
APPENDIX F.5

Survey and Manage Species Persistence Evaluation

**Jordan Cove Natural Gas Liquefaction and
Pacific Connector Gas Pipeline Project
Final EIS**

Appendix F.5

**Survey and Manage Species Persistence Evaluation
Umpqua, Rogue River-Siskiyou and Fremont-Winema
National Forests**

Prepared for:

USDA Forest Service

Prepared by:

Stantec Consulting Services Inc.

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Summary

This report analyzes the impacts of the Pacific Connector Gas Pipeline Project (PCGP Project) on Survey and Manage (S&M) species on National Forest System (NFS) lands in southern Oregon. The PCGP Project includes construction 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 Jordan Cove natural gas liquefaction and terminal at Coos Bay, Oregon. The purpose of this analysis is to determine if the PCGP Project would threaten the persistence of any S&M species within the range of the northern spotted owl (NSO) or otherwise not meet the persistence objectives in the 1994 Northwest Forest Plan Record of Decision (ROD) and 2001 S&M ROD. If the PCGP Project is certificated by the Federal Energy Regulatory Commission, the U.S. Department of Agriculture, Forest Service (Forest Service) is proposing to amend the respective land management plans for the Umpqua, Rogue River-Siskiyou, and Fremont-Winema National Forests to waive the Management Recommendations that require protection of known S&M species sites on lands directly affected by the PCGP Project.

The analysis entailed background research on S&M species that could be affected by the PCGP Project; a review of survey reports prepared by others for the PCGP Project; and processing and analysis of spatial data obtained from the Bureau of Land Management (BLM), Forest Service, and other sources, including S&M species site data created using a Feature Manipulation Extract tool consistent with the guidance and definitions used in annual species reviews and other planning and analysis purposes over the past 12 years. The site data were used to describe the distribution patterns and abundance of S&M species in the NSO range, as well as at local (5th field watersheds) and project area scales, and to assess project-related effects on the species (i.e., their sites). Background information was used in combination with new information available as a result of surveys for the PCGP Project and recent surveys in other portions of the NSO range to discuss the currently known distribution of the species in the NSO range. Impacts to sites as a result of the PCGP Project were analyzed to determine if the species would continue to have a reasonable assurance of persistence in the NSO range following implementation of the PCGP Project, taking into consideration the status and distribution of the species and general habitat in the NSO range.

Based on the analyses presented in this report, the conclusions summarized below were made for the 38 S&M species from the 2003 S&M list that could be affected by the PCGP Project.

The species listed below appear to be more common than previously documented or are relatively common across the NSO range based on new information available from surveys for the PCGP Project and/or other sources since the species were last assessed in 2003. For these 27 species, the PCGP Project would affect individuals or habitat at one or more sites and could affect site persistence, but the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence:

Fungi:

Albatrellus ellisii

Clavariadelphus occidentalis

Clavariadelphus sachalinensis

Clavariadelphus truncatus

Collybia bakerensis

Gomphus kauffmanii

Mycena overholtsii

Polyozellus multiplex

Ramaria araiospora

Ramaria coulterae

Cortinarius olympianus
Cudonia monticola
Galerina atkinsoniana
Gastroboletus subalpinus
Gomphus clavatus

Ramaria rubrievanescens
Ramaria rubripermanens
Rhizopogon truncatus
Sparassis crispa
Spathularia flavida
Tremiscus helvelloides

Lichens:

Chaenotheca subroscida
Leptogium teretiusculum

Mollusk:

Monadenia chaceana

Vascular Plant:

Cypripedium fasciculatum

Vertebrates:

Arborimus longicaudus
Strix nebulosa

The species listed below are not necessarily more common than previously documented despite new information available from pre-disturbance surveys for the PCGP Project and/or other sources since the species were last assessed in 2003. For these 10 species, the PCGP Project would affect individuals or habitat at one or more sites and could affect site persistence, but the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence:

Fungi:

Arcangeliella crassa
Boletus pulcherrimus
Choiromyces alveolatus
Collybia racemosa
Cortinarius magnivelatus
Cortinarius verrucisporus
Gymnomyces abietis
Hygrophorus caeruleus
Sedecula pulvinata

Mollusk:

Deroceras hesperium

The species listed below is not necessarily more common than previously documented despite new information available from pre-disturbance surveys for the PCGP Project and/or other sources since the species were last assessed in 2003. For this species, the PCGP Project would affect site persistence at one or more sites, and the remaining sites in the NSO range may not provide a reasonable assurance of species persistence. The species is known from a low number of sites within a part of the NSO range, has specialized or somewhat limited habitat requirements, and has a distribution pattern in which every site may be important for dispersal opportunities to ensure the persistence of the species in the NSO range:

Fungi:

Sarcodon fuscoindicus

The pipeline route variation between MPs 111.5 and 11.6 (described in section 3.4.2.7 of the DEIS has been incorporated into the proposed route to avoid the *Sarcodon fuscoindicus* site. Under this variation, the construction right-of-way between MPs 111.5 and 111.6 would be shifted at least 25 feet to the northeast, and the UCSA on the southwest side of the construction right-of-way would be eliminated. As a result, at least one of the two known occurrences of this species within the site would be at least 100 feet from any Project-related disturbance (see DEIS figure 3.4-7).

These conclusions will be used by the Forest Service to provide a recommendation to the decision-makers regarding the finding of species persistence for each S&M species evaluated in this report, and the findings will ultimately be documented in the Forest Service Record of Decision for the PCGP Project.

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Attachment C Spatial Analysis Process for Persistence Evaluation

List of Acronyms/Abbreviations

2001 ROD	<i>Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines</i>
ASR	Annual Species Review
BLM	U.S. Bureau of Land Management
feet msl	feet above mean sea level
FME	Feature Manipulation Engine
Forest Service	U.S. Department of Agriculture, Forest Service
GeoBOB	Geographic Biotic Observations, a BLM geodatabase
GIS	geographic information systems
KOAC	Known Owl Activity Center
LSOG	late-successional and old-growth
LSR	Late Successional Reserve
NFS	National Forest System
Northwest Forest Plan or NWFP	<i>Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management for Late-Successional and Old-Growth Related Species in the Range of the Northern Spotted Owl</i>
NRIS	Natural Resource Information System, a Forest Service geodatabase
NSO	northern spotted owl
ORBIC	Oregon Biodiversity Information Center
PCGP Project	Pacific Connector Gas Pipeline Project
POD	Plan of Development
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-Way
S&M	Survey and Manage
SEIS	Supplemental Environmental Impact Statement
TEWA	temporary extra work area
TMP	Transportation Management Plan
UCSA	uncleared storage area
<i>Species Abbreviations:</i>	
ALEL	<i>Albatrellus ellisii</i>
ARCR	<i>Arcangeliella crassa</i>
ARLO	<i>Arborimus longicaudus</i>
BOPU	<i>Boletus pulcherrimus</i>

CHAL	<i>Choiromyces alveolatus</i>
CHSU	<i>Chaenotheca subroscida</i>
CLOC	<i>Clavariadelphus occidentalis</i>
CLSA	<i>Clavariadelphus sachalinensis</i>
CLTR	<i>Clavariadelphus truncatus</i>
COBA	<i>Collybia bakerensis</i>
CORA	<i>Collybia racemosa</i>
COMA	<i>Cortinarius magnivelatus</i>
COOL	<i>Cortinarius olympianus</i>
COVE	<i>Cortinarius verrucisporus</i>
CUMO	<i>Cudonia monticola</i>
CYFA	<i>Cypridium fasciculatum</i>
DEHE	<i>Deroceras hesperium</i>
GAAT	<i>Galerina atkinsoniana</i>
GASU	<i>Gastroboletus subalpinus</i>
GOCL	<i>Gomphus clavatus</i>
GOKA	<i>Gomphus kauffmanii</i>
GYAB	<i>Gymnomyces abietis</i>
HYCA	<i>Hygrophorus caeruleus</i>
LETE	<i>Leptogium teretiusculum</i>
MOCH	<i>Monadenia chaceana</i>
MYOV	<i>Mycena overholtsii</i>
POMU	<i>Polyozellus multiplex</i>
RAAR	<i>Ramaria araiospora</i>
RACO	<i>Ramaria coulterae</i>
RARU5	<i>Ramaria rubrievanescens</i>
RARU6	<i>Ramaria rubripermanens</i>
RHTR	<i>Rhizopogon truncatus</i>
SAFU	<i>Sarcodon fuscoindicus</i>
SEPU	<i>Sedecula pulvinata</i>
SPCR	<i>Sparassis crispa</i>
SPFL	<i>Spathularia flavida</i>
STNE	<i>Strix nebulosa</i>
TRHE	<i>Tremiscus helvelloides</i>

1.0 INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

This report analyzes the impacts of the Pacific Connector Gas Pipeline Project (PCGP Project) on Survey and Manage (S&M) species on National Forest System (NFS) lands in southern Oregon. The information presented in this document will be used by:

- U.S. Department of Agriculture, Forest Service (Forest Service) decision-makers to support findings concerning the persistence of S&M species affected by the PCGP Project,
- Forest Service decision-makers in consideration of possible amendments of land management plans related to S&M species, and
- The Federal Energy Regulatory Commission while preparing an Environmental Impact Statement in compliance with the National Environmental Policy Act for construction and operation of the PCGP Project.

The proposed Jordan Cove Liquefied Natural Gas project is not a part of the PCGP Project and would not be located on NFS lands. It is, therefore, not subject to the S&M Standards and Guidelines or Forest Service discretionary actions.

The purpose of this analysis is to determine if the PCGP Project would affect the persistence of any S&M species within the range of the northern spotted owl (NSO) or otherwise not meet the persistence objectives in the 1994 Northwest Forest Plan Record of Decision (ROD) and 2001 S&M ROD to provide reasonable assurance of species persistence. An overview of the PCGP Project, a discussion of relevant planning documents, and a description of the methodology used to conduct the analysis are presented in this chapter.

1.2 PROJECT OVERVIEW

The PCGP Project includes construction 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 Jordan Cove natural gas liquefaction and terminal at Coos Bay, Oregon. The proposed route is illustrated on Figure INTRO-1.

The standard construction corridor would be about 95 feet wide, with some locations narrower depending on the work being conducted. Figure INTRO-2 illustrates a typical pipeline construction corridor with a temporary extra work area (TEWA). These TEWAs would be needed in numerous locations to support pipeline installation and facility construction; these areas would be cleared of vegetation and may be graded, but would be restored to pre-disturbance conditions (e.g., similar contours, vegetation) upon completion of construction. Uncleared storage areas (UCSAs) would also be used during construction to store materials, such as downed logs, large boulders and rootwads. Understory vegetation and sapling sized trees may be removed in the UCSAs, but larger trees would not be cut except as needed for safety during construction operations. Upon completion of the construction phase, a 50-foot-wide permanent easement centered on the pipeline would be required for long-term access and maintenance; 30 feet of the permanent easement would be maintained in low growing herbaceous and shrub vegetation to facilitate aerial inspections.

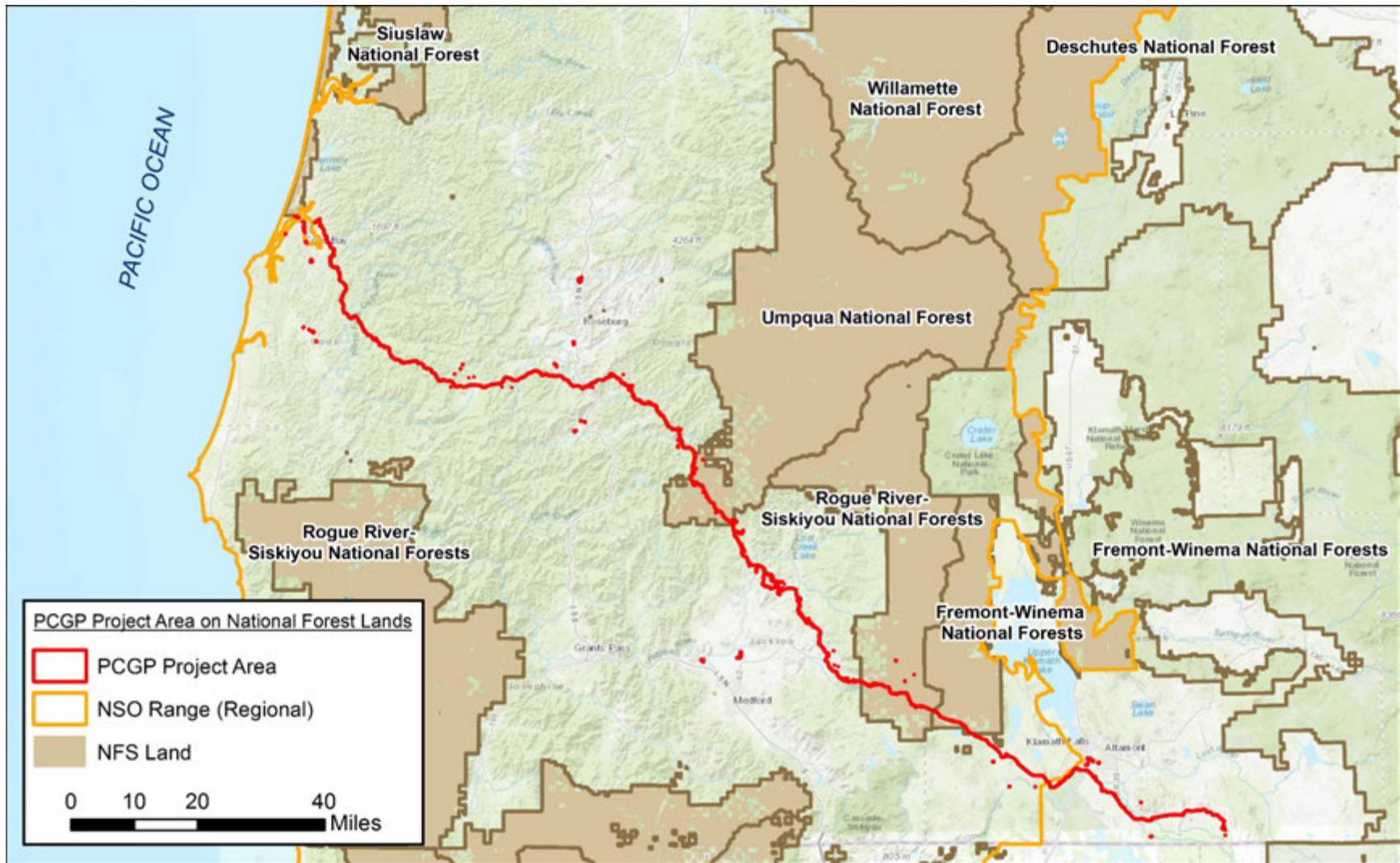


Figure 1. PCGP Project Area on National Forest Lands



Figure INTRO-2. Typical Pipeline Construction Corridor with Temporary Extra Work Areas

Table INTRO-1 displays an overview of the extent of the PCGP Project on NFS lands, and across 18 5th-field watersheds. The construction corridor and TEWAs (i.e., cleared portions) includes approximately 450 acres of NFS lands. The project area, which encompasses both cleared and modified components of the project, includes approximately 620 acres of NFS lands. Table INTRO-2 portrays the number of miles of the Project corridor on NFS lands in each watershed. The Project corridor extends approximately 30.5 miles across NFS lands, including the Umpqua, Rogue River-Siskiyou, and Fremont-Winema National Forests.

The PCGP Project Right-of-Way (ROW) Grant application includes a Plan of Development (POD) which consists of 29 specific exhibits, including the Transportation Management Plan (TMP) that identifies necessary road improvements and maintenance activities to support construction activities and defines new temporary and permanent access roads. Some road improvements and construction would be necessary on federal lands. Road maintenance and improvement/reconstruction, such as spot rocking, grading to remove ruts, resurfacing, culvert replacement, vegetation clearing, dust abatement, danger tree removal, drainage cleanout, road widening, and turnout construction, would be implemented on designated roads to accommodate pipe transportation and heavy construction equipment access to the corridor. These activities would involve a minimal amount of site disturbance and earthwork necessary to make the roads useable for construction access needs. More substantial work, such as surfacing or resurfacing of roads, may be necessary for roads used outside of the normal operating season. No maintenance or improvements will be allowed on any road not authorized for use or approved for improvements.

For purposes of this analysis, the anticipated disturbance area associated with the TMP encompasses a 30-foot-wide corridor along the existing and proposed Forest Service road alignments, some of which fall within the PCGP Project corridor.

Watershed Unit	Federal Land Allocation							
	LSR Project Area (acres)		Matrix Project Area (acres)		Riparian Reserves Project Area (acres)		All Allocations ³ Project Area (acres)	
	Cleared	Modified	Cleared	Modified	Cleared	Modified	Cleared	Modified
Big Butte Creek	0	0	0	4.9	0	0	0	4.9
Coos Bay Frontal	0	0	0	0	0	0	0	0
East Fork Coquille River	0	0	0	0	0	0	0	0
Elk Creek-South Umpqua	23.3	3.2	3.5	1.8	0	0	26.8	5.0
Klamath R. – John C Boyle Reservoir	0	0	0	0	0	0	0	0
Lake Ewauna-Upper Klamath River	0	0	0	0	0	0	0	0
Little Butte Creek	205.3	88.7	0.1	0.1	0	0	205.4	88.8
Lower Lost River	0	0	0	0	0	0	0	0
Middle Fork Coquille River	0	0	0	0	0	0	0	0
Middle South Umpqua River	0	0	0	0	0	0	0	0
Myrtle Creek	0	0	0	0	0	0	0	0
North Fork Coquille River	0	0	0	0	0	0	0	0
Olalla Creek-Lookingglass Creek	0	0	0	0	0	0	0	0
Rogue River-Shady Cove	0	0	0	0	0	0	0	0
South Umpqua River	9.3	20.0	11.8	14.0	0	0	21.1	34.0
Spencer Creek	0	0	71.0	10.0	8.6	1.7	79.6	11.7
Trail Creek	0	0	41.1	20.4	0	0	41.1	20.4
Upper Cow Creek	34.4	0.5	40.3	4.5	0	0	74.7	5.0
Total	272.3	112.4	167.8	55.7	8.6	1.7	448.7	169.8

Watershed	Length in Miles			
	Umpqua	Rogue River-Siskiyou	Fremont-Winema	Total
Elk Creek-South Umpqua	2.26	0	0	2.26
Little Butte Creek	0	13.72	0.01	13.73
South Umpqua River	1.53	0	0	1.53
Spencer Creek	0	0	6.04	6.04
Trail Creek	2.10	0	0	2.10
Upper Cow Creek	4.86	0	0	4.86
Total Length	10.75	13.72	6.05	30.52

A number of exhibits with the POD include design measures developed in consultation with the Forest Service to reduce impacts to lands and resources and comprehensive mitigation plans that may benefit S&M species. Design measures from the POD and additional construction measures that would benefit S&M species include:

- Approximately 2,000 acres of land will be reallocated from the Matrix land allocation to the Late Successional Reserve (LSR) land allocation. This would benefit S&M species because lands allocated as LSR are managed for late-successional and old-growth (LSOG) habitat with which S&M species are typically associated.
- Extensive large woody debris will be placed in Riparian Reserves and managed stands (e.g., plantations) where this material was removed by past management and fuel reduction treatments. Large woody debris will also be placed back on the corridor as part of the overall construction effort. This may benefit S&M species over time because large woody debris is an important habitat element for many S&M species.
- Fuels reductions and fire suppression projects will be implemented along the corridor. Stand-replacement fire has been the primary threat to LSOG habitat on federal lands in the Pacific Northwest (Moer et al. 2011). High intensity stand-replacement fire could adversely affect some S&M species. Fuels reduction and fire suppression projects reduce the probability that high-intensity stand-replacement fire will occur in areas where these activities are implemented.
- Approximately 80 miles of road decommissioning are proposed on federal lands within the 5th field watersheds affected by the PCGP Project. Road decommissioning may benefit LSOG habitat and a number of S&M species over time by re-establishing native vegetation and decreasing habitat fragmentation.
- Precommercial and commercial thinning will be implemented along the corridor. Reducing stand density in overstocked stands may benefit S&M species by accelerating the development of LSOG habitat, particularly with respect to accelerating late-successional stand characteristics, such as larger trees, snags, and a multi-layered canopy.
- Dead and downed woody debris greater than 16 inches in diameter, unmerchantable woody debris, slash (greater than 16 inches in diameter), and large rocks and boulders that are removed from the construction corridor will be stored nearby in UCSAs or TEWAs and used for restoration efforts in temporary disturbance areas to maintain or enhance upland habitat diversity.
- Prior to vegetation clearing activities, snags and large diameter trees on the edge of the removal area will be flagged and protected in place to preserve green tree recruitment and existing and potential snag habitat, where feasible.
- Known locations of populations or individuals of S&M species will be flagged and avoided in UCSAs and other temporary disturbance areas that do not require vegetation removal to avoid removal of the species.
- To minimize impacts to trees within UCSAs, the contractor will leave as much space between the stored material, spoils, or equipment/vehicle and the trees as practical. Operators will be informed about proper placement of materials and equipment in storage areas, such that placement and retrieval of these materials and equipment minimize soil compaction, bark damage, and other disturbance to protected trees.

- In upland forests, the contractor will limit stump removal to the trenchline and areas where grading is necessary to construct a safe level working plane. Minimizing stump removal in upland areas would minimize soil disturbance and erosion potential, increase soil strength by maintaining soil root structure, and provide substrate for fungi and other species.
- In isolated, rugged topographic areas with poor access, helicopter logging may be used. Cable and helicopter logging methods would minimize the potential for soil compaction. When log skidding is used, low-ground pressure vehicles will be used as much as possible, and soil duff layer removal will be avoided. Designated skid trails will be used to restrict soil compaction to a smaller area of the corridor.
- Rutting, compaction, and structural damage will be minimized by scheduling the majority of construction activities during the dry season, from May through October.
- Temporary erosion control devices will be installed immediately after initial disturbance (clearing) and will be properly maintained throughout construction. The devices will be reinstalled as necessary until replaced by permanent erosion control devices or restoration is complete.
- Equipment and vehicles will be cleaned prior to moving them onto the construction corridor to prevent the import and spread of weeds. Also, vegetation clearing and grading equipment will be cleaned if they pass through known noxious weed infestation areas. Pressure washing may be used to clean equipment, if deemed necessary.
- Temporary disturbed areas will be restored to pre-disturbance contours and conditions, to the extent practicable, including replanting of trees and replacement of woody debris, slash, and other woody materials and rocks removed from the area during construction.

1.3 REGULATORY BACKGROUND

1.3.1 Agency Land Management Plans

The 1994 *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management for Late-Successional and Old-Growth Related Species in the Range of the Northern Spotted Owl* (Northwest Forest Plan; NWFP ROD) amended or was incorporated into BLM and Forest Service land management plans to require certain actions for rare amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropods that occupy late-successional and old-growth forests (USDA and USDI 1994). These rare species were identified in Section C of Attachment A to the NWFP ROD collectively as “Survey and Manage” species. The NWFP ROD also established protection buffers on matrix lands for certain species (i.e., protection buffer species) that were not on the 1994 S&M list and required that those buffers be managed as part of the LSR network.

Four survey strategies were developed to guide management of S&M species:

- Manage known sites
- Survey prior to ground-disturbing activities
- Conduct extensive surveys
- Conduct general regional surveys

The NWFP ROD also established overall objectives for managing S&M species populations that were referred to as “persistence objectives.” These objectives were based on the Forest Service viability provision in the 1982 National Forest System Land and Resource Management Planning Regulation for the National Forest Management Act of 1976. This provision is targeted toward vertebrate species, but was also applied to non-vertebrate species, to the extent practicable, as described in the NWFP ROD. It generally states that the Forest Service shall manage habitat “to maintain viable populations of existing native and desired non-native vertebrate species in the planning area” (36 CFR 219.19¹). Although the viability standard is part of the Forest Service planning regulations, the protections for S&M species were also applied to BLM lands in the NWFP ROD with a goal of protecting long-term health and sustainability of all federal forests within the range of the NSO and the species that inhabit them. Because of the uncertainty associated with the continued persistence of species due to natural factors, the NWFP ROD noted that compliance with the planning regulations is not subject to precise numerical interpretations and cannot be fixed at any single threshold; rather, “as in any administrative field, common sense and agency expertise must be applied” (NWFP ROD, p. 44).

In 2001, the *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (2001 ROD; USDA and USDI 2001) modified the management direction provided in the NWFP ROD for S&M and protection buffer species and amended BLM and Forest Service land management plans in the range of the NSO accordingly. For the S&M Standards and Guidelines, the major elements were retained with some restructuring for clarity, and criteria and processes for changing species assignments in the future were developed. The list of S&M species was also modified to remove 72 species in all or part of their ranges because new information indicated they were secure or otherwise did not meet the basic criteria for S&M. Species remaining on the list were assigned to one of six categories (A-F) (see Table INTRO-3), which was based on their level of relative rarity, the ability to reasonably and consistently locate occupied sites during surveys prior to habitat disturbing activities, and the level of information known about the species or group of species. The 2001 ROD also removed the direction specific to protection buffer species, but some of these species were included in the S&M Standards and Guidelines. As part of the 2001 Standards and Guidelines, objectives, criteria, and management direction were defined for each category. Specific criteria were also established to add, remove, or change species categories based on new information and as part of the Annual Species Review (ASR) processes.

In 2016, the BLM approved two new Resource Management Plans RMPs, including the Northwestern and Coastal Oregon RMP and the Southwestern Oregon RMP (USDI 2016a, 2016b). All lands managed by the BLM that occur in the PCGP Project are within the revised RMPs management areas. The past RMPs were developed consistent with the 1994 Northwest Forest Plan and thereby included S&M measures. The 2016 RMPs revises the past RMPs in their entirety and removes all S&M measures, although S&M species would likely still be protected in certain management areas on lands managed by the BLM.

Although some species covered by the S&M Standards and Guidelines also occur on private land, land managed by the BLM, and areas outside the NSO range, the requirements of the 1994 NWFP

¹ The NWFP was developed under the 1982 planning regulations rather than the current 2012 planning rule.

and 2001 ROD apply to lands managed by the Forest Service within the range of the NSO and to lands managed by the BLM within the range of the NSO in California.

