only include those sites that satisfy the definition of "site" provided in *Survey Protocol for Great Gray Owl (Strix nebulosi)* (Huff and Goodwin 2016). When available, great gray owl polygons representing the extent of a known site were used. When only point observation data was available, the points were buffered 0.25-mile to create each site. Duplicate sites determined to be the same nest site observed during several surveys were merged or removed.

Habitat Mapping

Raster data (mr200_sppsz_2006.grd) with forest cover, structure, and age were obtained from the Forest Service and Oregon State University, Landscape Ecology, Moderaling, Mapping, and Analysis group, and were the same data used for the Northwest Forest Plan 15-year monitoring report. In support of that report, the raster was processed to produce a shapefile depicting the extent of LSOG forests across the NSO range. The shapefile was also used for this report to produce the LSOG subset of forests for each species and determine the number of sites found in LSOG forests. The forest cover raster was processed using the following steps to produce a regional forest coverage layer and map and estimate the extent of forests that could provide habitat for each species:

- The raster was first reclassified using the "FORTYPBA" attribute, which describes the forest type based on the dominant tree species using alpha codes from the 2000 PLANTS database.
- The resulting raster (mr200_fortest) was further classified by coniferous (code of "1" based on dominant plants that are only conifer species), mixed hardwood-coniferous (code of "2" based on dominant plants that are conifer and hardwood species), and hardwood (code of "3" based on dominant plants that are only hardwood species) forests by adding a new attribute column, then the raster was clipped to the CA, OR, and WA extents of the NSO range to produce three smaller rasters to work with.
- The resulting rasters were converted to shapefiles using the new attribute column for forest type (1, 2, or 3) and clipped to the extent of Forest Service and BLM lands to only display and use the extent of forests on those lands subject to the Northwest Forest Plan Standards and Guidelines. The acreage of each forest type was also calculated. These layers provided the extent of coniferous, mixed hardwood-coniferous, and hardwood forests across the region (NSO range).
- The OR forest layer (mr200_fortyp_or_FS_BLM.shp) was further clipped to the local (NSR_HUC5_2017_Crossed.shp) and project (Combined_ROW_Roads_0817.shp) areas to calculate the extent of all forests at those scales. It was also intersected with the project features layer to estimate the extent of impacts to the forests from each activity type in the project area.
- For species that had elevation limits, the forest layers were further processed according to the elevation criteria. The appropriate elevation limit was selected using the DEMs (converted into feet) and intersected the elevation layer with the forest layer to generate a new shapefile of any forest type above or below a specified elevation limit (e.g., coniferous and mixed hardwood-coniferous forests below 6,000 feet above mean sea level) for each state. Acreages were calculated for these layers to produce an estimate of

the regional extent of the forests. The OR forest layer was further processed, as with the general forest layer, to produce estimates at the local and project area scales and estimate the extent of impacts to the forests.

- These datasets were used to map forests that could provide habitat for each species according to the background information collected on the species. The background information was supplemented with the locations of sites at various elevations and in the different forests using a Select by Location process to select the forest type and elevation contours that intersected the sites. The spatial information was used as a general reference to supplement the published information on each species.

Spatial Analysis Steps

Once the spatial data were processed, the data were used to describe information on each species in terms of their spatial distributions and anticipated effects associated with the PCGP Project, as detailed below.

Species Distributions

The distribution patterns of each species were described at three scales (regional, local, and analysis areas) using the GIS data. The following steps detail the processes used to obtain information on the species' distributions:

- The data listed in Table C-1, as modified by the data processes discussed above, were uploaded into ArcGIS.
- A definition query was set for the site data (SMKnownSites_2017_NWFP_StoutsRemoved, SMKnownSites_2017_AnalysisArea50m, SMKnownSites_2017_STNE_AnalysisArea, and SMKnownSites_2017_RTV_AnalysisArea100m) for the species in question.
- The site data were queried for number of sites in the regional, local, analysis, and project areas (i.e., total feature count for regional and analysis areas data; Select by Location for sites that intersect the NSR_HUC5_Crossed_2017.shp and Combined_ROW_Roads_0817.shp).
- The site data were queried for number of sites in each land ownership (Forest Service, BLM, National Park Service, U.S. Fish and Wildlife Service, or Other) and across each scale (regional, local, and analysis areas). A Select by Attributes process was first used on the "NSR_Lands_NWFP" shapefile for the "NSR_Own" attribute to select the land owner, then the Select by Location process was used to select sites that intersect the selected land ownership features.
- Using the same processes as for the land ownership data, the site data were queried for number of sites in each land use allocation (LUA = AMA, AMR, AW, CR, LSR, LSR3, LSR4, MLSA, ND, Other in NWFP_LUA_FS_2013.shp; LUA = AW, CR, DD, HLB, LSR, ND, Other in BLM_LUA_2016_NWFP_revised) across each scale.
- The distribution of the sites across the physiographic provinces was assessed by using the Select by Location process for the "Provinces" shapefile to select provinces that intersect the sites.

- The number of sites on BLM and National Forest System lands and in reserve land allocations across the three scales (regional, local, and analysis areas) was counted by using a Select by Location on the site layer to select sites that intersect the respective ownership shapefile and reserves shapefile. The selection started with the regional sites, and those sites within the local and analysis areas were reselected.
- For sites in reserve land allocatins on BLM lands, the query was further refined to analyze the number of sites located entirely in reserves (i.e., do not share boundaries with "non-reserve" land allocation).
- The site data were queried for number of sites on National Forest System lands within the National Forests that encompass the project area. A Select by Attributes process was first used on the "FSForests_ROW" shapefile for the "FORESTNAME" attribute to select the Forest name, then the Select by Location process was used to select sites that intersect the selected features.
- The locations of sites in or near the project area were identified using the mileposts associated with the construction corridor.
- The extent of potential habitat for each species was calculated using the processed habitat data and presented in a map with the sites to portray the distribution of sites across the habitat.
- Maps were produced to display the distribution of sites across the regional and local areas on BLM and National Forest System lands and reserve lands within those lands.

Analysis of PCGP Project Impacts on Sites

Two levels of analysis were conducted using the GIS data, depending on the potential for concern for the species' persistence in the NSO range. For all species, an initial analysis was conducted using the steps below:

- Sites, as produced by the FME tool, that could be affected by the PCGP Project, either directly or indirectly, were identified by selecting those sites that fall within, either partially or entirely, the analysis area for the species. These sites are contained in the analysis area site layers (SMKnownSites_2017_StoutsRemoved_AnalysisArea50m, SMKnownSites_2017_StoutsRemoved_STNE_AnalysisArea, and SMKnownSites_2017_StoutsRemoved_RTV_AnalysisArea100m shapefiles).
- The direct impacts to the sites were calculated in acres using the processed site data (SPECIES_project_clip.shp, SPECIES_project_inter.shp). The intersected layers provided details by feature of the PCGP Project that would cause the impact (e.g., FEATURE = Combined_ROW_Roads_0817).
- The estimated acreage of impacts to potential habitat was calculated using the processed habitat data (habitat data clipped to and intersected with the project area). The estimated amount of forests to be restored within the project area was also calculated using the intersected data.

If the level of project-related impacts appeared to create a concern for species persistence, the following steps were used to conduct a closer analysis of the anticipated impacts and assess the potential for site persistence at each affected site:

- The original observation data from GeoBOB and NRIS were uploaded into ArcGIS and viewed with the analysis area site data, the PCGP Project data, contour data, and aerial imagery (BING basemaps provided through ArcGIS) to determine proximity of the observation to the project area and potential for impacts (direct or indirect).
- A map was produced of the analysis area sites to display the observation and other useful data that were used to assess impacts.
- If the impacts would still create a concern for species persistence in the NSO range, a potential route modification was determined using the GIS data and mileposts.