Table INTRO-3			
Survey and Manage Categories			
Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	<u>Category A</u> - Manage all known sites - Pre-disturbance surveys practical - Strategic surveys necessary	<u>Category B</u> - Manage all known sites - Strategic surveys necessary	<u>Category E</u> - Manage all known sites - Pre-disturbance surveys not applicable - Strategic surveys necessary
Uncommon	<u>Category C</u> - Manage high-priority sites - Pre-disturbance surveys practical - Strategic surveys necessary	<u>Category D</u> - Manage high-priority sites - Strategic surveys necessary	<u>Category F</u> - Management of known sites is not required - Pre-disturbance surveys not applicable - Strategic surveys necessary

Source: USDA and USDI 2001

1.3.2 Litigation and Settlement Agreement Modifications

In 2004 and again in 2007, the BLM and Forest Service issued a ROD to eliminate the S&M requirements of the 2001 ROD and to provide protection for species on the S&M lists by managing them under the agencies’ special-status species programs. In 2014, the Court issued a remedy order in the case of Conservation Northwest et al. v. Bonnie et al., No 08-1067-JCC (W.D. Wash.)/No. 11-35729 (9th Circ.). As the latest step in the ongoing litigation challenging the 2007 ROD, this remedy order vacated the 2007 ROD to remove or modify the S&M mitigation measure standards and guidelines, which returned the agencies to the status quo in existence prior to the 2007 ROD. Thus, the 2001 ROD was reinstated, including any amendments or modifications to the 2001 ROD that were in effect as of March 21, 2004, with the exception of the 2003 ASR removal for the red tree vole, returning the species to the category assigned in the 2001 ROD.

In accordance with the 2014 Court decision, this assessment was completed using the 2001 ROD Survey and Manage Standards and Guidelines, with the 2003 ASR modifications for the species list and category assignments. The 2003 list is included as Attachment A and identifies the species considered in this report, based on their documented presence in or near the PCGP Project corridor and associated roads and work areas. Attachment A also includes 12 species that were removed or changed in 2003 ASR, but may require special consideration at this time, as directed in Instruction Memorandum No. OR-2014-037 (USDI 2014). These 12 species have the 2001 ROD category assignments for the purposes of this analysis.

1.3.3 Forest Trends and Effectiveness Monitoring of the Northwest Forest Plan

Based on an analysis of forest trends conducted by Strittholt et al. (2006), old-growth forests (a component of LSOG forests) have experienced a decline over the past couple of centuries as a result of timber harvesting and other activities that have removed old and mature trees. Old-growth forests (defined as forests greater than 150 years old by Strittholt et al. 2006; note that this definition deviates slightly from the 2001 ROD definition for old-growth) encompassed an estimated 16.1 million hectares in the Pacific Northwest during the 1800s. By 2000, the extent of old-growth forests had declined by an estimated 70 percent, totaling approximately 4.7 million

hectares. Since the inception of the Northwest Forest Plan, and based on an analysis of LSOG forest trends conducted by Davis et al. (2015), LSOG forests have declined between 2 and 3 percent on federal-managed lands and between 11 and 18 percent on other land ownerships (Davis et al. 2015). LSOG forests are defined as medium and large older forest with greater than 10 percent canopy cover and conifer trees with diameters larger than 20 inches (2001 ROD). These declines are primarily a result of wildfire on federal-managed lands and a result of timber harvest on other lands. An estimated 10.6 million acres of LSOG forests existed in the NSO range in 2012, with 69 percent of this area located on federal-managed lands (Davis et al. 2015). These analyses of forest trends generally demonstrate that older, mature forests have declined across the Pacific Northwest over the past 200 years, with a slower decline in LSOG forests since 1994.

1.3.4 Management Recommendations

The Forest Service has developed management recommendations for most S&M species or groups of species, and additional research on many species has generated useful background information on the species to aid in management decisions. In addition, conservation assessments have been prepared for many species to update information and management recommendations for the species. Management recommendations are documents developed by taxa experts and land managers that provide guidance about conserving S&M species and direction on managing known sites. The documents describe what is known about the habitat or life history requirements of the species and discuss management recommendations that correspond with the level of protection intended in the Standards and Guidelines of the respective agency's land management plans. The management recommendations identify management goals and objectives and general or specific direction or requirements for species, depending on the amount of information known about the species. For some species, specific information may be identified on sizes (e.g., width) of buffers to be applied to a known location of a species and what management activities are appropriate for maintaining one or more habitat components. Some recommendations may also allow loss of some individuals, areas, or elements not affecting continued site occupancy. In many cases, the need for more information and research is identified to further refine the management recommendations, support management of known sites, identify high-priority sites, and identify survey priorities.

1.3.5 Proposed Amendment of Land Management Plans

Management recommendations for S&M species generally require protection of known sites. Because of construction requirements and the linear nature of pipelines (see Figure INTRO-1), it is not possible for the PCGP Project to comply with the Forest Service land management plans as proposed in the draft ROW Grant application. Therefore if the PCGP Project is certificated by the Federal Energy Regulatory Commission, the Forest Service is proposing an amendment to its land management plans to waive the Management Recommendations that require protection of known S&M species sites within the PCGP Project corridor on the Umpqua, Rogue River-Siskiyou, and Fremont-Winema National Forests in order to make provision for the PCGP Project. This proposed amendment (FS-1) is specific to the actions that could be authorized by the Forest Service under a ROW Grant and would not remove or change species to which the S&M Standards and Guidelines apply or change species categories. The proposed amendments to the land management plans would not exempt the Forest Service from the requirements of the 2001 S&M ROD to maintain species persistence within the range of the NSO. If a reasonable assurance of species persistence is not maintained, the agencies would require avoidance of sites where the species is

found or would decline to adopt the land management plans amendments. Amendments concerning S&M Standards and Guidelines associated with the PCGP project have been coordinated with the Regional Ecosystem Office as required by the Northwest Forest Plan².

1.4 OTHER LISTING AND SPECIES STATUS CATEGORIES

In addition to the S&M status, the state (Oregon), federal, and global listing statuses of each species was reviewed to assist with the discussion on the rarity of each species in support of the persistence evaluation. In Oregon, the Oregon Department of Fish and Wildlife maintains a list of native fish and wildlife species that meet the state requirements for listing as threatened and endangered (OAR 635-100-0105), and the Oregon Department of Agriculture maintains a list of threatened and endangered plant species (ORS 564.105 and OAR 603-073). The U.S. Fish and Wildlife Service maintains lists of threatened and endangered plant and wildlife species that are protected under the Endangered Species Act (50 CFR 17.11 and 17.12). The BLM and Forest Service also have lists of species considered “sensitive” on their lands, which are managed in accordance with Section 2670 of the Forest Service Manual and Section 6840 of the BLM Manual. NatureServe and local natural heritage or conservation centers also identify state and global rankings for species based on their known ranges and distributions and information provided by state and federal agencies. The Oregon Biodiversity Information Center (ORBIC) evaluates the NatureServe ranks and further refines the data for state application by placing species on their Lists 1 to 4. List 1 species are threatened with extinction; List 2 species are threatened with extirpation; List 3 species require more information; and List 4 species are of conservation concern. The BLM and Forest Service use these lists to identify Sensitive species; List 1 and 2 species potentially qualify as Sensitive. Definitions of the state and global ranking systems and the list categories are available on the ORBIC website (<http://inr.oregonstate.edu/orbic>). None of the species on the S&M list are listed under the Endangered Species Act.

1.5 METHODOLOGY FOR PERSISTENCE EVALUATION

This section presents an overview of the species evaluations and summarizes the methodology used to evaluate the effects of the PCGP Project on S&M species and determine if the PCGP Project would threaten species persistence of each affected species in the NSO range. The S&M species considered in this report are listed in Attachment A; these species have sites documented on Forest Service lands within the analysis areas used for the persistence evaluation (additional details on the analysis areas are provided in Section 1.5.5 below). Key terms used throughout this report are defined in the Glossary in Attachment B. Additional information on the spatial analysis processes and geographic information systems (GIS) data used to conduct the analysis is provided in Attachment C.

1.5.1 Format of Species Sections

Each S&M species considered in this report has its own section that consists of the following subsections (each subsection serves a specific purpose to support the evaluation, as noted below):

² A submission package was sent to the Regional Interagency Executive Committee (RIEC) on June 28, 2019. A response to the RIECs comments was sent by Forest Supervisor Alice Carlton in October 2019, which concluded the RIEC review process (October 28, 2019, 2600 memo to Glen Casamassa, Chair, Regional Interagency Executive Committee).

- **Regulatory Status and Ranking:** presents the S&M status of the species, as well as global and state (Oregon) rankings and other agency statuses that help demonstrate how rare or common the species appears to be.
- **Background Information:** includes descriptions of the species' life history, known range, population status, habitat requirements, threats, and management recommendations; this information captures what has been published or previously documented about the species, including recent survey results specific to the PCGP Project, and presents the previously known information (or information available prior to conducting the analyses).
- **Persistence Evaluation:** discusses the distribution of the species using the most current information on sites, evaluates impacts to sites from the PCGP Project, and summarizes the information on distributions and impacts to support the determinations made for each species; the distribution information, in combination with the background information, was used to determine the need for a more focused analysis.
- **Conclusions:** presents a determination regarding whether remaining sites (i.e., those not affected by the PCGP Project and that would persist in or near the project area following project implementation) would provide a reasonable assurance of species persistence in the NSO range; when applicable, recommendations for avoiding or minimizing disturbance in sites are presented to protect sites that may be needed to provide a reasonable assurance of species persistence.

1.5.2 Data Sources

Background research was conducted on each species considered in this analysis to describe its known range, habitat requirements, life history, threats, population status, and other relevant information. The type of information collected was based on evaluation criteria presented in the 2001 ROD for assessing the level of concern or relative rarity of a species. This information was presented in the “Background Information” section for each species. The primary sources of information include agency handbooks, species factsheets, management recommendations, conservation assessments, and annual species reviews for S&M species; journal articles; ORBIC species accounts; and other species descriptions available on the Internet. Much of the information presented in the species descriptions was compiled from previous work done by Pacific Connector (the project applicant).

The 2001 ROD, BLM and Forest Service Sensitive species lists, and ORBIC website were reviewed to determine current regulatory status and rankings of each species. Each species' status and ranking were presented in the “Regulatory Status and Ranking” section and used to discuss how rare or common the species is.

GIS data were also compiled from Forest Service and BLM geodatabases (NRIS and GeoBOB, respectively) to discuss the distribution of each species for the “Persistence Evaluation” section. These data are based on the results of surveys conducted over the past 20-plus years and include new information on species locations that was not available during ASRs. It should be noted, however, that the data only include observations that have been recorded and entered into the geodatabases and are not intended to provide information on the population status of the species. For example, observations of some species may have been made incidentally or outside of formal surveys (e.g., by mushroom collectors or enthusiasts) and are not necessarily included in the

geodatabases. Also, surveys have not been conducted extensively across the NSO range for most species, and detectability of some species (e.g., fungi, lichens) can affect observations of the species, even with formal surveys. Specific survey limitations for fungi result from the species not necessarily fruiting each year and the deviations in seasons when the various S&M fungi may fruit, requiring surveys throughout the year and over the course of several years to obtain the best information on their locations. Pre-disturbance surveys for many species were also not required prior to 2011 (for fungi) and 2006 (for bryophytes and lichens). The geodatabase data only reflect where observations of species have been recorded, and it is likely that many species may be found in other previously unsurveyed locations or even where surveys have been conducted, but at the wrong time.

The agency geodatabase data were converted into sites using a GIS-based tool, as discussed in Section 1.5.4 Spatial Analyses. Additional GIS data were used to map forests and evaluate the distribution of the species across different land ownerships and land use allocations on NFS and BLM lands (see Attachment C for list of key data used). This information was also presented in the “Persistence Evaluation” section.

1.5.3 Project Surveys

The project proponent retained Siskiyou BioSurvey LLC to conduct surveys for S&M species on federal lands in the PCGP Project area between 2007–2008 and 2010–2016. Surveys were conducted by qualified botanists and biologists, trained in the taxonomy and identification of the target species, and vouchers or specimens of the observed species were submitted to the agencies for verification. These surveys were based on the S&M lists and survey requirements in effect at the time of the survey, and incidental observations of species not requiring surveys were also recorded. All surveys were consistent with the 2001 S&M list and established protocol, which is the most inclusive list out of all the versions as a result of ASRs and litigation. An overview of the methodology for surveys for each group of species is presented below, and additional details on the survey areas and other details are available in the reports prepared by Edge Environmental (2011, 2013), Siskiyou BioSurvey LLC (2008, 2011a-c, 2012a-b), and Whiteman (2013, 2015, 2016). More recent observation data is available as unpublished data (Siskiyou BioSurvey 2016a). Results of the surveys are presented as part of the discussion of population status in the “Background Information” section for each species in this report, and the observations resulting from these surveys were compiled in agency geodatabases, after verification of the species observations by the agencies, and converted to sites for use in the “Persistence Evaluation” section. Agency botanists, biologists, and specialists in S&M species provided direction on the survey protocol and reviewed the results of the surveys.

Fungi

Surveys for one Category A fungus (*Bridgeoporus nobilissimus*) were conducted, along with surveys for vascular and non-vascular plants, between spring of 2007 and the fall of 2008 on approximately 1,331 acres within the Coos Bay and Roseburg BLM Districts (Siskiyou BioSurvey LLC 2008). Between 2010 and 2012, 2-year equivalent effort surveys were conducted for Category B fungi in old-growth coniferous forest to satisfy the requirements of the 2001 ROD (Siskiyou BioSurvey LLC 2012a). Additional surveys for Category B fungi were conducted between 2013 and 2016 in locations where the project was re-routed. All fungi surveys were conducted according to the protocols described in *Sporocarp Survey Protocol for Macrofungi*,

Version 1.0 (for 2007–2008 surveys) and *Survey & Manage Category B Fungi Equivalent-Effort Survey Protocol, Version 1.0* (for 2010–2016 surveys) (Van Norman et al. 2008, 2012). Surveys were conducted within old-growth stands in the PCGP Project area and within a 100-foot buffer of habitat removal areas, creating a survey unit width that ranged generally from 250 to 300 feet. Old-growth stands were defined as those stands equal to or older than 180 years that have met the generally accepted definition of “old-growth” forest found in the 2001 ROD. Approximately 565 acres within about 43 survey units were surveyed: 181 acres within the Umpqua National Forest, 146 acres within the Rogue River-Siskiyou National Forest, 57 acres within the Fremont-Winema National Forest, and 181 acres within BLM lands.

Additional persistence surveys were conducted for fungus species that were determined to be rare at a watershed level or were determined to be rare within the range of the NSO. Persistence surveys included several levels, ranging from 100-meter evaluations around identified “rare” fungi to extensive surveys in LSRs to augment information about selected species. Persistence surveys were conducted in 44 areas adjacent to the project area, on LSR lands near the project area, and in the Cascade-Siskiyou National Monument.

Lichen

Surveys for Category A, B, and C lichen were conducted between spring 2007 and the end of 2008 on approximately 7,900 acres (Siskiyou BioSurvey LLC 2008a). Additional surveys were conducted in 2010, 2015, and 2016 to survey the modified areas of the PCGP Project area not previously surveyed, to verify locations of previously recorded occurrences, and to conduct persistence surveys for some species, as done for the fungi (Siskiyou BioSurvey LLC 2011a, 2016a [unpublished data]). Surveys were conducted in accordance with *Survey Protocols for Survey and Manage Category A & C Lichens in the Northwest Forest Plan Area, Version 2.1* (Derr et al. 2003). Full coverage complete surveys were conducted within the PCGP Project area, and the intuitive-controlled method was used within suitable habitat in the PCGP Project area and within 200 feet of habitat removal and within 50 feet on either side of proposed TMP access roads. The persistence surveys were conducted for certain species (i.e., those that were determined to be locally or regionally rare) in suitable habitat within 0.25-mile around the documented population or observation in the survey area.

Bryophytes

Surveys for bryophyte species were conducted on approximately 7,900 acres in the PCGP Project area, focusing on BLM and Forest Service Sensitive species, but also targeting S&M bryophyte species (Siskiyou BioSurvey LLC 2008). Additional surveys were conducted in 2010, 2015, and 2016 to survey the modified areas of the PCGP Project area not previously surveyed (Siskiyou BioSurvey LLC 2011a, 2016a [unpublished data]). Surveys were conducted within suitable habitat in the PCGP Project area and within 200 feet of habitat removal and within 50 feet on either side of proposed TMP access roads. No bryophytes on the 2001 S&M list were found in the surveyed areas.

Vascular Plants

Surveys for special-status vascular plants, including S&M plants, were conducted on approximately 7,900 acres between spring 2007 and the end of 2008 (Siskiyou BioSurvey LLC 2008). Additional surveys were conducted in 2010, 2015, and 2016 to survey the modified areas

of the PCGP Project area not previously surveyed, to verify locations of previously recorded occurrences, and to conduct persistence surveys for wayside aster (*Eucephalus vialis*) within 0.25 mile of the previously documented occurrence (Siskiyou BioSurvey LLC 2011a, 2016a [unpublished data]). Surveys were conducted according to *Survey Protocols for Survey and Manage Strategy 2 Vascular Plants (Version 2.0)* (Whitaker et al. 1998). Full coverage complete surveys were conducted within the PCGP Project area, and the intuitive-controlled method was used in suitable habitat in the PCGP Project area and within 200 feet of habitat removal, as well as within 50 feet on either side of proposed access roads.

Mollusks

Surveys for Category A and B mollusks were conducted on approximately 1,561 acres in 2007, including one spring visit and one fall visit (Siskiyou BioSurvey LLC 2008b). Additional surveys were conducted in areas modified in the PCGP Project area in 2010, 2013, and 2014 on approximately 290 acres in 17 survey units (Whiteman 2013, 2015, 2016). The surveys were conducted within suitable habitat in the PCGP Project area and within 100 feet of habitat removal in accordance with the *Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan, Version 3.0* (Duncan et al. 2003).

Great Gray Owl

Surveys for great gray owls were conducted in suitable habitat in the PCGP Project area in accordance with the *Survey Protocol for the Great Gray Owl within the Range of the Northwest Forest Plan, Version 3.0* (Quintana-Coyer et al. 2004). Within the PCGP Project area, suitable habitat generally occurs east of the Coos County/Douglas County border. Six visits were conducted each year for two years, between March 24 and July 15, 2007 and March 21 and July 9, 2008, within 22 survey areas on approximately 4,442 acres (Siskiyou BioSurvey LLC 2008). Additional surveys were conducted in 2010 and 2011 on approximately 131 acres (two survey units) in suitable habitat associated with modified portions of the PCGP Project area that were not previously surveyed (Siskiyou BioSurvey LLC 2011c). Surveys in 2010 were initiated too late in the season (June); therefore, only three visits between May 15 and July 15 were conducted.

Red Tree Vole

Surveys for red tree voles were conducted in 2007 in the xeric biological zone in the PCGP Project area and within a 150-foot buffer of the project corridor on approximately 314 acres in the Medford BLM District and on the Umpqua National Forest (Siskiyou BioSurvey LLC 2008a). Surveys were conducted in accordance with the *Survey Protocol for the Red Tree Vole, Version 2.1* (Biswell et al. 2002). Version 2.2 of the survey protocol was completed in 2003, and it released six watersheds from pre-disturbance requirements; these watersheds are not crossed by the PCGP Project corridor. The purpose of the surveys was to identify active and inactive nests in and near the project area. Where potential nest sites were identified in trees during ground survey efforts, the trees were climbed to verify the status of the nest (i.e., active, inactive, other). Surveys for the “mesic biological zone” were initiated in the PCGP Project area and within a 150-foot buffer in 2010 after S&M litigation (December 2009) required red tree vole surveys in the mesic zone. Surveys in the mesic biological zone were conducted between September 2010 and June 2012 on approximately 825 acres within 43 survey units in the Coos Bay and Roseburg BLM Districts and on the Umpqua National Forest (Siskiyou BioSurvey LLC 2012b). Additional surveys in both the mesic and xeric zones were completed during 2015 and 2016 (Siskiyou Biosurvey LLC 2016b).

1.5.4 Spatial Analysis

The BLM and Forest Service maintain geodatabases of recorded S&M and sensitive species observations in California, Oregon, and Washington (geodatabases are referred to as GeoBOB and NRIS, respectively). The BLM spatial data include point files of collections (for flora) and observations (for fauna) and polygon files of buffered observations (for flora) and nest sites or other important areas (for fauna). The Forest Service spatial data include polygon files for flora and fauna species observations, based on a buffer around a recorded observation (generally 10 meters to account for spatial accuracy). These data were standardized for use in this analysis by converting the original observation data into a polygon geodatabase feature to establish sites using a Feature Manipulation Engine (FME) tool; additional details on this process is provided in Attachment C and can be obtained from the agencies upon request. Within each site, multiple points or observations may have been recorded, and the converted polygon encompasses observations that are in close proximity to one another. The sizes of sites vary based on the proximity and size of the original observation data and the buffer distance around the original data, which is consistent with the buffers used in annual species reviews and other planning and analysis purposes over the past 12 years. These buffers include 50 meters (164 feet) around original data for fungi, lichens, bryophytes, plants, and red-tree vole; 36 meters (120 feet) for amphibians; and no buffer for mollusks. Overlapping buffers were dissolved or combined using the tool to create a single site for observations within the overlapping polygons. Using this method, the sizes and shapes of sites vary for each species and depend on the proximity of observations to one another.

The FME tool was not used to create sites for great gray owl due to the large amount of incidental observations that may not constitute true sites. Instead, guidance was followed from the great gray owl survey protocol (Huff and Godwin 2016) to select observations that would be considered a great gray owl site (e.g., documented reproduction, repeated male and female siting). 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 the site. Additional information is provided in Attachment C: Spatial Analysis Process.

The site data was modified to remove sites that were in the destructive areas of the Stouts Creek Fire. The fire occurred in Douglas County during the summer of 2015 and encompassed approximately 13.4 linear miles of the PCGP Project. Fire impacts were determined by utilizing Burned Area Reflectance Classification data. This satellite-derived layer of post-fire vegetation conditions classifies data into four categories of fire severity, including low/unburned, low, moderate, and high. These data were then used to develop an input for burn severity mapping produced by Burned Area Emergency Response (BAER) teams (Silva 2015). A combination of field surveys³, discussions with BLM and Forest Service natural resource specialists, and BAER reports confirmed that the moderate and high severity classification represent a stand replacement fire event. Additionally, field surveys established which portions of LSRs crossed by the PCGP Project were impacted by the fire. Based on these data, it is presumed that S&M sites in areas of moderate or high severity classifications, as refined by field surveys within the PCGP Project area, are no longer viable and would not contribute towards each species persistence. Therefore, these sites were removed from the overall site dataset for the purposes of the persistence evaluation.

³ Personnel from North State Resources, Inc. surveyed the pipeline alignment within the fire area during November 2015.

For all species except red tree vole, the resulting polygon site data (FME sites) were used for the persistence evaluation and were further queried using other available GIS data, such as land allocations, reserve boundaries, ownership, project data, and vegetation/forest cover layers. The FME sites for red tree vole were further modified according to the management recommendations for the species (Forest Service and BLM 2001). Those sites within 100 meters of the project area were modified to establish habitat areas around active and undetermined nest sites using the original observation data from NRIS and GeoBOB. Guidance from the management recommendations on how to define habitat areas was used to create new polygons, which were then used for the analysis of impacts on red tree vole sites.

Forest Service land use allocation data were obtained from the Forest Service Regional Ecosystems Office using a GIS dataset that was developed in 2009 and included land allocations consistent with the NWFP ROD for federal lands in the NSO range. Although more recent data are available for some NFS lands, the 2009 regional data provide sufficient representation of the different land allocations for purposes of this analysis and represent the best information available to the agencies that is applicable at the scales used in the analysis (i.e., regional, local, analysis, project, as defined below) and consistent with the NWFP ROD allocations.

The 2009 land use allocation data were used to identify reserve lands, which were defined as NFS lands with allocations of Congressionally Reserved (e.g., Wilderness) or Late Successional Reserve (LSR) (including occupied marbled murrelet stands [LSR3] and known owl activity centers [KOAC, LSR4]), as recognized and defined in the 1994 ROD, in combination with the National Hydrography Dataset from the U.S. Geological Survey, which was used to map Riparian Reserves across the NSO range. Regional datasets of Riparian Reserves were not available from the Forest Service for this analysis, although each Forest Service management unit has a unique GIS layer used to portray Riparian Reserves; albeit at various scales and degrees of field verification. For consistency at multiple scales, and across the various Forest Service management units, this analysis used the National Hydrography Dataset to determine locations of Riparian Reserves; this dataset was clipped to only cover those lands in the Other/Matrix allocation of the regional land allocation dataset. Using this approach, the extent of Riparian Reserves may be underestimated across the region.

BLM land use allocation data were obtained from a 2016 final EIS dataset associated with the 2016 BLM RMPs (USDI 2016a, 2016b). The 2016 BLM RMPs supersede the NWFP on all BLM lands across the project area, and sites on BLM lands are no longer protected under S&M Standards and Guidelines. However, it is likely that sites located entirely in BLM reserves receive some level of protection due to the land preservation that occurs with management of LSRs, Congressional Reserves, District Designated Reserves, and Riparian Reserves. All observational data, regardless of the management agency or land ownership, was considered when determining if a species would persist. The observations on BLM lands are particularly important in determining persistence when the species is generally uncommon on NFS lands but abundant on BLM lands. The BLM land use data was used to determine the likelihood that certain sites would remain protected and therefore contribute to the species overall population numbers, distribution, and persistence.

Original vegetation data from the Landscape Ecology, Modeling, Mapping, and Analysis team (Forest Service and Oregon State University staff) were used to map and estimate the extent of forests across the NSO range. These data had been used for the Northwest Forest Plan

Effectiveness Monitoring 15-year report to map LSOG forests (Moeur et al. 2011) and provided a consistent dataset for mapping forests across the NSO range. Because each S&M species has narrower habitat requirements, the extent and distribution of forests that could provide habitat for the species using the vegetation data is much greater than where the species' habitat is likely found. Regional data were not available to accurately map or estimate all types of potential habitat or specific microsite conditions that are preferred by S&M species, such as moist understories, closed or open canopies, or wet areas. Digital elevation models from the U.S. Geological Survey were also used to obtain elevation information about the locations of sites in the NSO range and to map and estimate the extent of forests at different elevation ranges, depending on the species' general habitat requirements. A list of key datasets used for the analysis is included in Attachment C, and a complete list of GIS data used for the analysis is part of the Project Record.

1.5.5 Evaluation of Persistence

This report is intended to present the facts, evaluate the evidence, and draw conclusions on the impacts of the PCGP Project with respect to the persistence objectives for S&M species defined in the 2001 ROD, as modified by the 2001-2003 ASRs. The Forest Service will use the information provided in this report to make a persistence finding for each species potentially affected by the PCGP Project in their decision documents. The intent of this evaluation is to determine the extent of the PCGP Project's effects on S&M species, specifically through the quantification of the number of sites and acreage of forests affected by project-related activities and the effects on the distribution of the species and potential habitat within the NSO range. The extent of impacts on sites and the species found within those sites was considered in combination with background and new information on the species to determine if remaining sites (i.e., those not affected by the PCGP Project and that would persist in or near the project area following project implementation) would provide a reasonable assurance of species persistence in the NSO range.

Evaluation Factors

The 2001 ROD outlines criteria to consider during ASRs and regional reviews of the status of species to assess the level of concern for persistence of a species and the relative rarity of a species for which a concern has been identified. Although the criteria themselves support a different purpose, they were used as guidance to present applicable information in support of the conclusions made for each species regarding the reasonable assurance of species persistence. The 2001 ROD does not provide a clearly defined process to analyze project-level impacts on species persistence, nor could a project-level analysis develop the type of information needed to address those criteria in the ROD at their intended scale. This analysis seeks to determine whether sites of S&M species affected by the PCGP Project would continue to provide a reasonable assurance of persistence in the NSO range if the PCGP Project is constructed. Accordingly, the Forest Service adapted the criteria from the ROD to address that question at the project scale. It is important to note that this persistence evaluation is not intended to lead to a change in category for any species or the removal of any species from the S&M list. Although new information available for this evaluation (e.g., survey results, sites generated by the FME tool) may demonstrate that a species appears to be more common than when it was last addressed in an ASR, additional assessment and determinations through an ASR process would be necessary to modify the species' S&M status.

The 2001 ROD criteria used to assess the concern for persistence include:

- Criteria indicating a concern for persistence⁴:
 - Low-to-moderate number of likely extant known sites/records in all or part of a species range.
 - Low-to-moderate number of individuals.
 - Low-to-moderate number of individuals at most sites or in most populations.
 - Very-limited to somewhat-limited range.
 - Very-limited to somewhat-limited habitat.
 - Distribution within habitat is spotty or unpredictable in at least part of its range.
- Criteria indicating little or no concern for persistence⁵:
 - Moderate-to-high number of likely extant sites/records.
 - High proportion of sites and habitat in reserve land allocations; or limited number of sites within reserves, but the proportion or amount of potential habitat within reserves is high and there is a high probability that the habitat is occupied.
 - Sites are relatively well distributed within the species range.
 - Matrix Standards and Guidelines or other elements of the NWFP (e.g., LSR and Riparian Reserves Standards and Guidelines) provide a reasonable assurance of species persistence.

The 2001 ROD criteria used to assess relative rarity include:

- A species may be “rare” if it has:
 - A limited distribution,
 - A low number of sites (or individuals per site),
 - Highly specialized habitat requirements,
 - Declining habitat or population trends,
 - Reproductive characteristics that limit population growth rates,
 - Restricted distribution pattern relative to range or potential habitat, and/or
 - Narrow ecological amplitude.
- A species may be “uncommon” if it has:
 - A more widespread distribution,
 - A higher number of sites,
 - A low-to-high number of individuals per site,
 - More stable populations or habitats,
 - Less restricted distribution pattern relative to range or potential habitat, and
 - Moderate-to-broad ecological amplitude.

⁴ Per the 2001 ROD, one or more of the criteria, which are to be considered in the context of the reserve system and other standards and guidelines of the Northwest Forest Plan, may indicate a concern for species persistence. The criteria must be considered aside from the Survey and Manage provisions and must apply within the Northwest Forest Plan area.

⁵ Per the 2001 ROD, usually, most of the criteria need to be met to indicate that a concern for persistence does not exist. These criteria must apply within the Northwest Forest Plan area.

To support the project-level analysis of species persistence for the PCGP Project, background and current information on each S&M species that could be affected by the project was compiled and presented to address the following factors derived from the above criteria:

- Range of the species, in terms of being locally endemic or found globally;
- Rarity status or rankings across its range within the NSO range as well as globally and across Oregon;
- Relative distribution of the species across its known range based on agency geodatabases;
- Current range or distribution compared with known information on historical range or distribution;
- Distribution patterns across the range of the NSO, locally, and in and near the project area, in terms of being well distributed or spotty and unpredictable;
- Locations of NFS sites on Matrix versus reserve lands (i.e., proportion of NFS sites in reserves) and on NFS lands versus private, BLM, or other lands at different scales (regional, local, project);
- Locations of sites on BLM lands that are entirely in BLM reserves (i.e., proportion of BLM sites in reserves);
- Stability of known populations and normal fluctuation patterns;
- Risk factors or threats to populations; and
- Extent of forests that could provide habitat across different scales (regional, local, project) and proportion of those forests in reserve land allocations⁶.

Incomplete or Unavailable Information

This analysis was conducted using the best available information and data on S&M species for the factors listed in the previous section. Council on Environmental Quality regulations 40 CFR 1502.22 require a discussion of incomplete or unavailable information. Information was unavailable for:

- **Total populations of S&M species beyond those represented in the geodatabases of the agencies used in this report.** Although a statistically reliable region-wide survey has been done for most of the S&M species, the results of those surveys have not been biologically interpreted, and the results have not yet been published. In absence of a published interpretation of the results of those regional surveys, this assessment relies on the known sites of affected species that have been inventoried and recorded in the known site geodatabases of the BLM and Forest Service. This data constitutes “best available information” for populations of S&M species.
- **Total acres of the specialized microsites and habitats used by certain S&M species.** This analysis was completed using geodatabase records of observations (i.e., “known

⁶ Data, such as microsite-level habitat conditions, were not available at the regional scale to accurately map or estimate the extent of habitat for each species. The best available regional data of forest cover were used to map general habitat or forests that could provide habitat for the species, which overestimates the extent of potential habitat.

sites”), regionally available vegetation inventory data, and evaluation criteria developed from the 2001 ROD. In many cases, S&M species rely on specialized habitats that may not be catalogued in agency geodatabase records or vegetation inventories. This is one of the reasons why pre-project surveys are required for S&M species. Habitat requirements for each of the species considered are discussed in detail in each species’ section, to the extent the information is available from previous literature. In this assessment, estimates are provided of the general forests where specialized habitats may be found, but these should not be interpreted as the actual acres of available specialized habitats; the actual acres of available specialized habitats are typically a fraction of the general forest description. For example, some mollusks rely on moist microsites found in late-successional coniferous forests. A regional inventory of late-successional coniferous forests is available, but a regional inventory of moist microsites is not; many, many more acres of late-successional forests exist than acres of moist microsites within those forests. This assessment identifies sites and broad habitat classifications such as “late-successional coniferous forests below 6,000 feet” where specialized habitats and the species in question may be found, but makes no estimates of, nor does the analysis rely on, estimates of specialized habitats that may exist within those broad vegetation categories.

- **Recovery of occupied sites after disturbance.** S&M species are by definition associated with LSOG forests. The construction corridor and TEWAs will be reforested and replanted with native vegetation similar to what occupied the project area prior to disturbance. It will be at least 80 years before those areas provide late-successional habitat. A 30-foot-wide maintenance corridor centered along the pipeline would be maintained in low growing brush and grass vegetation (no trees) for the life of the project. When the project is decommissioned, it would be an additional 80 years before this strip provides late-successional stand characteristics. Information is not generally available as to how quickly, or if the affected S&M species will, reoccupy these areas. This analysis presumes that if the “site” is within the construction clearing or TEWAs, the project would result in a long-term loss of that site. This analysis does not speculate on when or if the affected species may reoccupy the site.

Areas Used for Analysis

The regional area discussed in this report for purposes of analyzing the distribution patterns of each species and forests that could provide habitat in the range of the NSO, which encompasses approximately 58.2 million acres (23.6 million hectares), including 19.7 million acres of NFS lands, in western Washington, western Oregon, and northwestern California (see Table INTRO-4 for overview of areas). The focus of the regional distribution is on the currently known species’ range, which is generally where sites have been documented, within the NSO range. The local area includes the following 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. The local area encompasses approximately 2.0 million acres, of which approximately 213,780 acres are NFS lands.

An analysis area was established to identify S&M species that may be directly or indirectly affected by the PCGP Project. This area was established by creating a buffer around the PCGP Project area. The PCGP Project area includes the project corridor, associated work areas, and the access roads subject to improvements or modifications pursuant to the TMP. For analysis purposes for most S&M species (fungi, lichens, bryophytes, plants, and mollusks), a 50-meter buffer was established around the project area to identify sites that could be affected by the PCGP Project. The sites for fungi, lichens, bryophytes, and plants also include a 50-meter buffer around the recorded observation of the species using the FME tool, which ensures that any observations of these species up to 100 meters away from the project area are addressed in the analysis. This is a conservative approach to analyzing potential effects. Management recommendations for great gray owl and red tree vole provided guidance for the analysis areas for those species. A 1-mile buffer around potential blasting areas and a 0.25-mile buffer around other project activities were established as the analysis area for great gray owl. The red tree vole analysis area encompassed 100 meters around the PCGP Project area based on the site potential tree distance (approximately 60 meters in the project vicinity).

The analysis area for the non-vertebrate species encompasses approximately 1,990 acres of NFS lands, and the PCGP Project area encompasses approximately 590 acres of NFS lands (see Table INTRO-4). The great gray owl analysis area encompasses approximately 193,190 acres, including 37,150 acres of NFS lands. The red tree vole analysis area encompasses approximately 28,330 acres, including 3,380 acres of NFS lands.

Lands	Regional Area	Local Area	Analysis Area*	Project Area
Other	38,526,790	1,745,620	14,960	4,770
NFS	19,704,740	213,780	1,990	590
Total All Lands	58,231,530	1,959,400	16,950	5,360

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Data source: Merged land ownership data for CA, WA, and OR in NSO range, October 2011
Note: Areas are presented in acres.
*Analysis area is the 50-meter buffer of the project area used for fungi, lichens, bryophytes, plants, and mollusks.

Analysis Process

The general assessment of each species included a literature review and Internet research to compile background information on the species; a review of the site data generated from the spatial analysis process described above; a discussion of the regional, local, and analysis/project area distributions; mapping of general habitat for each species using the data described above; and an evaluation of the PCGP Project’s impacts on the S&M sites on NFS lands within the range of the NSO. For many species, limited information is available on their ranges, life histories, and habitat requirements, and published and agency source documents were compiled and reviewed to describe this information to the level of detail available. The distribution patterns of the species at different scales were described based on the GIS data (FME sites) and required additional spatial analyses to present the number of sites in different land allocations, land ownerships, and agency boundaries across the three scales (regional, local, and analysis/project areas) and to estimate the extent of forests that could provide habitat in the regional, local, and project areas. This information was used to describe the general distribution of the species in terms of sites being isolated or clustered and scattered/spotty/sparse or well-distributed, as well as the potential for

other sites to exist in the NSO range. Information on general habitat (i.e., forests that could provide habitat) for the species across the three scales was also presented using GIS data. All of this information was used to assess the effects of the PCGP Project on persistence of the species and support the conclusions made for each species using the factors listed under “Evaluation Criteria” above.

The final level of review entailed an evaluation of impacts on the sites and forests as a result of the PCGP Project. For each species, an initial analysis was conducted to quantify the extent of project-related impacts on sites using the GIS data. The methods used for this initial analysis included:

- Identify sites on NFS lands that could be affected by the PCGP Project, either directly or indirectly, by selecting those sites that fall within, either partially or entirely, the analysis area for the species.
- Compare the number of potentially affected sites for each species to the number of sites in the NSO range and assess other factors presented in the Background Information and Species Distribution discussions for each species to determine if a more focused analysis of impacts is necessary.
- Review the number of sites on land managed BLM that occur entirely in reserves and would likely receive some degree of protection. For certain species, a large proportion of sites occur on BLM land, and preceding the 2016 BLM RMP amendments, would have been protected under the S&M Standards and Guidelines. While sites on BLM lands are no longer subject to protections under the S&M Standards and Guidelines, it is presumed that the BLM reserve system would enable a certain proportion of sites to persist and contribute towards the species overall distribution, dispersal, and ultimately, persistence. Many sites occur partially in BLM reserves and partially in non-reserve land allocations; while these sites are included in the overall population numbers, they may not be protected and are not considered when evaluating the likelihood of a species to persist after Project implementation.
- Quantify anticipated effects to the sites based on the proximity of those sites to the project area using a spatial intersect in GIS.
- Quantify and generally discuss the anticipated effects to forests that could provide habitat for the species using the GIS data and information on the species’ habitat requirements.
- If a more focused analysis was determined not to be necessary, a discussion of the types of impacts expected in the sites was provided based on the results of the spatial intersect noted above.

If this initial analysis provided sufficient evidence to support a determination that the persistence objectives of the NWFP would be met for the species in question (i.e., remaining sites would provide a reasonable assurance of species persistence in the NSO range), a more focused analysis was determined not to be needed. This level of analysis was considered adequate to assess project impacts using a conservative approach (i.e., if a site fell within the analysis area, it was generally assumed that site persistence would not be maintained following project implementation) if project-related effects on the sites would not substantially alter the distribution of the species

across the NSO range (e.g., the species would still be well distributed or locally abundant in the vicinity of the project area). The analysis used GIS data (e.g., FME sites, PCGP Project data) and is reproducible in that the same methods could be applied to any project using similar datasets to evaluate impacts. This is a conservative interpretation of potential effects on the species and likely overstates the impacts of the PCGP Project.

However, if this initial analysis identified that the extent of PCGP Project impacts on the site or sites could reduce the number of remaining sites such that they may not provide a reasonable assurance of species persistence or that insufficient evidence was available to support a determination that the persistence objectives of the NWFP would be met for the species, a closer evaluation of the effects on each site was conducted to further assess impacts of the project. The intent of the more focused analysis was to determine if site persistence would be maintained at any of the sites following project implementation or if measures were needed to protect or avoid the site(s). The analysis entailed a closer look at the effects of the PCGP Project on the sites and the original observations of the species within the sites (from the FME original data and/or the NRIS and GeoBOB databases). This evaluation employed professional judgment to determine whether the site in question was likely to persist after project implementation. The methods used for the more focused analysis included:

- Review the site and original observation data in GIS and determine the potential for direct impacts on the actual observations. If the only observation(s) of a species within a site were within the corridor or a TEWA, site persistence was not likely to be maintained following ground disturbance activities. If some observations were outside the corridor or TEWAs, the potential for indirect effects was evaluated.
- Evaluate indirect effects to the site and observations using aerial photographs, contour lines, forest cover data, land use and ownership data, and background on the species' habitat requirements. Professional judgment was used to determine the extent of impacts (i.e., how far out from the observation an impact would be anticipated) and potential for the species to survive near the project area. If the anticipated indirect effects associated with habitat or microclimate alterations are expected to be unfavorable to the species in question, the species is not likely to survive at the site. If the anticipated indirect effects are considered neutral or beneficial to the species in question, the species is likely to survive at the site after project implementation. For some species, a closer evaluation of the sites confirmed that topography, distance, or other factors reduced the potential for indirect effects (and no direct effects were anticipated), and site persistence would be maintained after project implementation.

The analysis resulted in the following general conclusions:

- Upon a closer evaluation of impacts to sites, site persistence was expected to be maintained at one or more of the sites in the analysis area. For some species, all sites were expected to persist, and the PCGP Project would, therefore, not affect the distribution of the species in the NSO range. For other species, some sites were expected to persist, while others would not likely persist, but the remaining sites in the NSO range would provide a reasonable assurance of species persistence, and the PCGP Project was not expected to affect the distribution of the species in the NSO range.

- The PCGP Project would directly affect one or more sites of a species, and those sites were determined to be important to the species for dispersal opportunities or other reasons. For these species, the PCGP Project could substantially affect the distribution of the species in the local vicinity of the project area or in the NSO range. In these cases, remaining sites may not provide a reasonable assurance of species persistence, and recommendations were developed to avoid impacts to the site(s) by re-routing the corridor away from the site(s).

1.5.6 Effects Conclusions

Based on the information compiled and analyzed for each species, a conclusion was made to state that with implementation of the PCGP Project, remaining sites (i.e., those not affected by the PCGP Project and that would persist in or near the project area following project implementation) either “would provide a reasonable assurance of species persistence” or “may not provide a reasonable assurance of species persistence.” To support this conclusion, the evaluation factors listed above were addressed for each species, considering pre- and post-project site distributions and other factors, to make one of the following three conclusions:

- For species that are not necessarily more common than previously documented despite new information available from pre-disturbance surveys for the PCGP Project and/or other sources since the species were listed in the 2001 ROD and 2001-2003 ASRs, the PCGP Project would affect site persistence of the species at one or more sites, and the remaining sites in the NSO range may not provide a reasonable assurance of species persistence. For these species, the PCGP Project could substantially alter the distribution of the species in the local vicinity of the project area or in the NSO range.
- For species that are not necessarily more common than previously documented despite new information available from pre-disturbance surveys for the PCGP Project and/or other sources since the species were listed in the 2001 ROD and 2001-2003 ASRs, the PCGP Project would affect site persistence of the species at one or more sites, but the remaining sites in the NSO range would provide a reasonable assurance of species persistence. For these species, the PCGP Project would not substantially alter the distribution of the species in the local vicinity of the project area or in the NSO range.
- For species that appear to be more common than previously documented based on new information available from surveys for the PCGP Project and/or other sources since the species were listed in the 2001 ROD and 2001-2003 ASRs, the PCGP Project would affect site persistence of the species at one or more sites, but the remaining sites in the NSO range would provide a reasonable assurance of species persistence. For these species, the PCGP Project would not substantially alter the distribution of the species in the local vicinity of the project area or in the NSO range.

1.6 AGENCY DECISIONS

The Forest Service will review the analyses contained in this report and provide a recommendation to the decision-makers regarding the finding of persistence for each S&M species evaluated in this report. The findings will ultimately be documented in the Forest Service Record of Decision for the PCGP Project.

2.0 FUNGI SPECIES

2.1 ALBATRELLUS ELLISII

Albatrellus ellisii is an ecto-polypore fungus in the Albatrellaceae family (formerly in the Scutigeraceae family) and is commonly known as greening goat's foot.

2.1.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *A. ellisii* as a Category B (rare) species. ORBIC evaluated *A. ellisii* 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 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. The species is on ORBIC List 4. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.1.2 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 or reproductive biology of *A. ellisii*. It is an annual polypore fungus and is most easily detected in late summer and fall (Castellano et al. 2003). The fruit bodies tend to be large and conspicuous, and the species may appear locally common during heavy fruiting of a single population (Holthausen et al. 1994). Other ecto-polypore species in the genus *Albatrellus* (e.g., *A. avellaneus* and *A. caeruleoparus*) are presumed to be dependent on wind and possibly on animals, particularly arthropods, for the dispersal of spores (Castellano and O'Dell 1997), and the same may be true of *A. ellisii*. Based on the presumed dispersal capability, extirpated populations may become re-established through natural recolonization and may recover from decreased abundance over a period of several years (ORBIC 2004).

Range

Albatrellus ellisii is endemic to North America and has been documented in 10 states from New Jersey south to Alabama, and from Colorado west to the Pacific Northwest where it has been found from British Columbia to northern California (ORBIC 2004). In the Pacific Northwest, the mushroom has been found most often in the Cascade Range. 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 is likely similar to the current range, with populations widely distributed across 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 reported *A. ellisii* from less than 200 element occurrences¹ across the species' range in 2004. In the Pacific Northwest, Oregon had the highest number of occurrences at more than 20 in 2004, while California and Washington had less than five occurrences each (ORBIC 2004). According to ORBIC (2004), *A. ellisii* was considered to be uncommon with a sporadic distribution across the NSO range in 2004. *Albatrellus ellisii* populations of the species appeared to be stable in western North America, but their status in eastern North America was unknown. The species was not found during Random Multi-Species surveys across the NSO range in 2001 through 2004 (USDA and USDI 2007). Molina (2008) documented 34 new sites of *A. ellisii* in the NSO range between 1998 and 2006, and 48 total sites were documented by 2006, including 16 in reserves or protected areas. The 2007 Final SEIS reported 46 sites on NFS and BLM lands and 48 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 surveys² 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 *A. ellisii*, and resulted in 18 new observations of individuals or populations of *A. ellisii*. Additional surveys for *A. ellisii* in LSRs in nearby areas resulted in five additional observations of the species. These observations have increased the number of sites documented in BLM and Forest Service records by about 40 percent. Based on the increased number of known sites since 1998 as a result of the increased number of surveys (a more than three-fold increase between 1998 and 2006 per Molina 2008 records) and considering that the species is fairly conspicuous, additional surveys would be expected to locate additional populations within the NSO range, particularly in the Cascade Range, where most observations have been reported. The current estimated number of sites and distribution of the species based on 2017 data are presented below under Species Distribution.

Habitat

Albatrellus ellisii occurs as solitary sporocarps or small clusters on the soil surface in coniferous or mixed hardwood-coniferous forests (Castellano et al. 2003, Holthausen et al. 1994). Based on data available in 1994, *A. ellisii* was primarily found in old-growth coniferous stands in Oregon and Washington, and mixed coastal coniferous and hardwood stands in California (Holthausen et al. 1994). Reported observations of *A. ellisii* in Portland, Eugene, Everett, and Berkeley have been in urban park settings, indicating the species may not be dependent on old-growth forest conditions (Trappe, pers. comm. 2013). Additionally, DNA markers have been used to confirm the mycelial presence of *A. ellisii* in several historical sites within managed forests where fruitings have not

¹ An element occurrence is different than a site, as defined in the 2001 ROD. ORBIC used element occurrences in accordance with the NatureServe definition, and one occurrence could consist of multiple sites or observations and usually contains a subpopulation, population, or metapopulation.

² Chapter 1 provides summaries of the survey methods for each group of species for the PCGP Project, and the cited survey reports provide additional details.

been observed in recent surveys (Gordon and Apple 2011). Based on data available in 2007, recorded observations were found between about 550 and 6,000 feet msl (Cushman and Huff 2007). *Albatrellus ellisii* may prefer specific microclimate conditions of LSOG forests, but it may not be restricted to these conditions.

Threats

Threats to *Albatrellus* species are presumably actions that disrupt stand conditions necessary for its survival, particularly damage to host trees and disturbance of soil occupied by host tree roots (Castellano and O'Dell 1997). Typical threats in coniferous forests include heavy logging that removes overstory trees and causes disturbance to soil, development, hot fires, and heavy thinning for fire management (ORBIC 2004). Invasive plants can also disrupt or displace the fungus by affecting its mycorrhizal association with its host plant, which could lead to mortality (Shohet et al. 2008). Like other *Albatrellus* species, the mushroom may be harvested for food, but is rarely harvested commercially (Holthausen et 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 *A. ellisii*:

- As a mycorrhizal species, *A. ellisii* 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.

2.1.3 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. ellisii* 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 sites³ in accordance with the methodology described in Chapter 1. Table ALEL-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 148 observations

³ The term site is used in the persistence evaluation throughout this document to represent the polygon created by buffering observation data from NRIS and GeoBOB by a specified buffer for each taxonomic group (refer to Chapter 1 for details) and combining polygons that overlap. Using this method, one or more observations may fall within a single site.

from BLM and Forest Service geodatabases were converted into 112 sites in the NSO range (region). Table ALEL-2 shows the total number of sites on NFS lands and other land ownerships across the regional, local, and analysis areas. Table ALEL-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 ALEL-1 displays the regional distribution of the species across NFS lands, Figure ALEL-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure ALEL-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 NFS and BLM lands.

TABLE ALEL-1	
Number of <i>Albatrellus ellisii</i> Sites (2017)	
Location*	Number of Sites
Regional Area	112
Local Area	45
Analysis Area (Project Area)	10 (10)
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 ALEL-2			
Distribution of <i>Albatrellus ellisii</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	72	22	9
BLM	36	23	1
NPS	1	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	7	4	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.			

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	1	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	16	-	-
Congressionally Reserved (CR)	4	-	-
Late Successional Reserve (LSR)	29	10	2
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) ^{a/}	-	-	-
Managed Late Successional Area (MLSA)	2	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	27	13	8
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	-	-	-
District Designated Reserve	11	6	1
Harvest Land Base	23	17	1
Late Successional Reserve	15	8	1
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	8	6	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

Albatrellus ellisii is widely distributed across 10 physiographic provinces in Washington (Western and Eastern Cascades, Olympic Peninsula), Oregon (Coast Range, Cascades East and West, and Klamath Mountain), and California (Klamath, Coast, and Cascades) (see Figure ALEL-1). Most sites are found along the eastern and western Cascade Range in Oregon, with scattered sites in other outlying areas in Washington and California. Several sites are clustered and near other known sites in the Cascade Range and Klamath Mountains, and several isolated sites occur in the rest of the species’ range. The largest cluster of sites is in the southern Cascade Range in Oregon, where the species appears to be locally abundant. *Albatrellus ellisii* does not, however, appear to be well distributed within its range in the NSO range.

Seven of 112 known sites are at least partially located on private, state, or other lands; one site is on NPS lands (Olympic National Park); 72 sites are at least partially on NFS lands; and 36 sites are at least partially on BLM lands. Sites managed by the Forest Service that encompass the project area include 40 sites on the Fremont-Winema National Forest, 11 sites on the Rogue River-Siskiyou National Forest, and five sites on the Umpqua National Forest. Sites included on other National Forests include four sites on the Willamette National Forest, five sites on the Klamath National Forest, four sites on the Shasta-Trinity National Forest, one site on the Six Rivers National Forest, one site on the Mt. Hood National Forest, one site on the Wenatchee National Forest, one site on the Gifford Pinchot National Forest, and one site on the Mt. Baker-Snoqualmie National Forest.

Across the NSO range, 33 sites are at least partially located in reserve lands⁴ managed by the Forest Service, including 29 in LSRs and four in Congressionally Reserved areas (see Figure ALEL-2). These sites represent 46 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, 13 sites are entirely located in reserve lands managed by BLM, which represents 36 percent of the total number of BLM sites in the region. While the 13 sites in BLM reserves and 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.

Albatrellus ellisii is primarily found in LSOG forests based on available data (94 of 112 total sites are in LSOG), but it has been found in urban park settings as well. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous forests below 6,000 feet msl throughout 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, including the LSOG component of these forests, within the NSO range could provide habitat for *A. ellisii* and support additional sites. These forests encompass an estimated 18.1 million acres on BLM and NFS lands in the region, including an estimated 10.7 million acres in reserve land allocations (59 percent of the forests; Table ALEL-4).

Of this acreage, an estimated 5.9 million acres are LSOG (see Figure ALEL-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 region, LSOG forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

TABLE ALEL-4

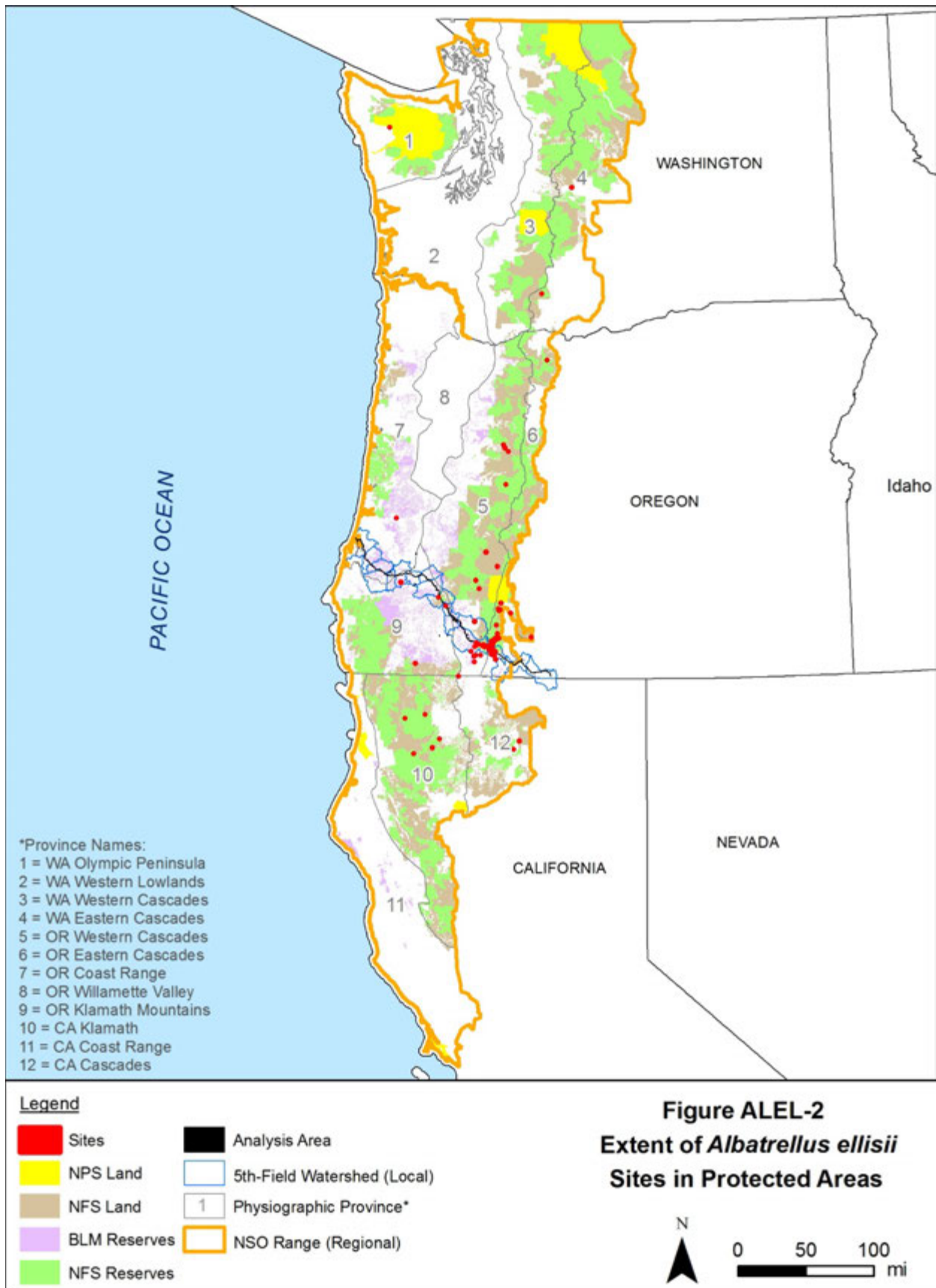
Extent of Forests That Could Provide Habitat for *Albatrellus ellisii* on BLM and NFS Lands ^{a/}

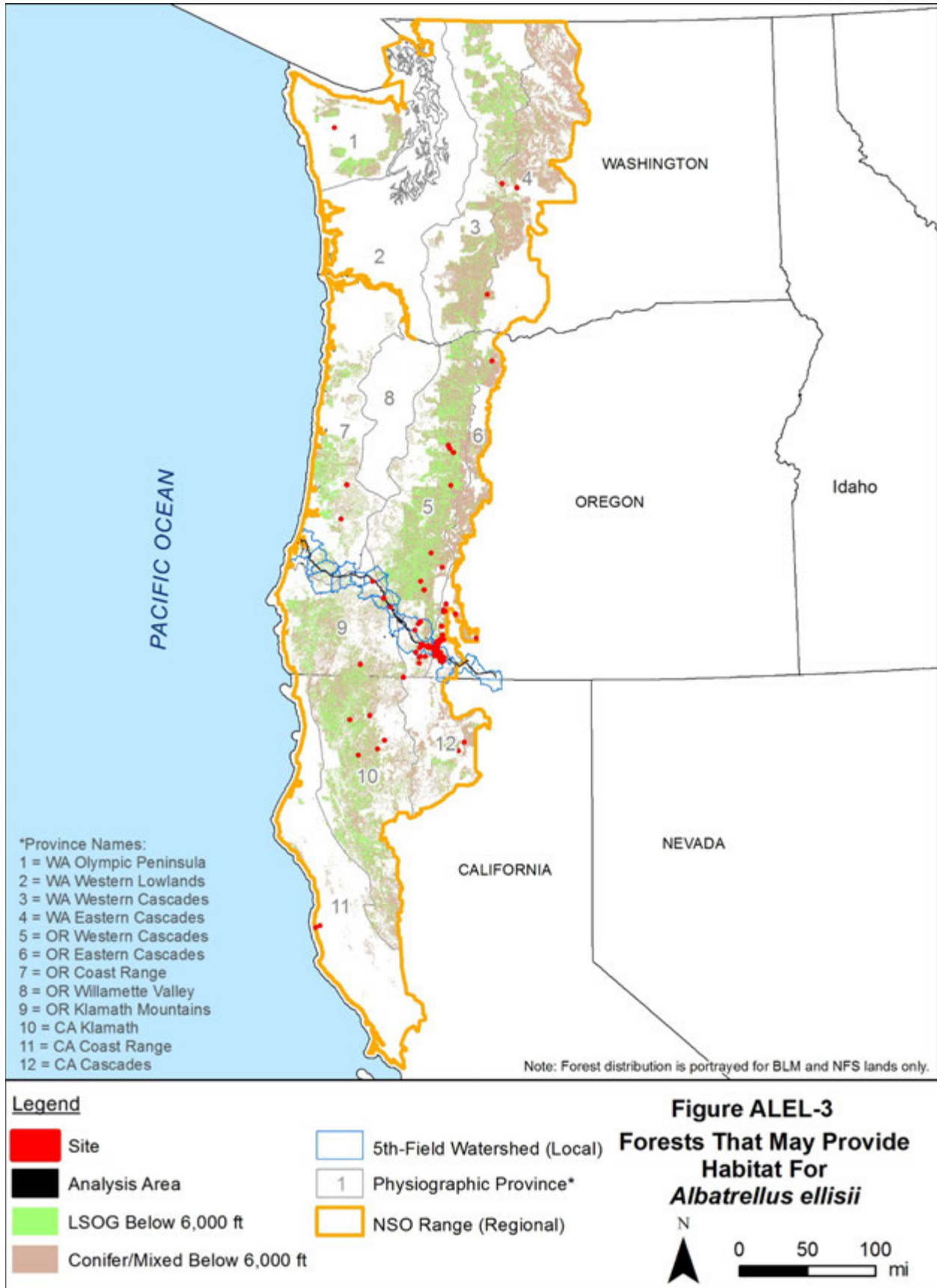
Location	Coniferous and Mixed Forests below 6,000 feet		LSOG Forests below 6,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	18,055,593	10,707,574	5,908,944	3,894,277
Local Area	568,307	369,371	181,349	133,178
Project Area	1,419	982	323	230

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.

⁴ See Chapter 1 for the definition and mapping of reserves for this report. LSR and Riparian Reserves are not consistently defined or mapped for NFS and BLM lands; therefore, the extent of lands managed as reserves may be underrepresented.







Local Distribution

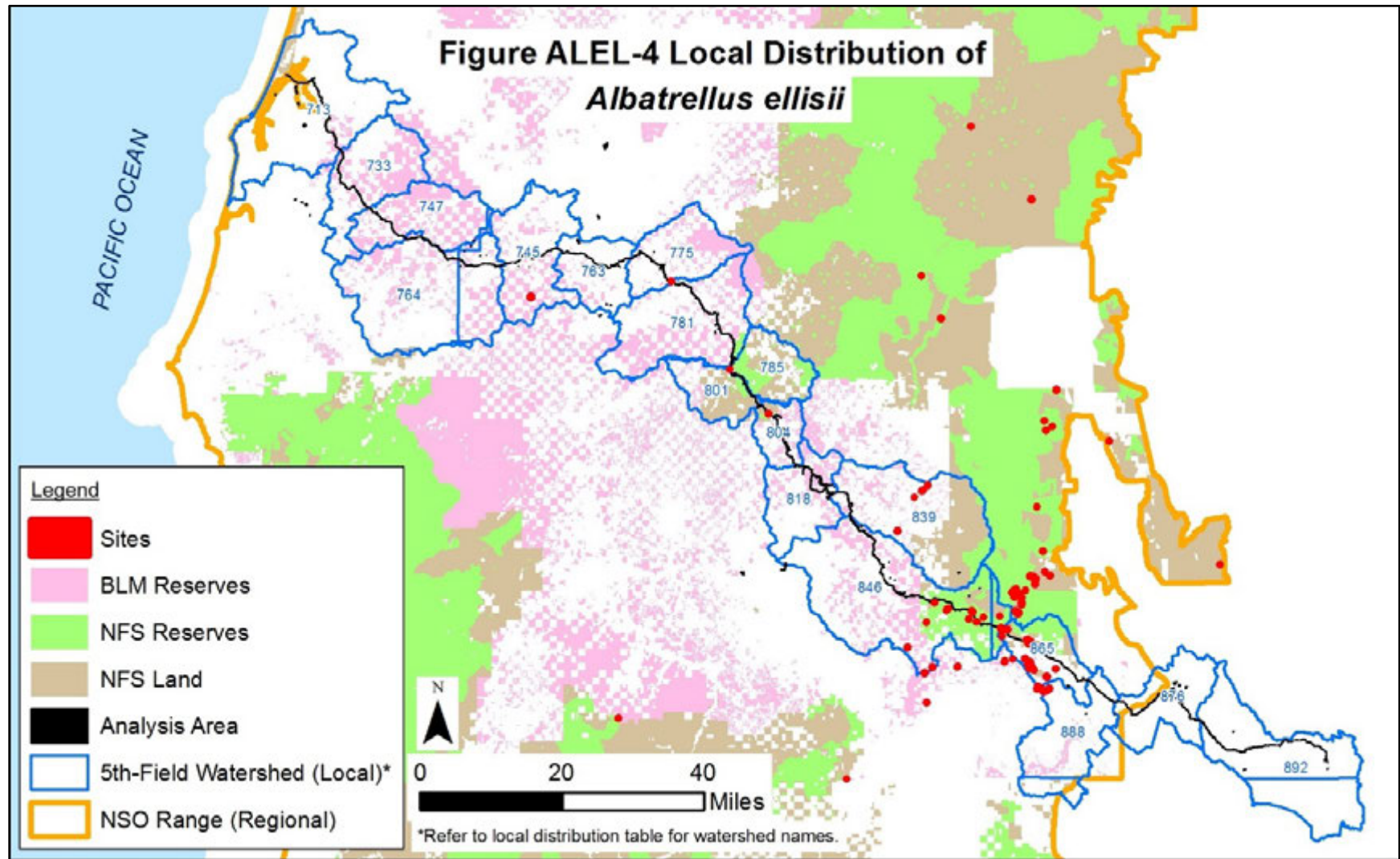
Within the local area, *A. ellisii* is distributed across 10 5th-field watersheds that overlap the project area (see Figure ALEL-4 and Table ALEL-5.) Most sites appear to be clustered and near one another in the Cascade Range, but sites in the Myrtle Creek/South Umpqua River, Olalla Creek-Lookingglass Creek, Elk Creek-South Umpqua/Upper Cow Creek, and Trail Creek watersheds appear more isolated. 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 based on the proximity of other sites in the region. Several sites are located within 10 miles of the project area within the Cascade Range.

Of the 45 sites in the local area, 22 are on NFS lands and are located on lands designated as Other (Matrix) and LSR. Four sites are partially on private lands and 23 are at least partially on BLM lands. Of the sites in the local area, nine sites are entirely within NFS reserves and six sites are entirely in BLM reserve lands, representing 57 percent of the NFS and BLM sites.

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).

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	6	-	5
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	1 <u>a/</u>	-	-
Klamath River-John C Boyle Reservoir (888)	3	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	12 <u>b/</u>	10	2
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	1 <u>c/</u>	-	1
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	1	-	1
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	1 <u>c/</u>	-	1
Spencer Creek (865)	21 <u>b/</u>	1	4
Trail Creek (804)	1	-	-
Upper Cow Creek (801)	1 <u>a/</u>	-	-

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 Elk Creek-South Umpqua and Upper Cow Creek watersheds.
b/ One site is in both Little Butte Creek and Spencer Creek watersheds; the portion of the site in Spencer Creek is not in a reserve.
c/ One site is in both Myrtle Creek and South Umpqua watersheds.



Analysis/Project Area Distribution

The analysis and project areas contain 10 sites of *A. ellisii*, 9 of which are at least partially on NFS lands, on the Rogue River-Siskiyou, Fremont-Winema, and Umpqua National Forests. Two sites are partially on private lands and one site is completely on BLM lands. The analysis area sites are distributed across seven 5th-field watersheds in the central to eastern portion of the analysis area. Sites in the Cascade Range are more clustered than sites in the Klamath Mountains. Many sites are also located within the immediate vicinity of the analysis area in the Cascade Range (see Local Distribution discussion above), including several on NFS lands within 10 miles.

The sites on NFS lands in the analysis area are located on lands designated as Other (Matrix) and LSR. Of the 9 NFS sites in the analysis area, two sites are entirely in reserve lands. The single site on BLM lands in the analysis area is entirely in reserve lands (District Designated Reserve, LSR, and Riparian Reserve).

Surveys for the PCGP Project resulted in 29 total observations of the species in 23 locations in or near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). An estimated 23 of these recorded observations comprise the 10 sites in the analysis area; the other observations are in sites outside the analysis area. Within the project area, seven sites are between mileposts (MP) 162.5 and 173.6, and one site is located near each of the following MPs: 82.9, 102.8, and 112.8.

Analysis

The PCGP Project would affect¹ 9 out of the 72 sites on NFS lands in the region, representing approximately 13 percent of the NFS sites. Site impacts on other land ownerships include one site affected on BLM lands. The total number of sites affected is 10 sites out of the 112 total sites on all lands. Table ALEL-6 provides an overview of the features of the PCGP Project that would affect the *A. ellisii* sites on NFS lands. The construction corridor and associated work and storage areas would affect approximately 14.3 acres within the sites (about 30 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 *A. ellisii* in and near the project area.

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 about 10.4 acres of vegetation and soil within 9 sites and could result in the removal of *A. ellisii* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about 1.6 acres within five 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 *A. ellisii* 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

¹ All impacts discussed in this document are focused on sites or portions of sites on NFS lands unless otherwise specified. Impacts on other lands are not subject to management direction from the Forest Service and are not considered in the persistence evaluation of each S&M species.

could make habitat within the sites no longer suitable for the species, although this species has been found in park-like settings and may be somewhat resilient to open canopies and edge effects. 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 throughout the project area 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 2.3 acres 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.

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	9	10.4 ac
Temporary Extra Work Area (TEWA)	5	1.6 ac
Uncleared Storage Area (UCSA)	5	2.3 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 1,132 acres of coniferous and mixed hardwood-coniferous forests below 6,000 feet msl, including 243 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *A. ellisii*. 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 9 sites on NFS lands as a result of the PCGP Project, 13 *A. ellisii* sites would remain on NFS lands in the local area, including seven at least partially in reserves, and 63 sites, including 31 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 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 49 percent of the remaining *A. ellisii* sites 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, 22 sites would remain on BLM lands in the local area, including five entirely in reserves, and 35 sites, including 12 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:

- *Albatrellus ellisii* 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:
 - *Albatrellus ellisii* has a wide, but somewhat scattered, distribution across 10 physiographic provinces and three states in the region and a moderate-high number of overall sites (72 on NFS lands, 112 on all lands). The species is fairly common in the Cascade Range, but less abundant in other areas. The currently known number of sites on NFS and BLM lands has increased by 66 sites since 2007, with many sites documented during the PCGP Project surveys.
 - An estimated 54 percent of the sites (58 sites) on federal lands are at least partially in reserves, which is an increase of 42 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 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 and Klamath Mountains, where most sites are documented.
- The PCGP Project would affect 9 of 72 *A. ellisii* sites on NFS lands, representing approximately 13 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the 9 sites, a moderate-high number of sites (63) would remain on NFS lands in the region, with a wide distribution across Washington, Oregon, and California. 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 six 5th-field watersheds. An additional 12 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 two sites in LSRs and the percentage of sites on NFS lands in reserves would increase from 46 to 49 percent. Of the remaining sites on NFS lands, 30 sites are at least partially in LSRs where management actions are

restricted to those activities that benefit LSOG forests, and four sites are in Congressionally Reserved areas where management activities that may adversely affect *A. ellisii* are unlikely. The PCGP Project would also affect one site entirely in BLM reserves. A total of 12 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 *A. ellisii* 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 *A. ellisii*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Albatrellus ellisii* 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.

2.1.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *A. ellisii* at 9 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, 63 sites would remain on NFS lands across the region, including 31 sites at least partially in reserves, and 13 sites would remain on NFS lands in the local area, including eight sites at least partially in reserves. Additionally, 35 sites would remain on BLM lands across the region, including 12 sites entirely in reserves, and 22 sites would remain on BLM lands in the local area, including five sites entirely in reserves. Although the PCGP Project would affect site persistence of *A. ellisii* at 9 sites on NFS lands, these sites are part of a large cluster of sites on federal lands in the Cascade Range in southern Oregon where the species is locally abundant. It is expected that BLM management would allow sites in BLM reserves to persist. After project implementation the species would remain locally common; 13 sites would remain on NFS lands in the local area (reserves and non-reserves) and five sites would remain in BLM reserves in the local area. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Albatrellus ellisii* would persist in the region without considering the 9 sites as part of the population.
- The PCGP Project would remove approximately 1,132 acres of coniferous and mixed hardwood-coniferous forests and 243 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 impacts to all *A. ellisii* 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 9 *A. ellisii* 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 *A. ellisii* 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.

2.2 ARCANGELIELLA CRASSA

Arcangeliella crassa is a sequestrate mushroom and false truffle species in the Russulaceae family and does not have a common name.

2.2.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *A. crassa* as a Category B (rare) species. ORBIC evaluated *A. crassa* in its most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2016, the species was considered to be between uncommon but not rare with some cause for long-term concern; and at high risk of extinction or elimination due to very restricted range, very few populations, steep declines, or other factors within its global range (G2G4). 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 ORBIC List 3. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.2.2 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 *A. crassa*. It forms sporocarps just under the surface of the soil near true fir (*Abies* spp.) or pine (*Pinus* spp.) trees (Castellano et al. 1999). Fruiting has been documented from June through October. It is presumed to be ectomycorrhizal, forming symbiotic associations with conifer trees for translocation of minerals, water, and nutrients (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, particularly small mammals (Holthausen et al. 1994).

Range

Arcangeliella crassa was believed to be endemic to California (Castellano et al. 1999), but it was recently found in Oregon during surveys between 2002 and 2012, including those for the PCGP Project (Siskiyou BioSurvey LLC 2012a). In California, it has been found from the Sierra Nevada in Fresno County north to the southern Cascade Range and Siskiyou Mountains (ORBIC 2004). This species is locally abundant in Fresno County, but its abundance across the Pacific Northwest is unknown. The species may be found in more locations with more survey efforts. 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

Within California, Castellano and O'Dell (1997) reported *A. crassa* from five populations in 1997, including two populations in the NSO range (one on the Klamath National Forest and one on the Shasta-Trinity National Forest). ORBIC (2004) reported the species from more than 10 element occurrences in California, where the species was thought to be endemic. Prior to 2002, the species had not been reported in Oregon, but surveys conducted since then have documented the species in multiple locations, including two observations on the Winema National Forest that were recorded during surveys conducted for the PCGP Project in October 2011 (Siskiyou BioSurvey LLC 2012a). 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 one new site of *A. crassa* in the NSO range between 1998 and 2006, which may have been from the Random Multi-Species surveys, and four total sites were documented by 2006, including two in reserves or protected areas. The 2007 Final SEIS reported two sites on NFS and BLM lands and two 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]). These equivalent-effort surveys targeted all Category B species, including *A. crassa*, and resulted in two new observations of *A. crassa* on the Winema

National Forest. *Arcangeliella crassa* has not been found in high numbers during past survey efforts, although limited fungi 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 presented below under Species Distribution.

Habitat

Based on data available prior to 1999, *A. crassa* was found in mixed coniferous forests above 6,000 feet msl (Castellano and O'Dell 1997, Castellano et al. 1999) and in upper montane true fir forests in northern California (Holthausen et al. 1994). It has been found in association with the roots of mountain hemlock (*Tsuga mertensiana*) at mid to high elevations (Holthausen et al. 1994) and with various trees in the Pine family (Pinaceae), such as white fir (*Abies concolor*), California red fir (*A. magnifica*), ponderosa pine (*Pinus ponderosa*), Jeffrey pine (*P. jeffreyi*), and lodgepole pine (*P. contorta*) (Castellano et al. 1999). It may require abundant coarse woody debris along the forest floor (Holthausen et al. 1994).

Threats

Threats to *A. crassa* are actions that affect host trees and disturb the soil, such as road and trail construction, logging, fire management, and recreational activities (Castellano and O'Dell 1997). Fire is not considered to be a major threat because the species is commonly found in cool, wet habitats that are less susceptible to fire. The removal of coarse woody debris on the forest floor can also affect the species (Holthausen et 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. Management recommendations were developed for *A. crassa* along with several other species (Group 3 of Castellano and O'Dell 1997). The primary guidance is to maintain habitat conditions at all known sites, which will maintain viable populations of the species until additional information on the effects of various management activities can be obtained and evaluated. Populations on federal land should be managed to maintain population viability. 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. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *A. crassa*:

- As a mycorrhizal species, *A. crassa* 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.

2.2.3 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 information on sites, 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. crassa* 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 ARCR-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 28 observations from BLM and Forest Service geodatabases were converted into 26 sites in the NSO range (region). Table ARCR-2 shows the total number of sites on NFS lands and other land ownerships across the regional, local, and analysis areas. Table ARCR-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 ARCR-1 displays the regional distribution of the species across NFS lands, Figure ARCR-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure ARCR-3 displays the species’ regional distribution as well as the extent of coniferous forests and LSOG coniferous forests between 2,000 and 7,000 feet msl on BLM and NFS lands within the currently known range of the species.

TABLE ARCR-1	
Number of <i>Arcangeliella crassa</i> Sites (2017)	
Location*	Number of Sites
Regional Area	26
Local Area	5
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 ARCR-2			
Distribution of <i>Arcangeliella crassa</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	21	1	1
BLM	5	4	-
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	3	3	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 ARCR-3

Distribution of *Arcangeliella crassa* 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)	5	-	-
Congressionally Reserved (CR)	-	-	-
Late Successional Reserve (LSR)	2	-	-
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) ^{a/}	-	-	-
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	15	1	1
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	-	-	-
District Designated Reserve	3	2	-
Harvest Land Base	4	3	-
Late Successional Reserve	2	2	-
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

Arcangeliella crassa has a somewhat limited distribution across six physiographic provinces in Oregon (Coast Range, Klamath Mountains, Cascades East and West) and California (Klamath and Cascades) and a low-moderate overall number of sites (see Figure ARCR-1). Most sites are found along the Cascade Range, with scattered sites in the Coast Range and Klamath Mountains. A group of sites is found in the eastern Cascade Range in Oregon, but other sites appear isolated. *Arcangeliella crassa* does not appear to be well distributed within its range in the NSO range.

Three of the 26 known sites are at least partially located on private, state, or other lands; five sites are at least partially on BLM lands, and 21 sites are at least partially on NFS lands. Sites managed by the Forest Service that encompass the project area include one site on each of the Fremont-Winema National Forest, Umpqua National Forest, and Rogue River-Siskiyou National Forest. Sites on other National Forests include 12 sites on the Deschutes National Forest, one site on the Mt. Hood National Forest, two sites on the Klamath National Forest, and three sites on the Shasta-Trinity National Forest.

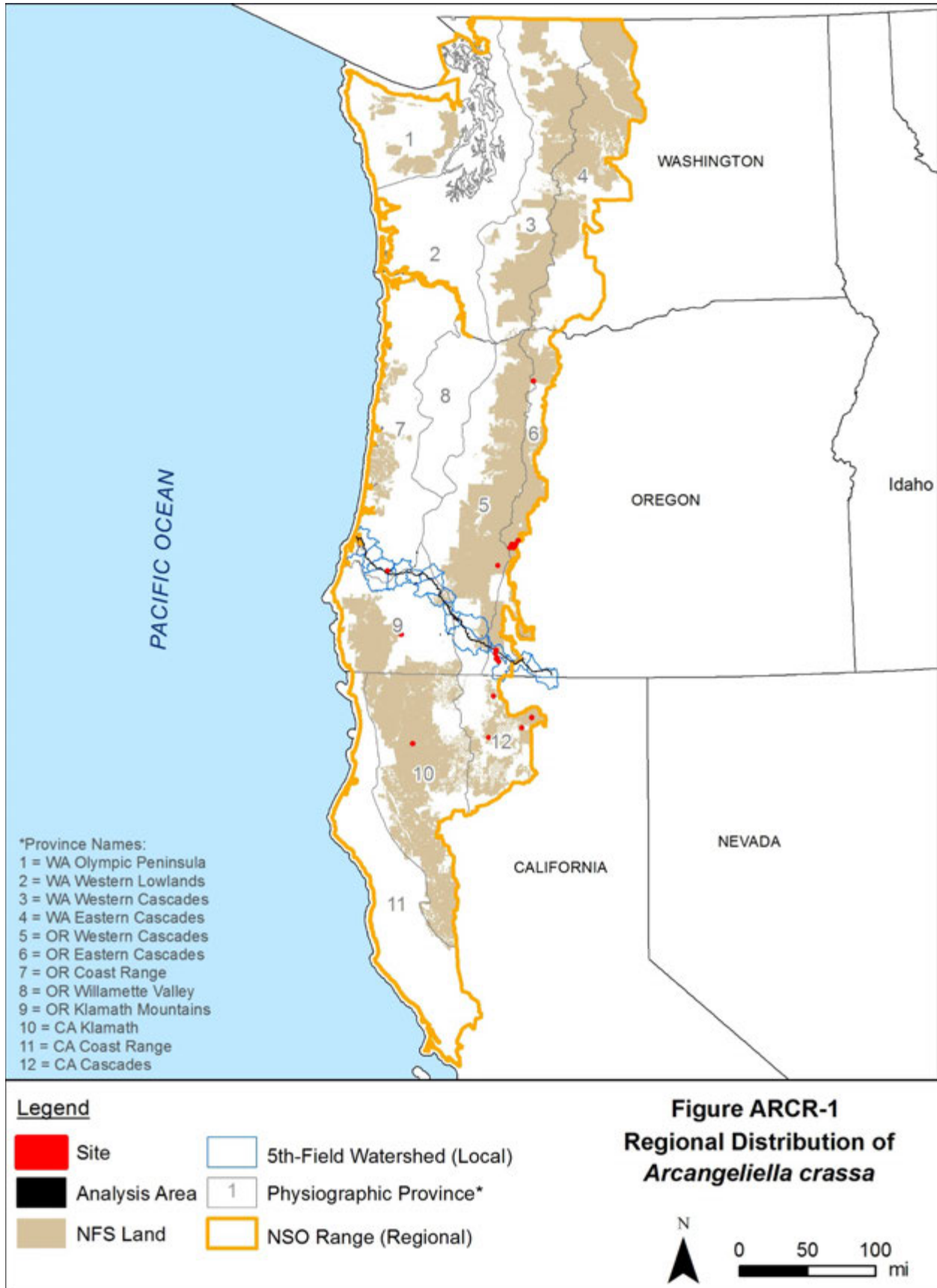
Across the NSO range, two sites are located on LSRs managed by the Forest Service (see Figure ARCR-2). This represents 10 percent of the total NFS sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. One site is located entirely on LSRs managed by BLM, while an additional three sites are partially in BLM reserves and partially on BLM harvest lands. While the single site that is entirely in BLM reserves is not covered by the S&M Standards and Guidelines, it will likely receive some degree of protection through BLM reserve management.

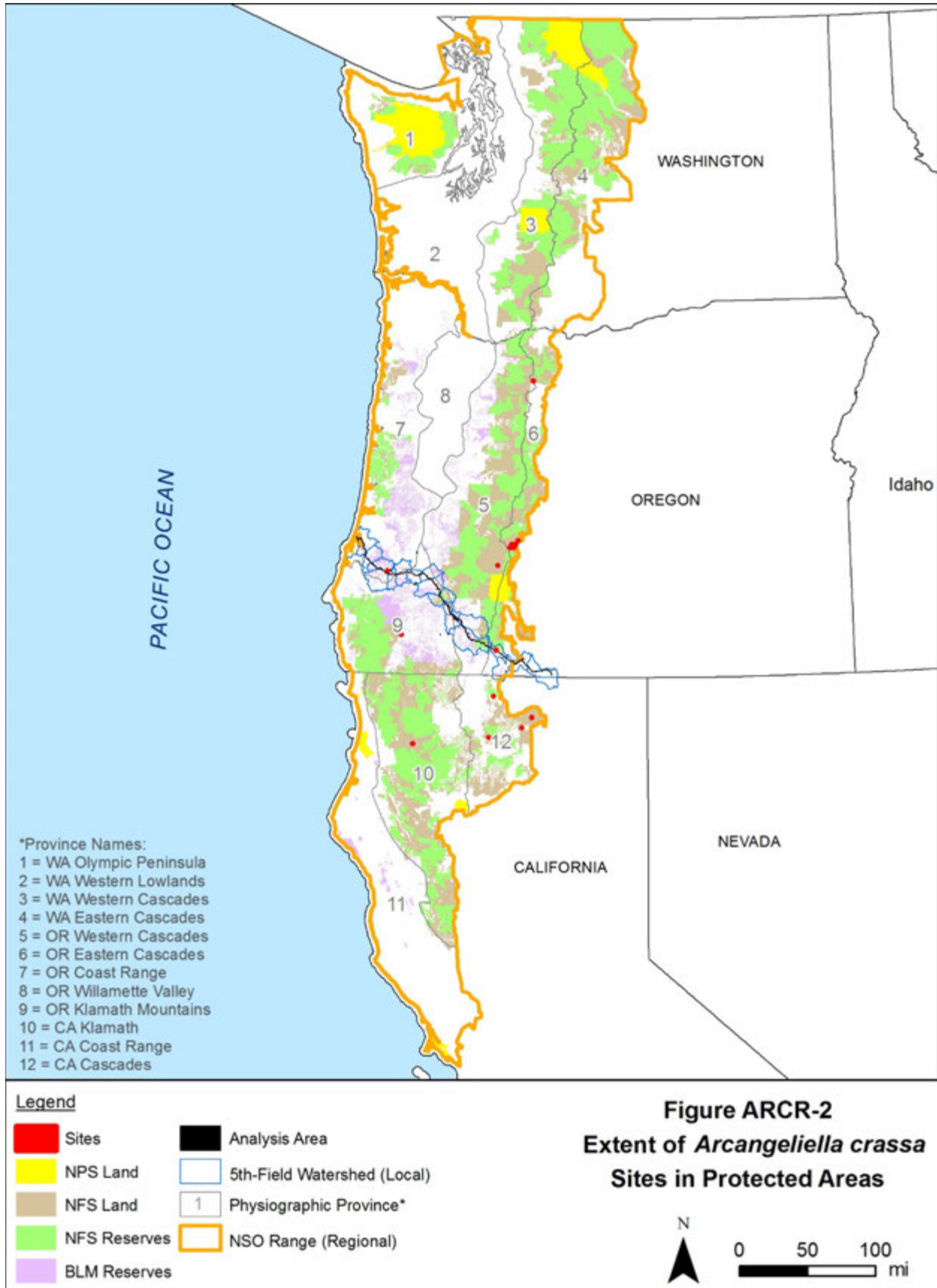
Arcangeliella crassa is primarily found in LSOG forests based on available data (22 of 26 total sites are in LSOG) and may be restricted to specific microclimate conditions of these forests. Based on current site locations, the species is found in coniferous forests between 2,000–7,000 feet msl and has only been documented 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 lands, both land ownerships are included in this potential habitat discussion. LSOG coniferous forests within the NSO range could provide habitat for *A. crassa* and support additional sites. These forests encompass an estimated 2.9 million acres on BLM and NFS lands (see Figure ARCR-3 and Table ARCR-4), including 1.7 million acres in reserve land allocations (59 percent of the forests). LSOG coniferous forests between 2,000–7,000 feet msl are a somewhat limited habitat in Oregon and California and are primarily found along the Cascade Range and the Klamath Mountains. Younger coniferous 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 (see Figure ARCR-3 and Table ARCR-4).

TABLE ARCR-4

Extent of Forests That Could Provide Habitat for <i>Arcangeliella crassa</i> on NFS and BLM Lands ^{a/}				
Location	Coniferous Forests between 2,000–7,000 feet		LSOG Conifer between 2,000–7,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	8,642,537	4,620,852	2,909,752	1,725,206
Local Area	328,613	178,814	104,916	65,073
Project Area	789	518	225	152

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

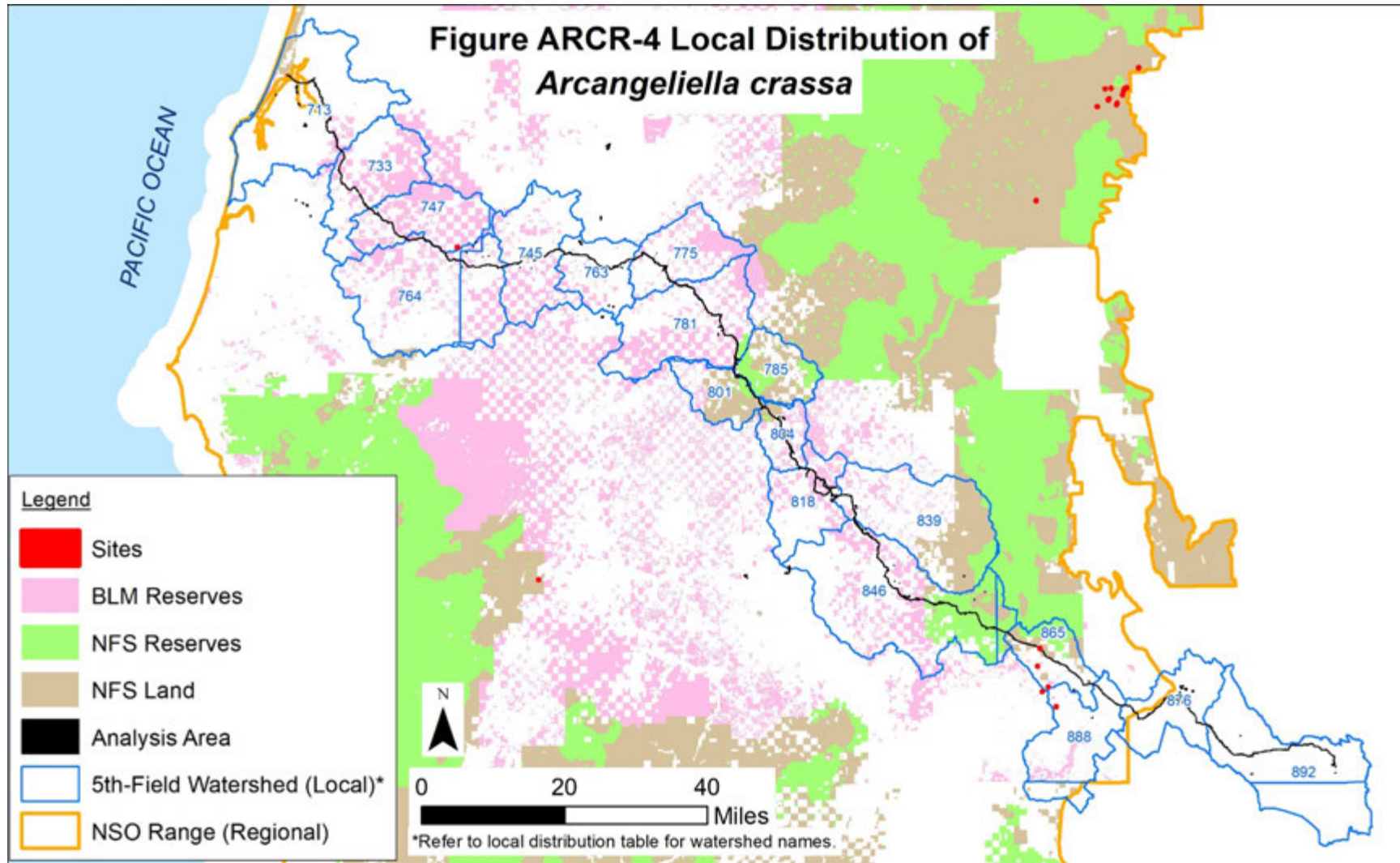
Within the local area, *A. crassa* is found in three 5th-field watersheds that overlap the project area: East Fork Coquille River, Klamath River-John C Boyle Reservoir, and Spencer Creek (see Table ARCR-5 and Figure ARCR-4). The sites appear isolated from others in the region, with the nearest site located 25 miles south of the easternmost local site in the eastern Cascade Range. The sites in the eastern Cascade Range are grouped locally, while the site in the Coast Range is isolated. Limited connectivity appears available between the local sites and other sites in the region based on the distance between the sites, although animals could transport spores across suitable habitat within the local area.

One site in the local area is located on land designated as Other (Matrix) on the Fremont-Winema National Forest and four sites are on BLM lands, one of which is entirely in reserves (LSRs). Three sites are partially on private lands.

LSOG coniferous forests between 2,000–7,000 feet msl encompass approximately 104,916 acres on BLM and NFS lands in the local area, including 65,073 acres in reserve land allocations (62 percent of the forests). Forests that may provide suitable habitat are primarily found in the Cascade Range (see Figure ARCR-2), and other sites may be located in the mountain range in areas that have not been previously surveyed.

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)	1	-	1
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)	3	-	1
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.



Analysis/Project Area Distribution

The analysis and project areas contain one site of *A. crassa*. This site is on the Winema National Forest in the Spencer Creek watershed, as described above in Local Distribution.

Surveys for the PCGP Project resulted in two observations of *A. crassa* in the survey area during fall 2011 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These recorded observations were near MP 173.2 and comprise the single site in the analysis area.

Project Impacts

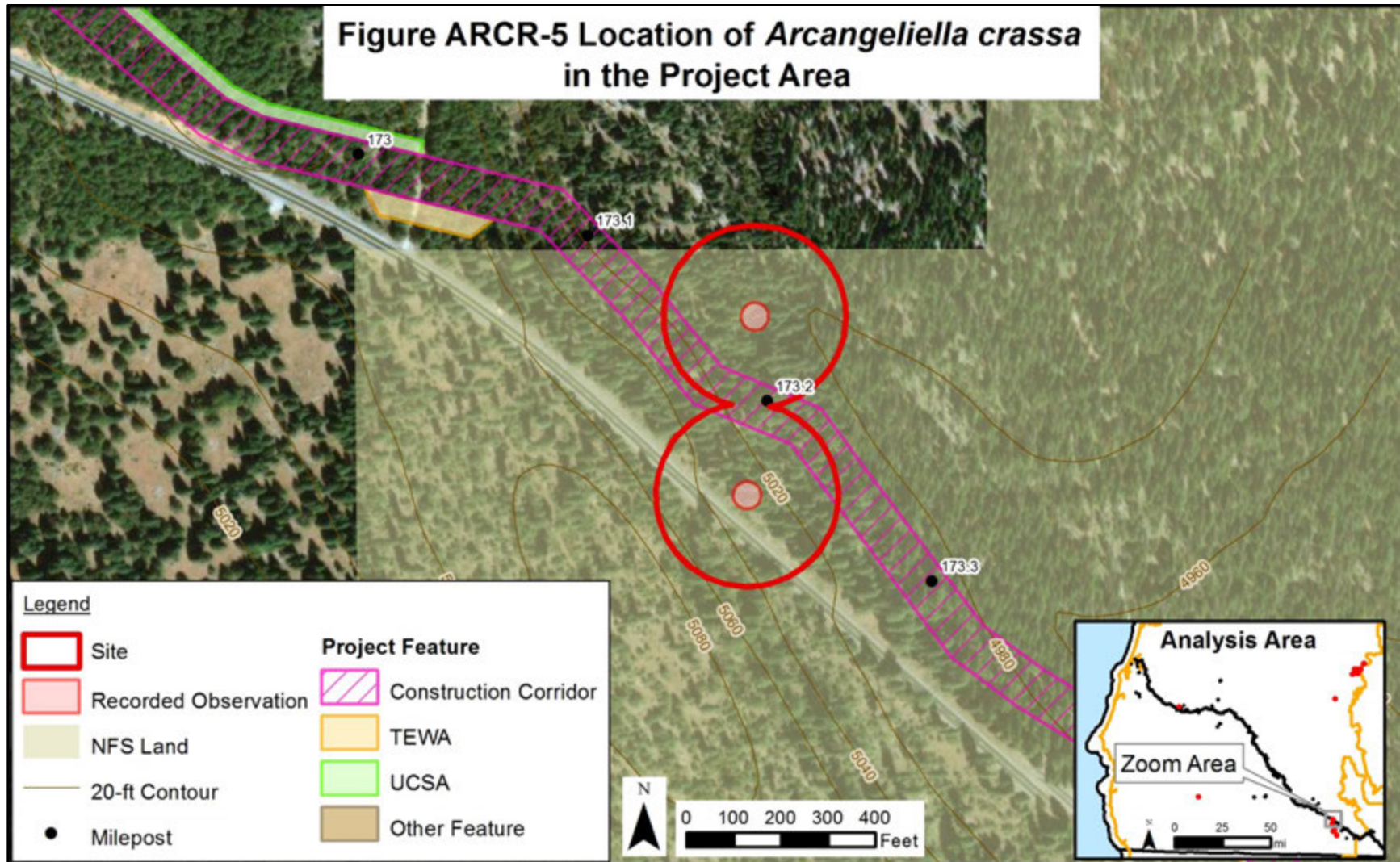
Analysis

The PCGP Project would affect one site out of the 21 sites on NFS lands in the region, representing approximately 5 percent of the NFS sites, or one out of the 26 total sites on all lands in the NSO range. The construction corridor would affect approximately 0.8 acre (15 percent) of the site (the site is approximately 5.4 acres), and the corridor would cross through the central portion of the site (see Figure ARCR-5). The site would not be affected by any other project component (e.g., TEWAs). 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 *A. crassa* in and near the project area. Due to the low number of overall sites of *A. crassa*, the effects on one site could potentially alter the distribution of the species in the NSO range if site persistence is affected.

This 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.

The PCGP Project would result in ground disturbance and vegetation removal across the central portion of the site near MP 173.2. The recorded observations of the species are just south and just north of the project area (see Figure ARCR-5). Both observations would likely be avoided by activities within the corridor. The species could 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 about 100 feet from the observations within the site. The site is mostly forested, and a paved road crosses through the southern portion of the site, just south of the southern observation. Based on the proximity of the road to the observation, the species may be somewhat resilient to edge effects in the site. The establishment of the corridor could adversely modify microclimate conditions around the observations, but the species is expected to persist within the site in forested areas that are not disturbed by the PCGP Project. The removal of forests and host trees and disturbance to soil could negatively affect *A. crassa* by removing its habitat, disturbing the roots of host trees, and affecting its mycorrhizal association with the trees, but individuals outside the corridor would be expected to persist despite nearby changes to the species' habitat. 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 throughout the project area 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, *A. crassa* is likely to persist at the site following project implementation. The site is one site in a small group of sites in the eastern Cascade Range in southern Oregon. While it is the only site in of the group that is on NFS lands, two of the other sites in the group are in BLM reserves, and would likely be protected under BLM management. The group of sites may be important for dispersal of the species between other sites to the north and south in the Cascade Range and sites to the southwest in the Klamath Mountains in California. Despite impacts to habitat in the site, *A. crassa* would still be found in the Cascade Range in Oregon, and opportunities for dispersal into the southern portion of the NSO range would still be possible.

Across the project area, the PCGP Project would remove an estimated 166 acres of LSOG coniferous forests between 2,000–7,000 feet msl. These impacts would result in a reduction of habitat that may be suitable for *A. crassa*. Within this impact area, about 86 acres (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, resulting in a loss of about 42 acres of LSOG coniferous forests between 2,000–7,000 feet msl. The permanent loss of LSOG coniferous forests between 2,000–7,000 feet msl represents less than 1 percent of the total estimated area of these forests in Oregon and California.

Discussion

Given that site persistence would be maintained at the one site in the project area despite impacts to individuals and habitat within the site as a result of the PCGP Project, one site of *A. crassa* would remain on NFS lands in the local area (non-reserves) and four sites would remain on BLM lands in the local area, including one site entirely in reserves. A total of 21 sites, including two in reserves, 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 two sites in NFS reserves is assumed to have additional protections provided by the NWFP Standards and Guidelines in place for the land allocation. Based on these site counts, approximately 9 percent of the *A. crassa* sites on NFS lands in the NSO range would continue to 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. The preceding discussions present this evaluation, as summarized below:

- *Arcangeliella crassa* 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 more information on the species’ distribution is available, as described below:

- *Arcangeliella crassa* has a somewhat limited distribution across four physiographic provinces and two states in the region, and the total number of sites is low-moderate (21 on NFS lands, 26 on all lands). *Arcangeliella crassa* does not appear to be well distributed in any part of its range because sites are scattered and its distribution is spotty. However, the currently known number of sites on NFS and BLM lands has increased by 24 since 2007, and new sites have been documented in Oregon since 2002.
- An estimated 23 percent of the sites (six sites) on federal lands are in reserves, which is an increase of four sites in reserves since 2006 per Molina (2008).
- LSOG coniferous forests between 2,000 and 7,000 feet msl (general habitat for the species) have a somewhat limited distribution across Oregon and California and encompass approximately 2.9 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. *Arcangeliella crassa* is likely restricted to a subcomponent of LSOG coniferous forests based on available information on its habitat and life history requirements.
- The PCGP Project would affect one of 21 sites of *A. crassa* on NFS lands, representing approximately 5 percent of the sites on NFS lands in the NSO range. However, the species is expected to persist at the site based on the analysis. 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.
- The two sites in reserves on NFS lands would not be affected by the PCGP Project. One site would remain entirely in BLM reserves as well. The sites in reserves 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 approximately 42 acres of LSOG coniferous forests between 2,000–7,000 feet msl (less than 1 percent of the total acreage in the NSO range). An estimated 1.7 million acres of LSOG coniferous forests between 2,000–7,000 feet msl would remain in reserves in Oregon and California.
- The remaining forests could support additional populations of *A. crassa*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Arcangeliella crassa* 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 strategic and other surveys, including surveys associated with the PCGP Project.

2.2.4 Conclusions

If implemented as proposed, the PCGP Project would affect habitat for *A. crassa* at one site on NFS lands, but *A. crassa* is expected to persist at the site, and the PCGP Project would not modify the distribution of the species in the NSO range. The remaining sites would continue to 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 individuals of *A. crassa* at one 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 625 acres of LSOG coniferous forest between 2,000–7,000 feet msl (a negligible amount of the forests). An estimated 52 percent of these 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 1.7 million acres of LSOG coniferous forests between 2,000–7,000 feet msl would remain in reserves (negligible change with project implementation). 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 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 single site entirely in BLM reserves is expected to receive significant protection under the 2016 BLM RMPs. Although a single natural disturbance event or combination of events could affect a significant portion of sites in the Cascade Range, some other 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 *A. crassa* site in the analysis area, but individuals within the site are expected to persist following project implementation and avoidance is not necessary. Amendments to the NFS land management plan that applies to the affected site would waive implementation of Management Recommendations for the *A. crassa* 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.

2.3 BOLETUS PULCHERRIMUS

Boletus pulcherrimus is a bolete mushroom species in the Boletaceae family and is commonly known as red pored bolete.

2.3.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *B. pulcherrimus* as a Category B (rare) species. ORBIC evaluated *B. pulcherrimus* 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). It was not included in the most recent updates of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2013, ORBIC 2016). In 2010, 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) 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). It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.3.2 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 *B. pulcherrimus*. As a presumed ectomycorrhizal species, *B. pulcherrimus* mycorrhiza form symbiotic associations with host plant roots, particularly roots of species in the Pine family (Castellano and O'Dell 1997). *Boletus pulcherrimus* spores possibly disperse by wind and by animal (arthropod) vectors. In California, fruiting has been documented from late fall to early winter (The Fungi of California 2010), but elsewhere in its range the species has been observed fruiting from July through December (Castellano et al. 1999).

Range

Boletus pulcherrimus is endemic to the Pacific Northwest, where it has been found from Canada south to California (Holthausen et al. 1994). Based on data available in 2004, *B. pulcherrimus* was found in Oregon in the lower eastern half of the Willamette Valley foothills and in the Ashland area (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 *B. pulcherrimus* from an estimated 45 element occurrences in the Pacific Northwest in 2004. Most of these occurrences were in Oregon (6), with fewer in California (3) and Washington (2) (ORBIC 2004). In 2004, population trends across the species' range in the Pacific Northwest were unknown, but some populations appeared to have good viability based on the recurrence of observations at the same locations. 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 15 new sites of *B. pulcherrimus* in the NSO range between 1998 and 2006, and 44 total sites were documented by 2006, including 14 in reserves or protected areas. The 2007 Final SEIS reported 20 sites on NFS and BLM lands and 26 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]). These equivalent-effort surveys targeted all Category B species, including *B. pulcherrimus*, and resulted in eight new observations of individuals or populations of the species between 2010 and 2011. Additional surveys for *B. pulcherrimus* in LSRs in nearby areas resulted in three additional observations of the species. These observations have increased the number of sites documented in BLM and Forest Service records by about 20 percent. Based on the increased number of known sites since 1998 as a result of the increased number of surveys (more than 50 percent increase between 1998 and 2006 per Molina 2008 records) and considering that the species is fairly conspicuous, 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 presented below under Species Distribution.

Habitat

Boletus pulcherrimus grows in humus in association with the roots of conifers such as Douglas-fir (*Pseudotsuga menziesii*) and grand fir (*Abies grandis*), and hardwoods such as tanoak (*Notholithocarpus densiflorus*) in coastal forests (Castellano et al. 1999). Sporocarps are usually found solitary or in scattered areas, but not in groups. It has primarily been found in low- to mid-elevation old-growth coniferous forests, generally below 6,000 feet (Holthausen et al. 1994, Cushman and Huff 2007). Prior to 1994, this species had not been observed in forests that were disturbed (Holthausen et al. 1994). However, it has more recently been reported from open mixed hardwood stands with young conifers and along roadsides (Trappe, pers. comm. 2013). *Boletus pulcherrimus* may prefer specific microclimate conditions of LSOG forests, but it may not be restricted to these conditions because it is also found in open stands and disturbed settings.

Threats

Threats to *B. pulcherrimus* include disruption of stand conditions, particularly from disturbance to host trees, soil, litter, and duff (Castellano and O'Dell 1997). Logging of LSOG forests is the most serious threat. *Boletus pulcherrimus* is not collected for food because it is toxic (The Fungi of California 2010).

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 *B. pulcherrimus* along with two other species (Group 1 of Castellano and O'Dell 1997). The primary guidance is to maintain current habitat and microclimatic conditions at all known sites. 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. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *B. pulcherrimus*:

- As a mycorrhizal species, *B. pulcherrimus* 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.

2.3.3 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 *B. pulcherrimus* 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 BOPU-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 92 observations from BLM and Forest Service geodatabases were converted into 60 sites in the NSO range (region). Table BOPU-2 shows the total number of sites on NFS lands and other land ownerships across the regional, local, and analysis areas. Table BOPU-3 shows the total number of sites within each land use allocation defined in the 1994 ROD and 2016 RMP across the regional, local, and analysis areas. Figure BOPU-1 displays the regional distribution of the species across NFS lands, Figure BOPU-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure BOPU-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 NFS and BLM lands.

Location*	Number of Sites
Regional Area	60
Local Area	22
Analysis Area (Project Area)	7 (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.

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	34	14	7
BLM	18	8	-
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	12	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 BOPU-3

Distribution of *Boletus pulcherrimus* 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)	10	-	-
Congressionally Reserved (CR)	2	-	-
Late Successional Reserve (LSR)	19	10	4
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) ^{a/}	-	-	-
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	4	4	3
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	1	-	-
Congressional Reserve	-	-	-
District Designated Reserve	6	5	-
Harvest Land Base	10	7	-
Late Successional Reserve	9	3	-
Not Designated (ND)	9	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	8	4	-

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

Boletus pulcherrimus has a wide, but scattered distribution across eight physiographic provinces in Washington (Western Lowlands and Western Cascades), Oregon (Willamette Valley, Cascades East and West, and Klamath Mountains), and California (Klamath and Coast). A large cluster of sites is found in the southern Cascade Range in Oregon, where the species appears to be locally abundant, while other sites scattered across the NSO range appear to be somewhat isolated. *Boletus pulcherrimus* does not appear to be well distributed within its range in the NSO range.

Twelve of the 60 known sites in the region are at least partially on private, state, or other lands; 34 sites are at least partially on NFS lands; and 18 are at least partially on BLM lands. Sites included on National Forests that encompass the project area include 20 sites on the Fremont-Winema National Forest and eight sites on the Rogue River-Siskiyou National Forest. Sites on other National Forests include two sites on the Shasta-Trinity National Forest, two sites on the Willamette National Forest, two sites on the Six Rivers National Forest, and one site on the Mt. Baker-Snoqualmie National Forest.

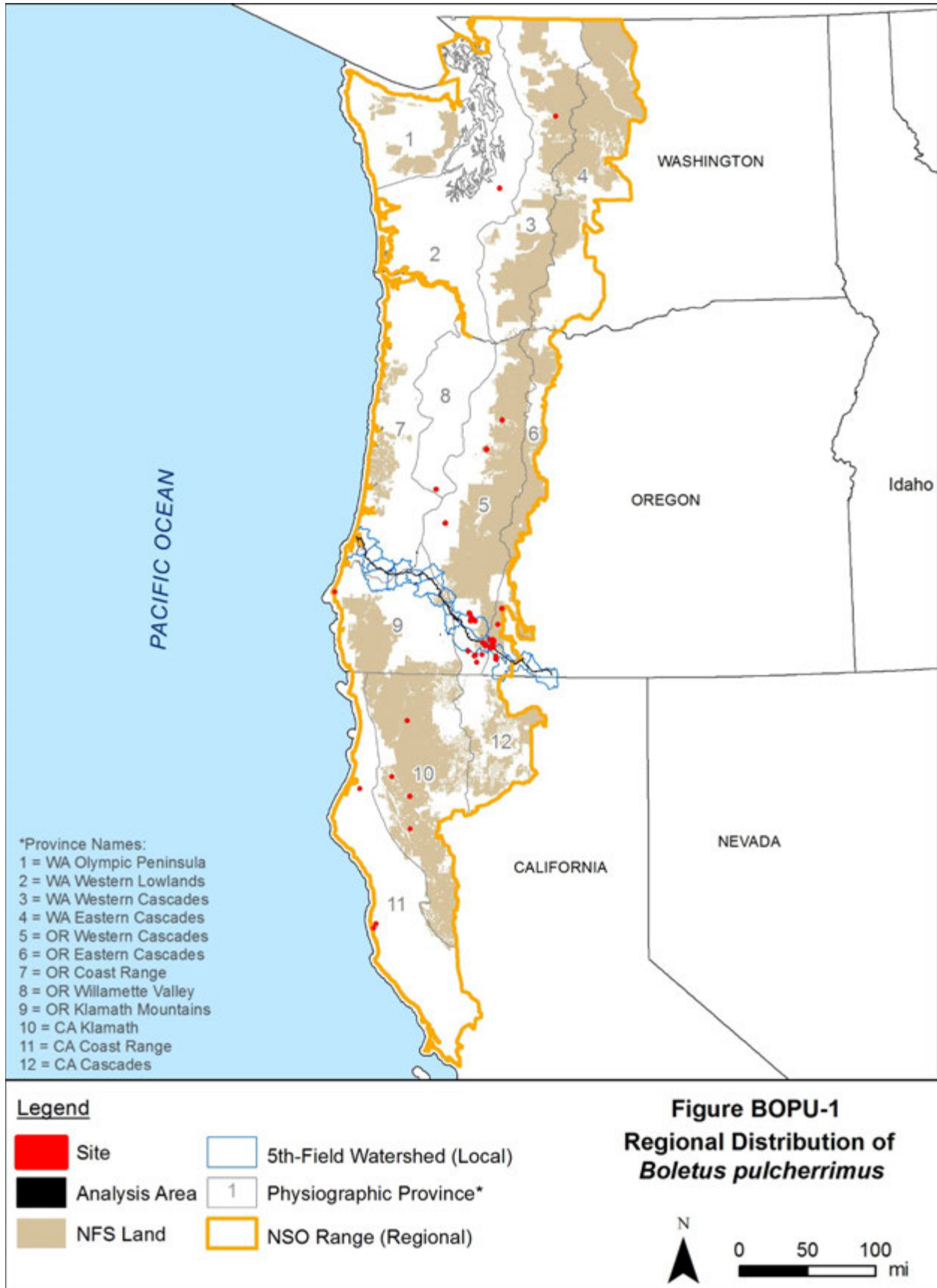
Across the NSO range, 21 sites are at least partially located in reserve lands managed the Forest Service, including 19 sites in LSRs and two sites in Congressionally Reserved areas (see Figure BOPU-2). These sites represent 62 percent of the total Forest Service-managed sites in the region. The remaining 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, eight sites are located entirely in reserve lands managed by BLM, which represents 44 percent of the total BLM-managed sites in the region. While the eight sites in BLM reserve lands are not covered

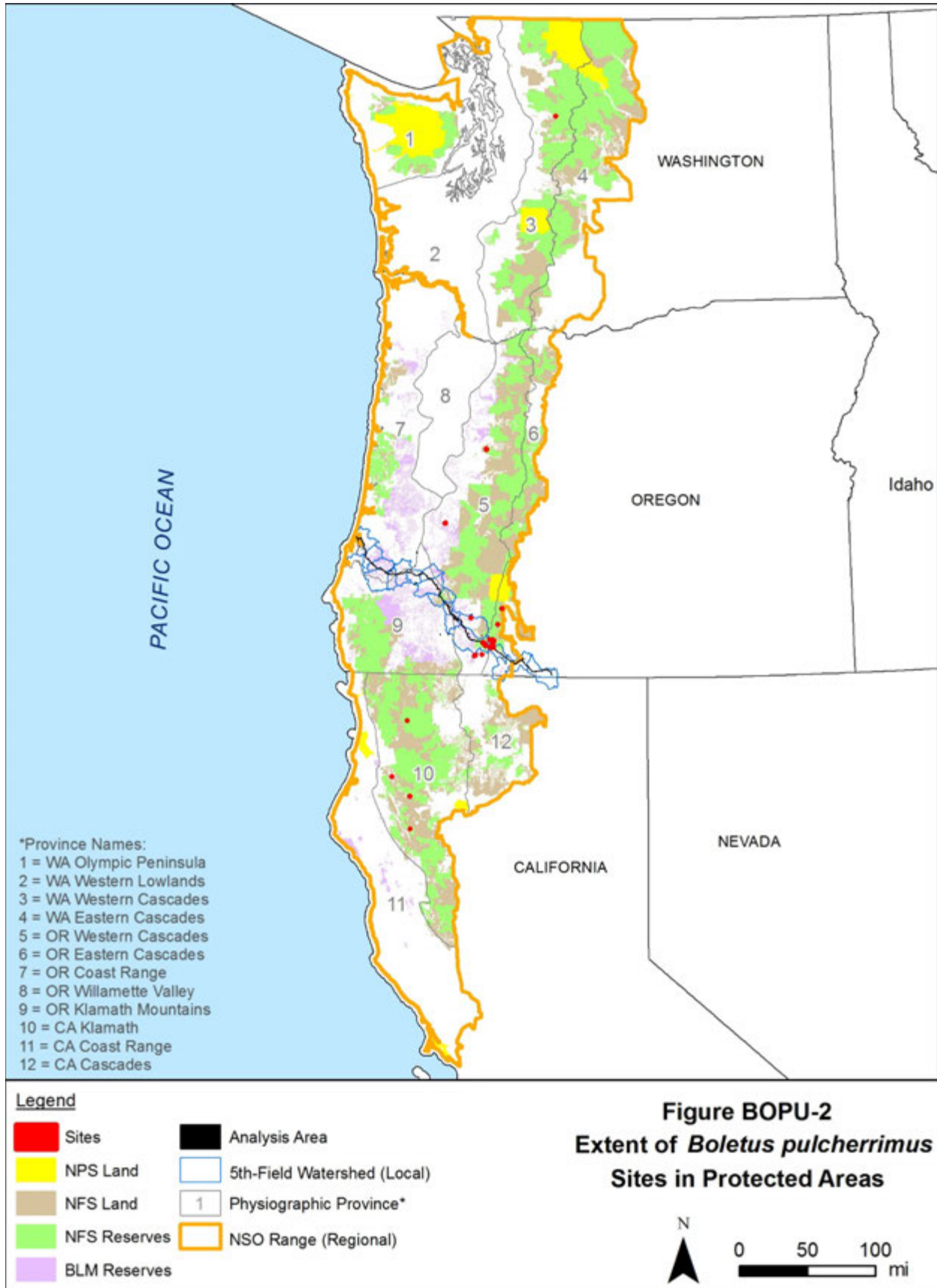
by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management.

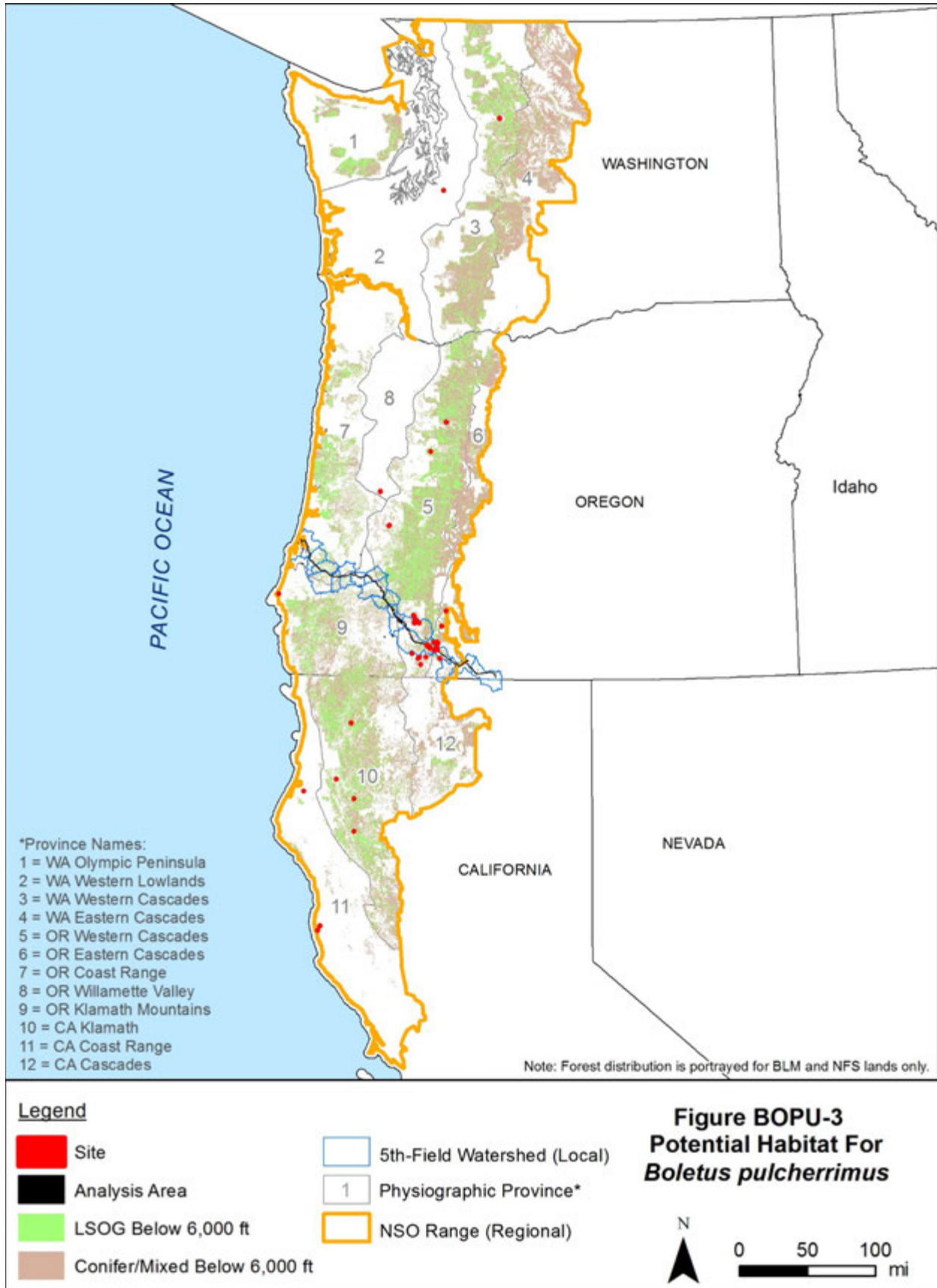
Boletus pulcherrimus is primarily found in LSOG forests based on available data (56 of 60 total sites are in LSOG) and may prefer certain microclimate conditions of these forests, but it has also been found in open stands and along roadsides. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous forests below about 6,000 feet msl throughout 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 about 6,000 feet msl, including the LSOG component of these forests within the NSO range could provide habitat for *B. pulcherrimus* 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 BOPU-4). Of this acreage, an estimated 5.9 million acres are LSOG (see Figure BOPU-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 region, LSOG forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

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.







Local Distribution

Within the local area, *B. pulcherrimus* is found in three 5th-field watersheds that overlap the project area: Little Butte Creek, Big Butte Creek, and Spencer Creek (see Table BOPU-5 and Figure BOPU-4). The sites are relatively close to one another in the Cascade Range. Several sites are located to the north and south in the regional vicinity, and dispersal opportunities appear to be available between the local sites and other sites in the region. The cluster of sites in the local area is part of the largest abundance of sites in the region (the southern Cascade Range in Oregon).

Fourteen out of the 22 sites are in the local area are on NFS lands in the Rogue River-Siskiyou and Fremont-Winema National Forests. Ten of these sites are entirely in LSRs, including all of the sites in the Little Butte Creek watershed and two of the sites in the Spencer Creek watershed. The remaining eight sites in the local area are located on BLM lands, one of which is entirely in BLM reserves (LSRs).

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	7	7	5
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)	8	8	-
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)	7	2	1
Trail Creek (804)	-	-	-
Upper Cow Creek (801)	-	-	-

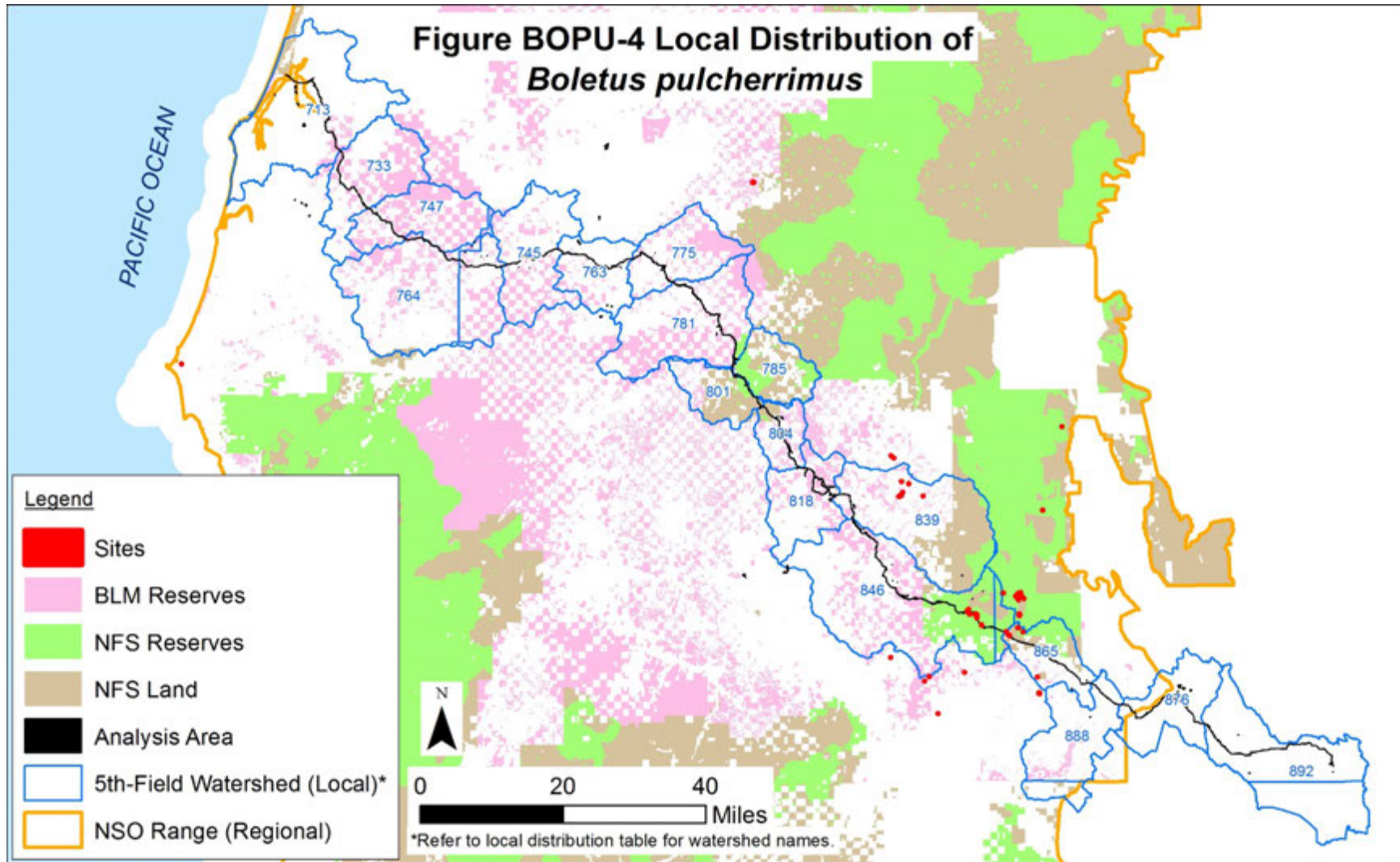
Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
 Note: Number of sites in reserves may include sites that are only partially in reserves.

Coniferous 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).

Analysis/Project Area Distribution

The analysis area contains seven *B. pulcherrimus* sites and the project area contains five sites. The seven analysis area sites are on NFS lands in the Little Butte Creek and Spencer Creek 5th-field watersheds. Four of the sites are entirely in LSRs, and the other three sites are on lands designated as Other (Matrix).

Surveys for the PCGP Project resulted in 18 total observations of *B. pulcherrimus* in 15 locations in or near the project area during 2010–2011 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). An estimated 13 of these recorded observations comprise the seven sites in the analysis area; the other observations are in sites outside the analysis area. Within the project area, seven sites are between MPs 161 and 169.



Project Impacts

Analysis

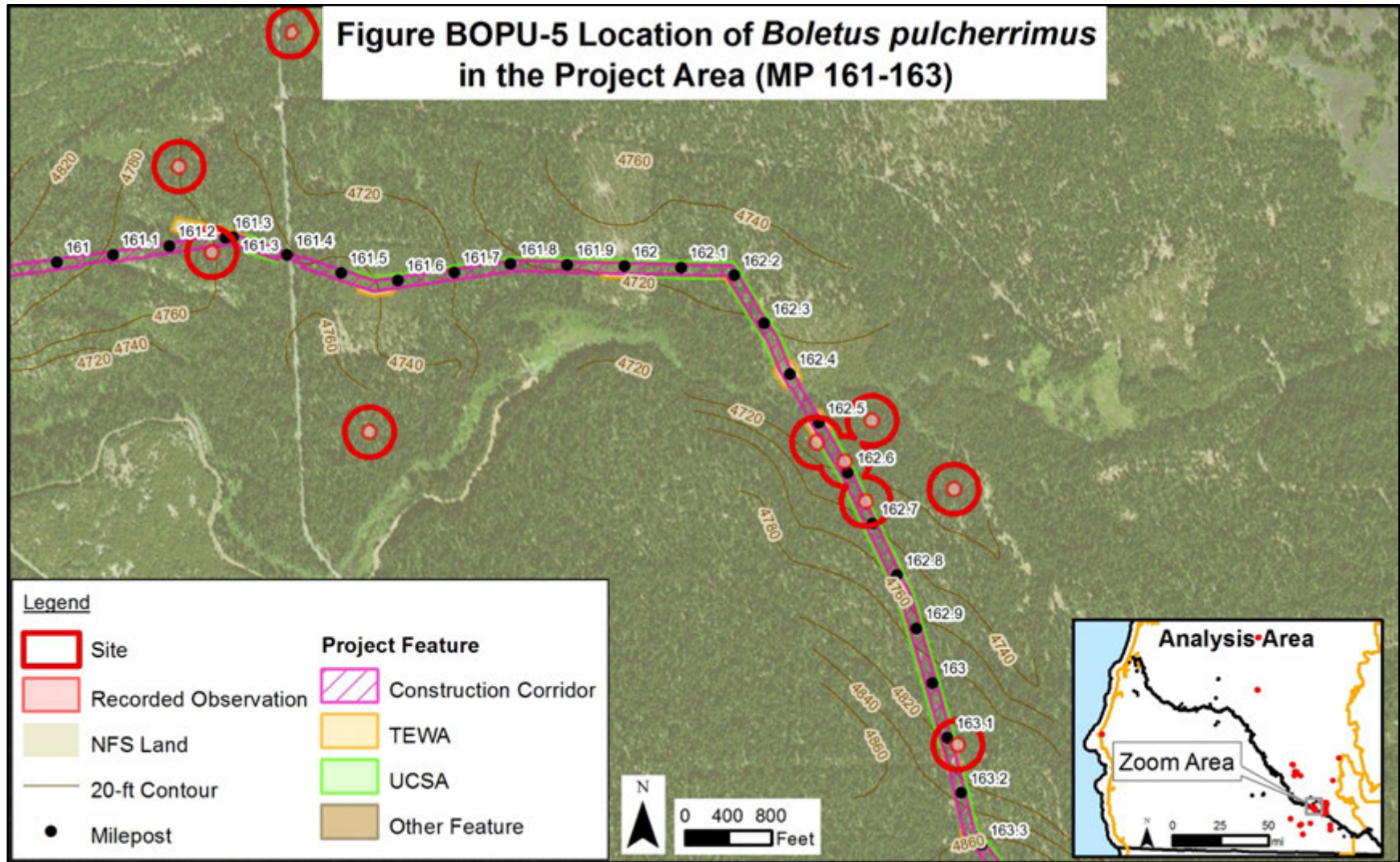
The PCGP Project would affect seven out of the 34 NFS sites in the region, representing approximately 21 percent of the NFS sites, or seven out of 60 total sites on all lands in the NSO range. Table BOPU-6 provides an overview of the features of the PCGP Project that would affect the *B. pulcherrimus* sites on NFS lands. The construction corridor and associated work and storage areas would affect approximately 10.2 acres (27 percent) of the sites (the sites encompass 38 acres), with some sites experiencing greater impacts than others (see Figures BOPU-5, BOPU-6, and BOPU-7). 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 *B. pulcherrimus* in and near the project area. Due to the proportion of sites affected, the effects on seven sites could potentially alter the distribution of the species in the NSO range if site persistence is affected.

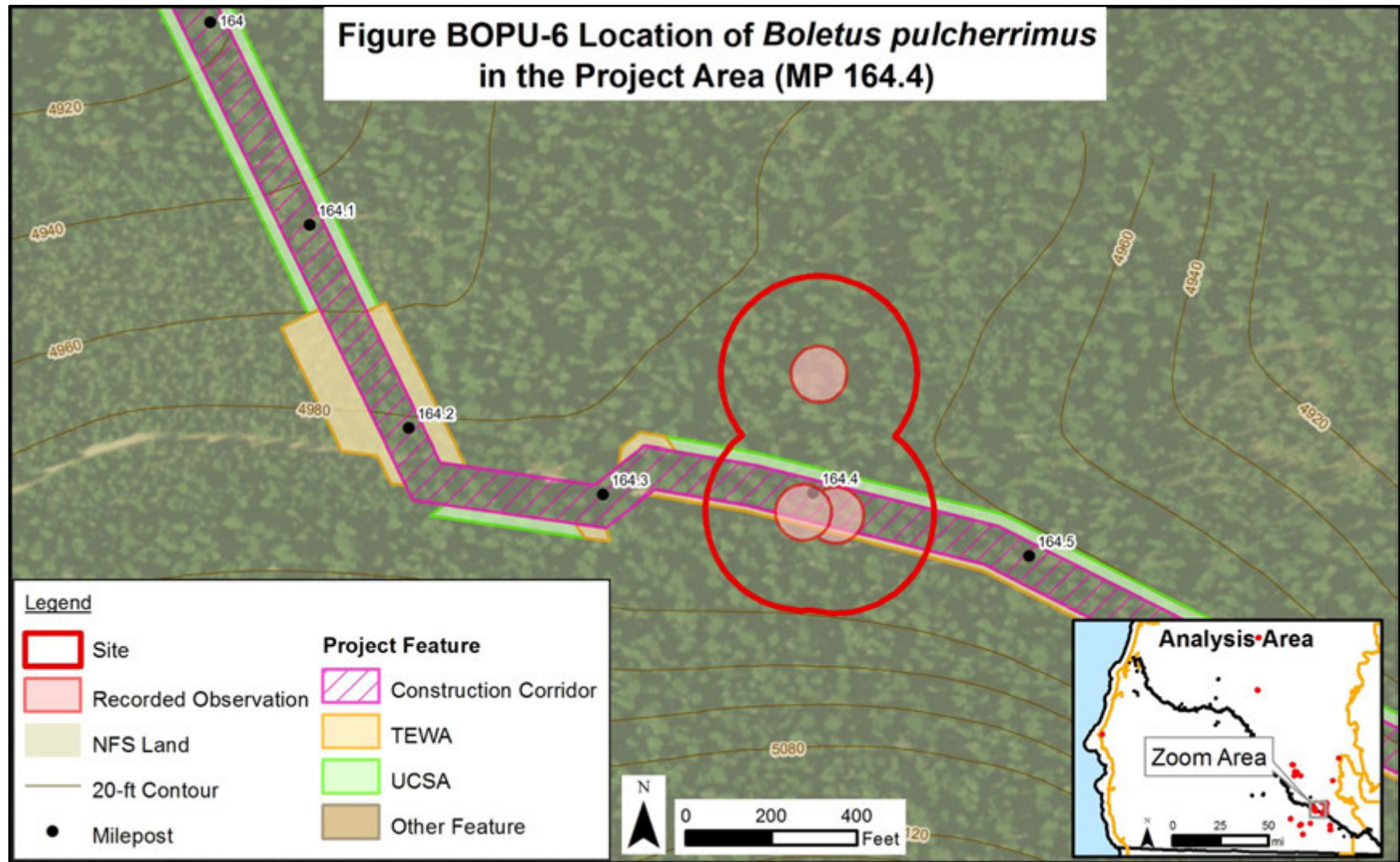
The following discussion provides an overview of the types of impacts that would be expected at the sites based on the features of the PCGP Project that could affect site persistence.

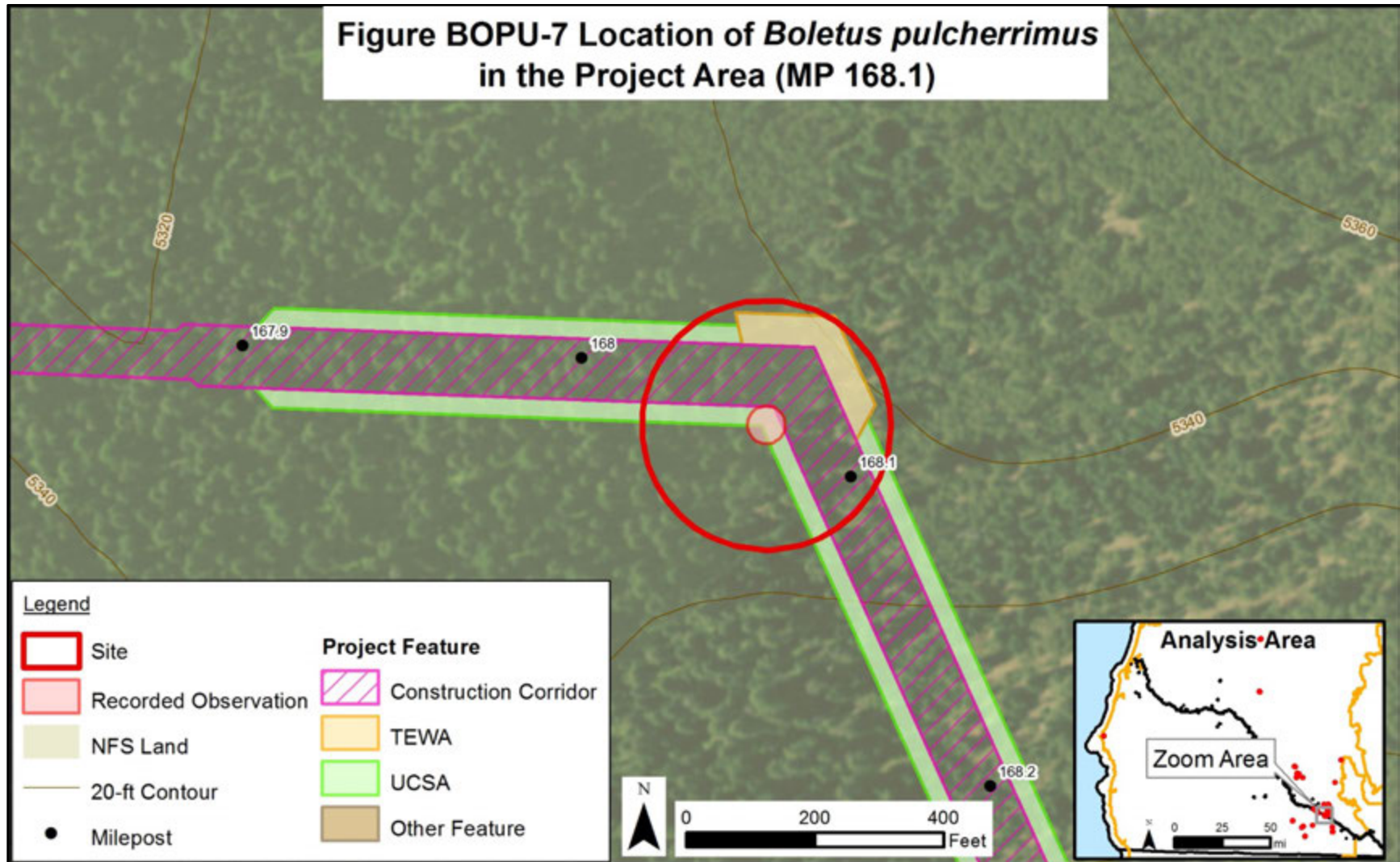
Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	5	6.4 ac
Temporary Extra Work Area (TEWA)	5	1.5 ac
Uncleared Storage Area (UCSA)	4	2.3 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

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

The PCGP Project would result in ground disturbance and vegetation removal in five out of the seven sites in the analysis area (Table BOPU-7). The only recorded observations of the species in three of the sites (MP 161.2-161.3, MP 163.1, and MP 168.1) would likely be removed by construction within the corridor (see Figures BOPU-5 and BOPU-6). The site at MP 162.5-162.7 is a large site and includes five observations, three of which are within the corridor and would likely be removed. The remaining two observations are outside the project area and would not be directly affected. The site at MP 164.4 is also a large site with three observations; two of the observations are within the corridor and would likely be removed. The third observation is outside the project area and would not be directly affected. 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.







Site Location	Source of Impacts	Area of Disturbance	Individuals Likely to Persist?
MP 161.2-161.3	Corridor	0.9 ac	No
	TEWA	0.5 ac	
MP 162.5-162.7	Corridor	2.5 ac	Yes
	TEWA	0.4 ac	
	UCSA	1.3 ac	
MP 163.1	Corridor	0.9 ac	No
	TEWA	0.2 ac	
	UCSA	0.3 ac	
MP 164.4	Corridor	1.2 ac	Yes
	TEWA	0.2 ac	
	UCSA	0.3 ac	
MP 168.1	Corridor	1.0 ac	No
	TEWA	0.3 ac	
	UCSA	0.4 ac	
MP 168.7	n/a	n/a	Yes
MP 168.8	n/a	n/a	Yes

Notes: MP = milepost; ac = acres

Establishment of the 95-foot wide construction corridor and TEWAs would likely remove *B. pulcherrimus* individuals in five sites and modify microclimate conditions around individuals that are not removed. The removal of forests and host trees and disturbance to soil could negatively affect *B. pulcherrimus* in adjacent areas by removing its habitat, disturbing the roots of host trees, and affecting its mycorrhizal association with the trees, although the species appears to be somewhat resilient to edge effects in some areas (e.g., it has been found along roadsides). 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. *Boletus pulcherrimus* is not likely to persist at three of the sites because of the extent of impacts within the sites and the proximity of the recorded observations to the corridor (see Table BOPU-7). *Boletus pulcherrimus* is likely to persist at the two larger sites (MP 162.5-162.7 and MP 164.4), despite impacts to some individuals, because some observations within those sites are more than 100 feet from the corridor, where direct effects are not anticipated and indirect effects are unlikely. The site at MP 162.5-162.7 is comprised of several observations and is located in a heavily forested area on a north-facing slope. One observation within the site is located more than 300 feet northeast and downslope of the corridor and is likely to persist. The site at MP 164.4 has similar conditions, and the observation located 180 feet north and downslope of the corridor is likely to persist. A road crosses through the southern part of this site, and the corridor would follow the north side of the road where two observations have been recorded and cannot be avoided.

The two other sites in the analysis area (about 280-300 feet west of MP 168.7 and MP 168.8) are not likely to be affected by activities within the corridor or TEWAs. These sites are in a forested area on a south-facing slope, and more open forests exist to the northeast and east where the corridor and TEWAs would be located. Vegetation removal and disturbance in the project area are not expected to affect microclimate conditions in the sites based on their distance from the activities and the existing habitat conditions.

Based on this analysis, *B. pulcherrimus* is not likely to persist at three of the seven sites in the analysis area following project implementation. The four sites that are expected to persist in the analysis area are distributed across the Cascade Range in southern Oregon, and several additional sites are located in the vicinity. The species would continue to be locally abundant in the southern Cascade Range in Oregon. Two of the affected sites are in LSRs, and the third is on land designated as Other (Matrix).

Across the project area, the PCGP Project would remove an estimated 1,132 acres of coniferous and mixed hardwood-coniferous forests below 6,000 feet msl, including 244 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *B. pulcherrimus*. 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 three sites as a result of the PCGP Project, 11 sites of *B. pulcherrimus* would remain on NFS lands in the local area, including eight in reserves, and 31 sites, including 19 in reserves, would remain on NFS lands in the NSO range. Additionally, eight sites are entirely within 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 19 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 eight sites in BLM reserves would likely receive some level of protection through BLM management. Based on these site counts, approximately 61 percent of the remaining *B. pulcherrimus* sites on NFS lands in the NSO range would be protected in NFS reserves and 52 percent of the remaining sites on federal lands would be protected in either NFS reserves 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:

- *Boletus pulcherrimus* 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:

- *Boletus pulcherrimus* has a wide, but scattered, distribution across eight physiographic provinces and three states in the region and a low-moderate number of overall sites (34 on NFS lands, 60 on all lands). The species is most abundant in the southern Cascade Range in Oregon, but less abundant in other areas. The currently known number of sites on NFS and BLM lands has increased by 32 sites since 2007, with many sites documented during the PCGP Project surveys.
- An estimated 67 percent of the sites (35 sites) on federal lands are in reserves, which is an increase of 21 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 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 and Klamath Mountains, where most sites are documented.
- The PCGP Project would affect three of 34 *B. pulcherrimus* sites on NFS lands, representing approximately 9 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at three of the sites in the analysis area, a low-moderate number of sites (31) would continue to be documented on NFS lands in the region with a wide, but scattered, distribution across Washington, Oregon, and California. Several sites (11 sites) would remain in the local vicinity of the analysis area; these sites would continue to occur in two 5th-field watersheds. Additionally, eight sites would remain entirely in BLM reserves in the region, and one site 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 two sites in LSRs, and the percentage of sites on NFS lands in reserves would remain about the same (61 percent). Of the remaining sites on NFS lands, 17 are at least partially in LSRs where management actions are restricted to activities that benefit LSOG forests, and two are in Congressionally Reserved areas where management activities that may adversely affect *B. pulcherrimus* are unlikely. Additionally, eight sites are entirely within BLM reserves in the regional area, including LSRs where management actions are restricted to 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 *B. pulcherrimus* 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 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 *B. pulcherrimus*, although the potential for the habitat to be occupied varies based on the distribution of sites and the

species' specific habitat requirements. *Boletus pulcherrimus* 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.

2.3.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *B. pulcherrimus* at seven 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, 31 sites would remain on NFS lands across the region, 11 sites would remain on NFS lands in the local area, and four sites would remain in the analysis area. Although the PCGP Project would affect site persistence of *B. pulcherrimus* at three sites, these sites are part of a large cluster of 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. *Boletus pulcherrimus* would persist in the region without considering the three sites as part of the population.
- The PCGP Project would remove approximately 1,132 acres of coniferous and mixed hardwood-coniferous forests and 243 acres of LSOG 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 sites in BLM reserves are expected to receive some level of protection under BLM reserve management. 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 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 *B. pulcherrimus* 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 seven *B. pulcherrimus* 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 *B. pulcherrimus* 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.

2.4 CHOIROMYCES ALVEOLATUS

Choiromyces alveolatus is a truffle species in the Tuberaceae family and does not have a common name.

2.4.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *C. alveolatus* as a Category B (rare) species. ORBIC evaluated *C. alveolatus* 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 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) and was considered to be at moderate risk of extinction due to a restricted range, relatively few populations, recent and widespread declines, or other factors in Oregon (S2). The species is on ORBIC List 3. It is not considered a BLM Sensitive or Strategic species in Oregon, but it is considered a Forest Service Strategic species in Oregon.

2.4.2 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 *C. alveolatus*. It is presumed to be ectomycorrhizal, forming symbiotic associations with the roots of conifer trees for translocation of minerals, water, and nutrients (Castellano and O'Dell 1997). It forms sporocarps below the soil surface (Castellano et al. 1999) and forms relatively large fruiting bodies (up to 2 inches in diameter) (ORBIC 2004). Fruiting has been documented from May through November (Castellano et al. 1999), although the species does not fruit regularly (ORBIC 2004). As with other sequestrate fungi, spore dispersal is presumed to depend on mycophagy (the consumption of fungi by small mammals) (Castellano and O'Dell 1997, Holthausen et al. 1994).

Range

Choiromyces alveolatus appears to be endemic to the western United States, where it has been found in California, Oregon, Washington, and Utah (ORBIC 2004). Based on data available in 1997, its range in the Pacific Northwest extended from the Cascade Range in Mt. Rainier National Park south to the Klamath National Forest in California (Castellano and O'Dell 1997). It also has disjunct occurrences on the Tahoe National Forest in California. 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 may have been similar to the current range, with populations distributed across western North America. It may have had more abundant local distributions across its range, but habitat modifications and other environmental factors may have reduced available habitat and further restricted the species' distribution, as discussed below under Threats.

Population Status

ORBIC (2004) reported *C. alveolatus* from less than 20 element occurrences with a patchy distribution across its range in 2004. An estimated nine of these occurrences were within the range of the NSO with four in protected areas. Most of the occurrences were in California (about 10), with fewer in Oregon (6) and Washington (1). 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 two new sites of *C. alveolatus* in the NSO range between 1998 and 2006, and 10 total sites were documented by 2006, including five in reserves or protected areas. The 2007 Final SEIS reported seven 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 *C. alveolatus*, and resulted in one new observation of the species in 2012 on the Fremont-Winema National Forest. *Choiromyces alveolatus* has not been found in high numbers during past survey efforts, although limited fungi 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 presented below under Species Distribution.

Habitat

Choiromyces alveolatus is found in mixed coniferous forests associated with various species in the Pine family, particularly noble fir (*Abies procera*), lodgepole pine, ponderosa pine, Douglas-fir, western hemlock (*Tsuga heterophylla*), and mountain hemlock (Castellano et al. 1999). Due to its underground fruiting habit, the species can grow in drier habitats such as ponderosa pine forests compared to a higher diversity of fungi which require wetter forests (Barroetaveña et al. 2007). Based on data available in 1999, the species had only been documented from elevations above 4,200 feet msl. More recent records indicate the species is found between 1,600 and 7,000 feet msl (Trappe, pers. comm. 2013). Prior to 1994, it was found in old-growth forests with abundant coarse woody debris along the forest floor (Holthausen et al. 1994).

Threats

Threats to *C. alveolatus* are actions that affect host trees and disturb the soil, such as road and trail construction, logging and fire management activities, and recreational activities (Castellano and O'Dell 1997). Fire is a lower threat to this species because it is found in cool, wet habitats that are less susceptible to fire. 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 *C. alveolatus* with several other species (Group 4 of Castellano and O'Dell 1997). The primary guidance is to maintain habitat and microclimatic conditions at all known sites; minimize soil disturbance at or around known sites; and prevent the removal of host trees. The known locations of the species on federal lands 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 *C. alveolatus*:

- As a mycorrhizal species, *C. alveolatus* 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.

2.4.3 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. alveolatus* 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 CHAL-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 23 observations from BLM and Forest Service geodatabases were converted into 21 sites in the NSO range (region). Table CHAL-2 shows the total number of sites on NFS lands and other land ownerships across the regional, local, and analysis areas. Table CHAL-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 CHAL-1 displays the regional distribution of the species across NFS lands, Figure CHAL-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure CHAL-3 displays the species' regional distribution as well as the extent of coniferous and LSOG coniferous forests below 7,000 feet on BLM and NFS lands within the currently known range of the species.

TABLE CHAL-1	
Number of <i>Choiromyces alveolatus</i> Sites (2017)	
Location*	Number of Sites
Regional Area	21
Local Area	3
Analysis Area (Project Area)	1 (0)

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 CHAL-2			
Distribution of <i>Choiromyces alveolatus</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	17	2	1
BLM	1	1	-
NPS	1	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	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 CHAL-3			
Distribution of <i>Choiromyces alveolatus</i> 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)	1	-	-
Congressionally Reserved (CR)	1	-	-
Late Successional Reserve (LSR)	10	1	-
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) a/	-	-	-
Managed Late Successional Area (MLSA)	2	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	6	1	1
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressionally Reserved	-	-	-
District Designated Reserve	-	-	-
Harvest Land Base	1	1	-
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

Choiromyces alveolatus is somewhat widely distributed across six physiographic provinces in Washington (Western Cascades), Oregon (Coast Range, Cascades East and West), and California (Klamath and Cascades), despite a low overall number of sites (see Figure CHAL-1). Most sites are found along the Cascade Range, with scattered sites located in the Coast Range in Oregon and

Klamath Mountains in California. A few of the sites are clustered and near other sites in the Cascade Range, but most sites appear isolated across the region. *Choiromyces alveolatus* does not appear to be well distributed within its range in the NSO range.

Two of the 21 sites are located on private, state, or other lands; one site is on NPS land (Mount Rainier National Park); one site is on BLM land, and the remainder (17) are on NFS lands across the region. Sites included on National Forests that encompass the project area include one site on the Rogue River-Siskiyou National Forest, one site on the Umpqua National Forest, and two sites on the Fremont-Winema National Forest. Sites included in other National Forests include six sites on the Klamath National Forest, one site on the Willamette National Forest, two sites on the Deschutes National Forest, four sites on the Mt. Hood National Forest, and one on the Shasta-Trinity National Forest.

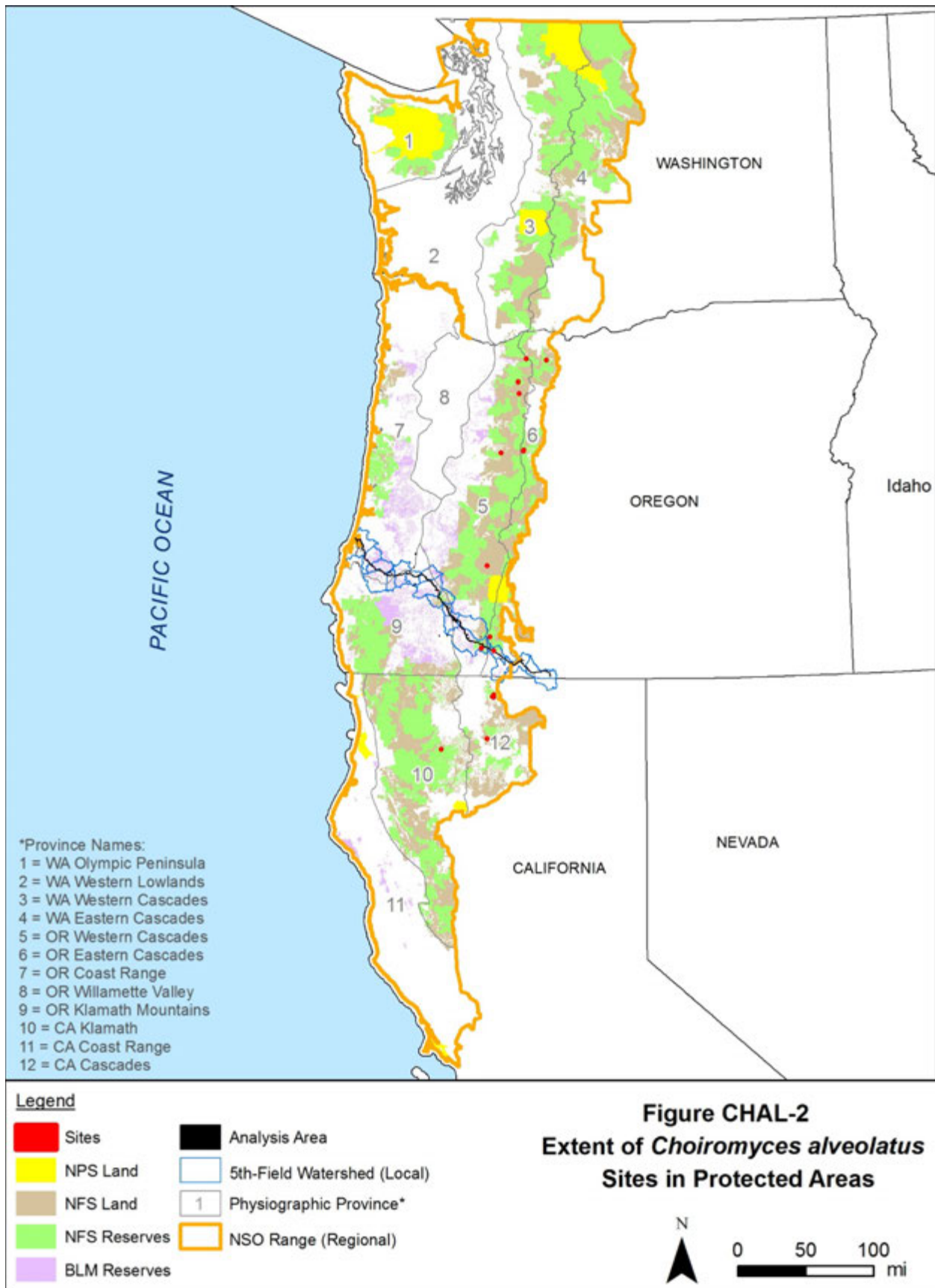
Across the NSO range, 11 sites are at least partially located in reserve lands managed by the Forest Service, including 10 sites in LSRs and one site in a Congressionally Reserved area (see Figure CHAL-2). These sites represent 65 percent of the total NFS sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. The NPS site, while not covered by the S&M Standards and Guidelines, likely receives some degree of protection based on National Park management. The site on BLM land does not occur in reserves and is likely not protected under the 2016 RMPs.

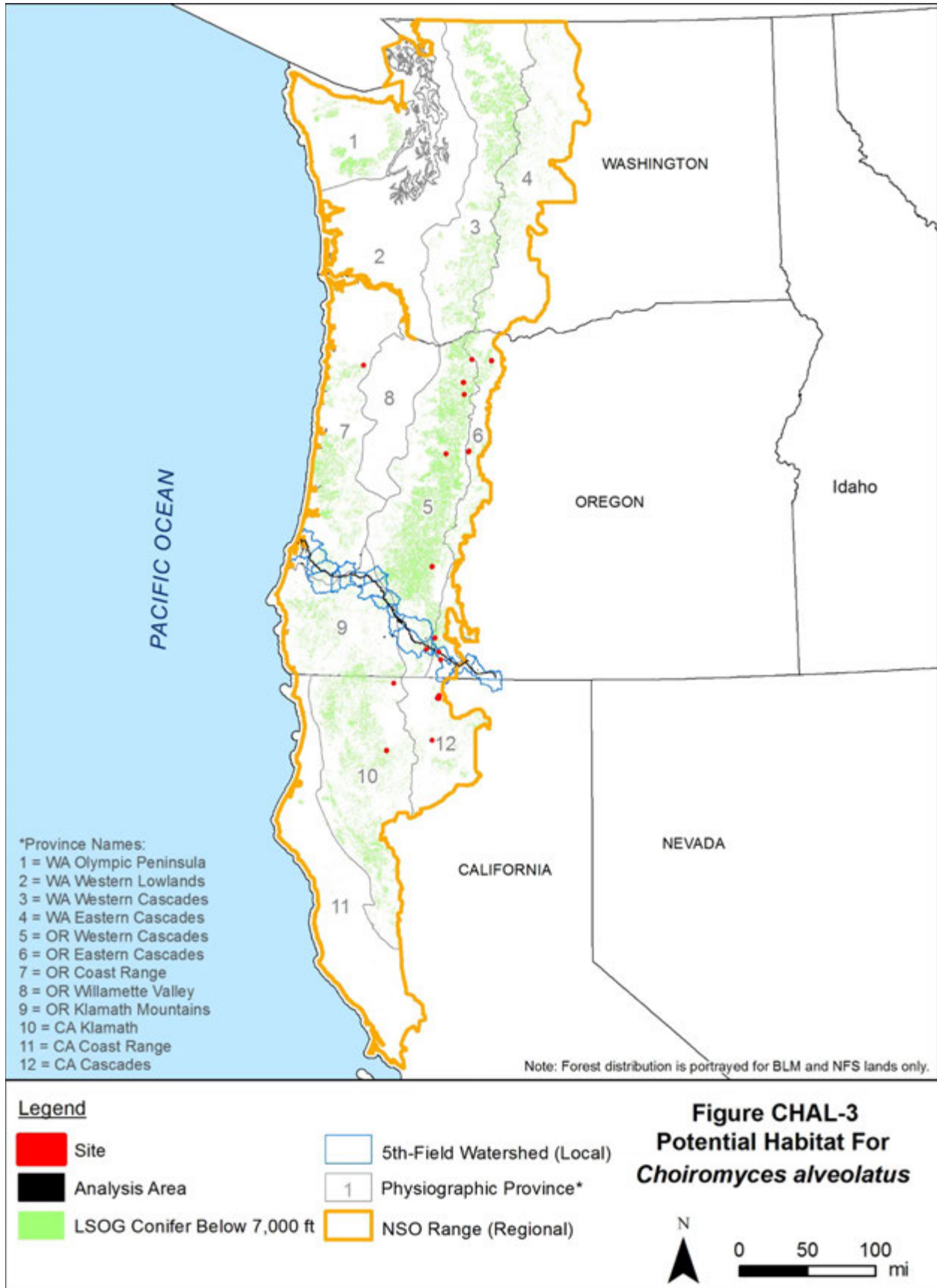
Choiromyces alveolatus is primarily found in LSOG forests based on available data (16 of 21 total sites are in LSOG), and may be restricted to specific microclimate conditions of these forests. Based on current site locations, the species is found in coniferous forests between about 2,000 and 6,200 feet msl and has only been found 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 lands, both land ownerships are included in this potential habitat discussion. LSOG coniferous forests in the NSO range could provide habitat for *C. alveolatus* and support additional sites. These forests encompass an estimated 5 million acres on BLM and NFS lands (see Figure CHAL-2 and Table CHAL-4), including 3.3 million acres in reserve land allocations (66 percent of the forests). LSOG coniferous forests below 7,000 feet msl are somewhat widespread across the region, particularly along the Cascade Range and Klamath Mountains. Younger coniferous 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 species' range (see Figure CHAL-3 and Table CHAL-4).

Location	Coniferous Forests below 7,000 feet		LSOG Coniferous Forests below 7,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	16,159,634	9,809,594	5,014,903	3,331,280
Local Area	452,942	284,057	161,625	116,952
Project Area	1,023	691	298	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.







Local Distribution

Within the local area, *C. alveolatus* is found in two 5th-field watersheds (Little Butte Creek and Spencer Creek) that overlap the project area (see Table CHAL-5 and Figure CHAL-4). Two of the sites are on NFS lands (Little Butte Creek and Spencer Creek) and the third is on BLM land (Spencer Creek). The Spencer Creek site on NFS land is designated as Other (Matrix) and the Little Butte Creek site is entirely in an LSR. These sites are in the western and eastern Cascade Range and are within 10 miles of one another and other sites to the north in the Cascade Range. Another group of sites are located approximately 25 miles to the south of the local sites, also in the Cascade Range. Connectivity may be available between the local sites and the other sites in the Cascade Range based on the extent of forests that may provide suitable habitat, and the ability of animals to transport spores across suitable habitat.

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)	2	-	-
Trail Creek (804)	-	-	-
Upper Cow Creek (801)	-	-	-

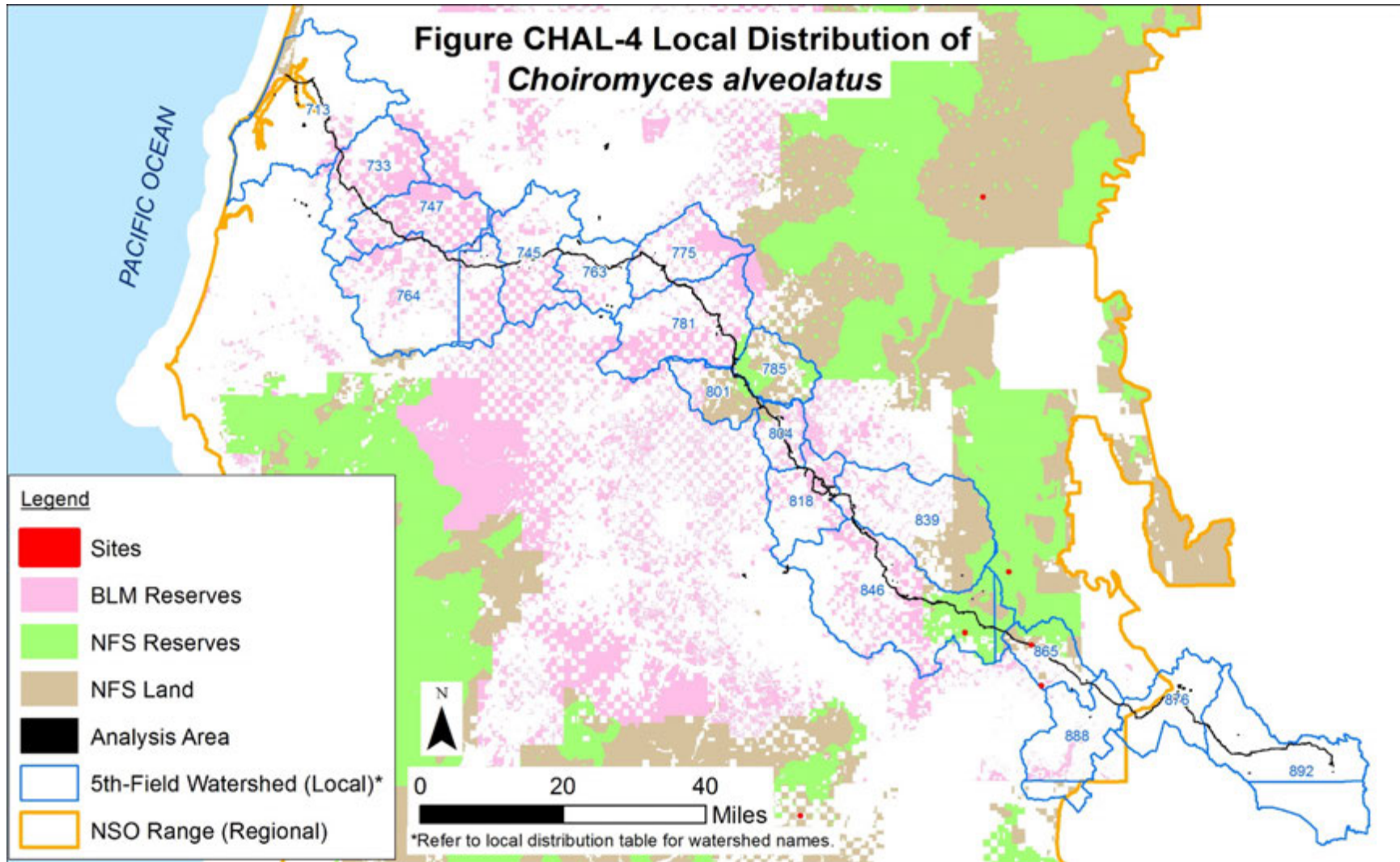
Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011

LSOG coniferous forests below 7,000 feet msl encompass approximately 161,625 acres on BLM and NFS lands in the local area, including 116,952 acres in reserve land allocations (72 percent of the forests). Forests that may provide suitable habitat are primarily found in the Cascade and Coast Ranges (see Figure CHAL-2), and other sites may be located in these mountain ranges in areas that have not been previously surveyed.

Analysis/Project Area Distribution

The analysis area contains one site of *C. alveolatus*, and the site is entirely outside the project area. This site is on NFS land designated as Other (Matrix) in the Spencer Creek watershed, as described in the Local Distribution discussion above.

Surveys for the PCGP Project resulted in one observation of *C. alveolatus* in the survey area during summer 2012 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). This recorded observation was between MP 172.1 and 172.2 and comprises the single site in the analysis area.



Project Impacts

Analysis

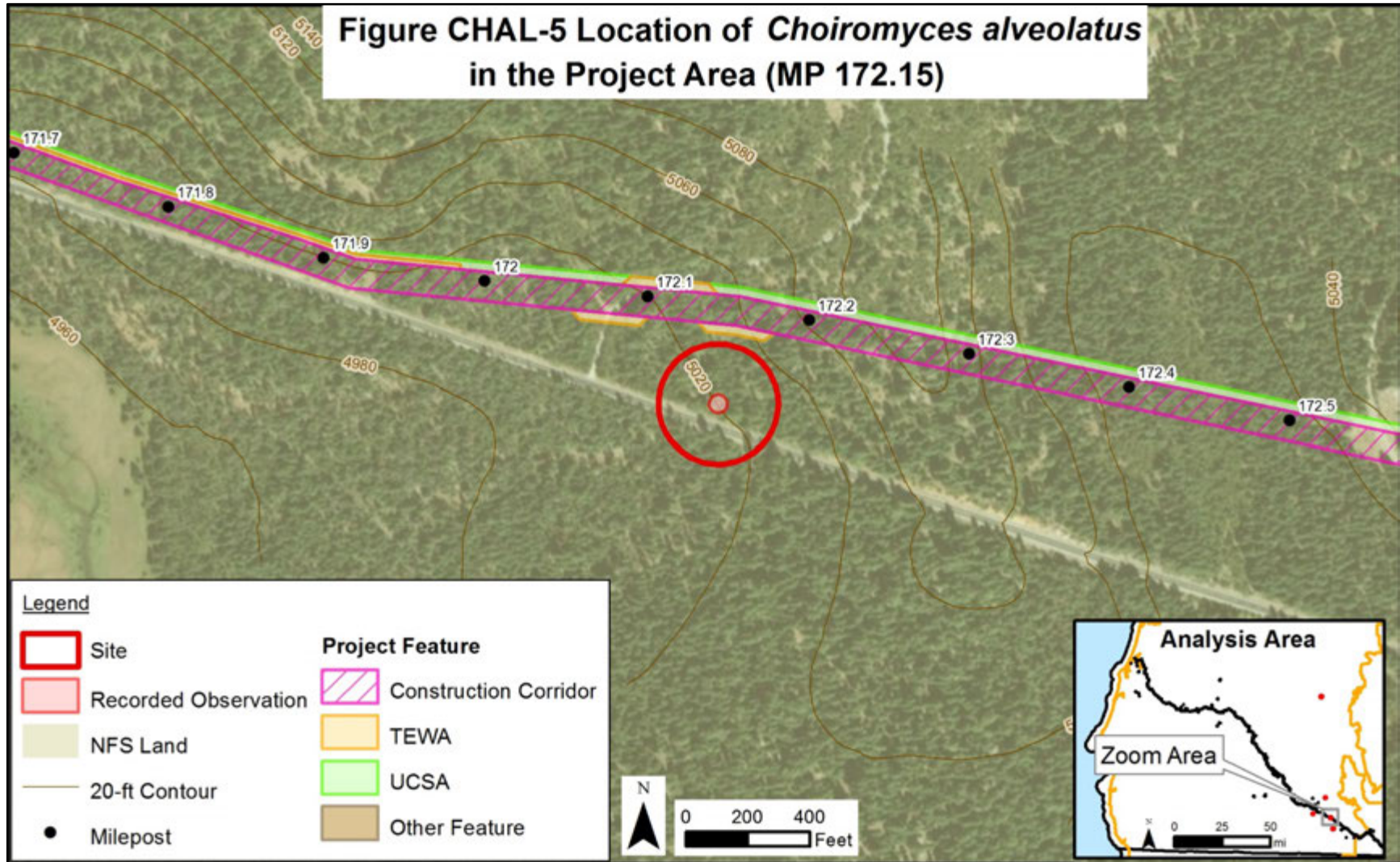
The PCGP Project would affect one out of the 17 NFS sites in the region, representing approximately 6 percent of the NFS sites (or one out of 21 total sites on all lands in the NSO range). Due to the low number of overall sites of *C. alveolatus*, the effects on one site could potentially alter the distribution of the species in the NSO range if site persistence is affected.

This 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.

Across the project area, the PCGP Project would remove an estimated 809 acres of LSOG coniferous forests below 7,000 feet msl. These impacts would result in a reduction of habitat that may be suitable for *C. alveolatus*. Within this impact area, about 115 acres (14 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, resulting in a loss of about 60 acres of coniferous forests below 7,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests below 7,000 feet msl across the species range.

Due to conclusions made in previous persistence analyses (North State Resources 2014), the PCGP Project alignment was moved approximately 150 feet north to avoid direct impacts to the single site in the analysis area. Establishment of the currently proposed 95-foot wide construction corridor and associated storage areas would disturb vegetation and soils about 200 feet from the observation within the site. The *C. alveolatus* original observation is downslope of the edge of the project area in a heavily wooded area (Figure CHAL-5), where direct effects would not occur and indirect effects are unlikely. The establishment of the corridor could adversely modify microclimate conditions adjacent to the site. The removal of forests and host trees and disturbance to soil could negatively affect *C. alveolatus* by removing its habitat, disturbing the roots of host trees, and affecting its mycorrhizal association with the tree; however, due to the distance away from the project area, individuals within the site are expected to persist despite nearby changes to the species' habitat. 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. Measures outlined 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 *C. alveolatus* near the project area.

Based on this analysis, *C. alveolatus* is likely to persist at the site following project implementation. Due to the low number of overall sites and its scattered distribution, all sites are likely required for the species to persist. The sites in southern Oregon may be important for dispersal of the species between other sites to the north and south in the Cascade Range and sites to the southwest in the Klamath Mountains in California. Despite impacts to habitat near the site, *C. alveolatus* would still be found in the Cascade Range in Oregon, and dispersal into the southern portion of the NSO range would still be possible.



Discussion

Given site persistence would be maintained at the single site in the analysis area, two sites of *C. alveolatus* would remain on NFS lands in the local area, including one entirely in reserves, and 17 sites, including 11 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 management recommendations for the species with regard to agency-related actions. The 11 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 65 percent of the *C. alveolatus* 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:

- *Choiromyces alveolatus* 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:
 - Although *C. alveolatus* is somewhat widely distributed across six physiographic provinces and three states in the region, the total number of sites is low (17 on NFS lands, 21 sites on all lands). *Choiromyces alveolatus* does not appear to be well distributed in any part of its range because sites are scattered and its distribution is spotty. However, the currently known number of sites on NFS and BLM lands has increased by five sites since 2007, with one site documented during the PCGP Project surveys.
 - An estimated 57 percent of the sites (11 sites) on federal lands are in reserves, which is an increase of six site in reserves since 2006 per Molina (2008).
- LSOG coniferous forests below 7,000 feet msl (general habitat for the species) have a somewhat wide distribution across the species’ range and encompass approximately 5 million acres on BLM and NFS lands with an estimated 66 percent in reserves. Most of the forests are found in the Cascade Range, where most sites are documented, and in the Klamath Mountains, where two sites are documented.
- The PCGP Project would affect one of 17 sites of *C. alveolatus* on NFS land, representing approximately 6 percent of the sites on NFS lands in the NSO range. However, the species is expected to persist at the site based on the analysis. Previous to this analysis, the proposed project alignment was moved 150 feet north 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.

- The PCGP Project would not affect any sites in reserves. Of the remaining sites, 10 sites are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and one is in Congressionally Reserved areas where management activities that may adversely affect *C. alveolatus* are unlikely.
- The PCGP Project would result in the permanent loss of approximately 59 acres of LSOG coniferous forests below 7,000 feet msl (less than 1 percent of the total acreage in the NSO range). An estimated 3.3 million acres (66 percent) of LSOG coniferous forests below 7,000 feet would remain in reserves in the portion of the NSO range where the species may occur. Suitable habitat for *C. alveolatus* includes a subcomponent of these forests, which may be limited based on the low number of currently known sites.
- The remaining forests could support additional populations of *C. alveolatus*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Choiromyces alveolatus* 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 strategic and other surveys, including surveys associated with the PCGP Project.

2.4.4 Conclusions

If implemented as proposed, the PCGP Project would affect habitat for *C. alveolatus* at one site on NFS lands, but *C. alveolatus* is expected to persist at the site, and the PCGP Project would not modify the distribution of the species in the NSO range. The remaining sites would continue to 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 *C. alveolatus* 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 224 acres of LSOG coniferous forests below 7,000 feet msl (a negligible amount of the forests). An estimated 51 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 3.3 million acres (66 percent) of LSOG coniferous forests below 7,000 feet msl would remain in reserves (negligible change with project implementation). 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 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 the Cascade Range, several other sites are scattered across the region and are less likely to be collectively affected by a single event.

The single site of *C. alveolatus* 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 150 feet north to avoid direct impacts to the site. Based on the above conclusions, *C. alveolatus* 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 *C. alveolatus* 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.

2.5 CLAVARIADELPHUS OCCIDENTALIS

Clavariadelphus occidentalis is a club mushroom species in the Clavariadelphaceae family and is commonly known as club coral.

2.5.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *C. occidentalis* as a Category B (rare) species. ORBIC evaluated *C. occidentalis* 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 demonstrably common, widespread and abundant within its global range (G5) and was considered to be uncommon but not rare with some cause for long-term concern due to declines or other factors in Oregon (S4). The species is not currently on any ORBIC lists. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.5.2 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 *C. occidentalis*. It is a mycorrhizal fungus that depends on host trees for nutrients (carbohydrates) (ORBIC 2004). Fruiting has been documented mostly from September through February but also occurs in May (Castellano et al. 2003). During fruiting, *C. occidentalis* produces clusters of two or three sporocarps.

Range

Clavariadelphus occidentalis is found across western North America, from Alaska to Mexico and east to Idaho and Arizona (ORBIC 2004). It is considered fairly common across its range, although its distribution within the NSO range was scattered to gregarious in 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. 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. occidentalis* from more than 200 element occurrences across its range in 2004. In the Pacific Northwest, Oregon had the highest number of occurrences with more than 60 (ORBIC 2004). California had more than 30 occurrences in 2004, and Washington had less than 10 occurrences. ORBIC estimated that 31 of the total occurrences were in protected areas in the NSO range in 2004. In 2004, *C. occidentalis* was considered to be fairly common, but population trends across its range were unknown (ORBIC 2004). The species was found in nine 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 *C. occidentalis* between 1998 and 2006, and 90 total sites were documented by 2006, including 28 in reserves or protected areas. The 2007 Final SEIS reported 66 sites on NFS and BLM lands and 80 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 *C. occidentalis*, and resulted in 15 new observations of individuals or populations of *C. occidentalis*. Additional surveys for *C. occidentalis* in LSRs in nearby areas resulted in 10 additional observations of the species. These observations have increased the number of sites documented in BLM and Forest Service records by about 20 percent. 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 currently estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Clavariadelphus occidentalis is found in coniferous and hardwood forests (ORBIC 2004). Based on data available in 1994, *C. occidentalis* was presumed to be similar to other club coral fungi, which require cool moist coniferous forests and are primarily found in LSOG forests (Holthausen et al. 1994). It may also require a well-developed humus layer and tends to be more common with increasing elevation and latitude. It grows solitary to gregarious in caespitose clusters on soil or duff in mixed hardwood-coniferous forests or hardwood forests (Castellano et al. 2003). Based on data available in 2007, all recorded observations were found below about 4,500 feet msl (Cushman and Huff 2007). *Clavariadelphus occidentalis* is considered to be fairly common (ORBIC 2004) and may prefer specific microclimate conditions of LSOG forests, but may not be restricted to these conditions.

Threats

The primary threat to *C. occidentalis* is from logging activities, which results in host tree removal and soil disturbance (ORBIC 2004). Like other club coral fungi, *C. occidentalis* is not subject to commercial harvest, but may be occasionally gathered by recreational pickers (Holthausen et al. 1994). Other specific threats to the species are not known.

Management Recommendations

As a Category B S&M species, the direction under the 2001 ROD was 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 *C. occidentalis*:

- As a mycorrhizal species, *C. occidentalis* 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.

2.5.3 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. occidentalis* 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 CLOC-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 214 observations from BLM and Forest Service geodatabases were converted into 177 sites in the NSO range (region). Table CLOC-2 shows the total number of sites on NFS lands and other land ownerships across the regional, local, and analysis areas. Table CLOC-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 CLOC-1 displays the regional distribution of the species across NFS lands, Figure CLOC-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure CLOC-3 displays the species' regional distribution as well as the extent of coniferous, mixed hardwood-coniferous, and hardwood forests, and LSOG forests below 6,000 feet msl on BLM and NFS lands.

TABLE CLOC-1	
Number of <i>Clavariadelphus occidentalis</i> Sites (2017)	
Location*	Number of Sites
Regional Area	177
Local Area	32
Analysis Area (Project Area)	6 (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 CLOC-2			
Distribution of <i>Clavariadelphus occidentalis</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	63	2	1
BLM	97	32	5
NPS	2	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	30	4	-
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 CLOC-3			
Distribution of <i>Clavariadelphus occidentalis</i> across 1994 ROD and 2016 RMPs Land Allocations			
National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	22	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	5	-	-
Congressionally Reserved (CR)	4	-	-
Late Successional Reserve (LSR)	17	-	-
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) a/	-	-	-
Managed Late Successional Area (MLSA)	1	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	16	2	1
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	7	-	-
District Designated Reserve	16	9	-
Harvest Land Base	30	14	4
Late Successional Reserve	65	22	5
Not Designated (ND)	1	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	37	10	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

Clavariadelphus occidentalis is widely distributed across 10 physiographic provinces in Washington (Western and Eastern Cascades, Olympic Peninsula), Oregon (Coast Range, Cascades East and West, Willamette Valley, and Klamath Mountain), and California (Klamath and Coast) (see Figure CLOC-1). Most sites are found along the western Cascade Range, Coast Range, and Klamath Mountains in Oregon, where the sites tend to be clustered or relatively close to one another in groups. Scattered sites are located in Washington, California, and other areas of Oregon.

Clavariadelphus occidentalis appears to be well distributed in its range in Oregon based on the abundance and size of sites, proximity of sites to one another, and distribution of the species across forests that may provide suitable habitat.

Thirty of 177 known sites are at least partially located on private, state, or other lands; two sites are on NPS lands (in Olympic and Mount Rainier National Parks); 63 sites are at least partially located on NFS lands, and 97 sites are at least partially located on BLM lands. Sites included on National Forests that encompass the project area include four sites on the Rogue River-Siskiyou National Forest and 15 sites on the Umpqua National Forest. The remaining sites on NFS lands are on the Klamath, Mt. Baker-Snoqualmie, Mt. Hood, Okanogan-Wenatchee, Shasta-Trinity, Suislaw, Six Rivers, and Willamette National Forests.

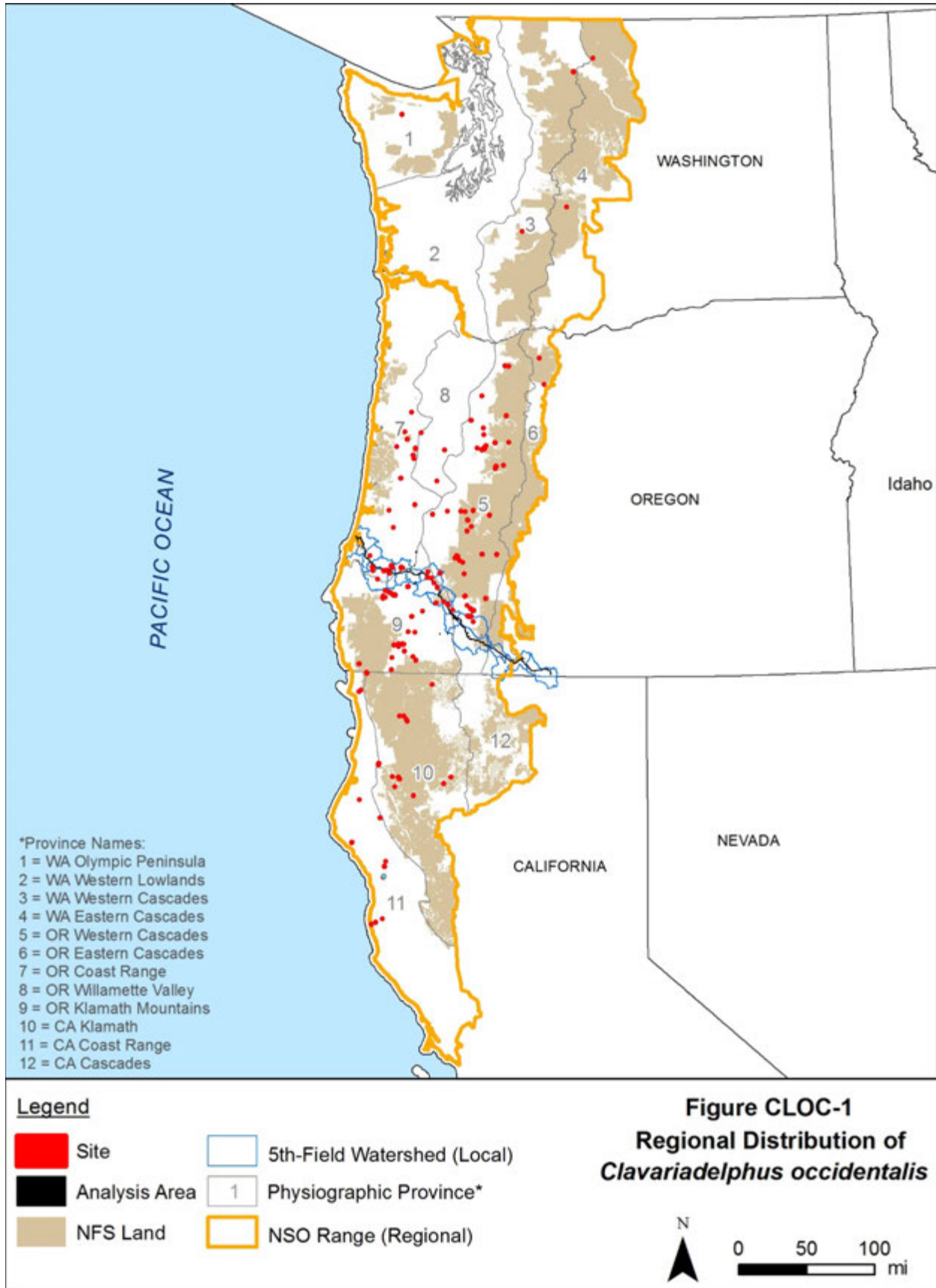
Across the NSO range, 21 sites are located entirely in reserve lands managed by the NFS, including 17 in LSRs and four in Congressionally Reserved areas (see Figure CLOC-2). These sites represent 33 percent of the total NFS-managed sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 66 sites are entirely in reserve lands managed by BLM, which represents 68 percent of the total BLM-managed sites in the region. While the 66 sites in BLM reserves and the two NPS sites are not covered by the S&M Standards and Guidelines, they likely receive some level of protection through BLM reserve management and National Park management.

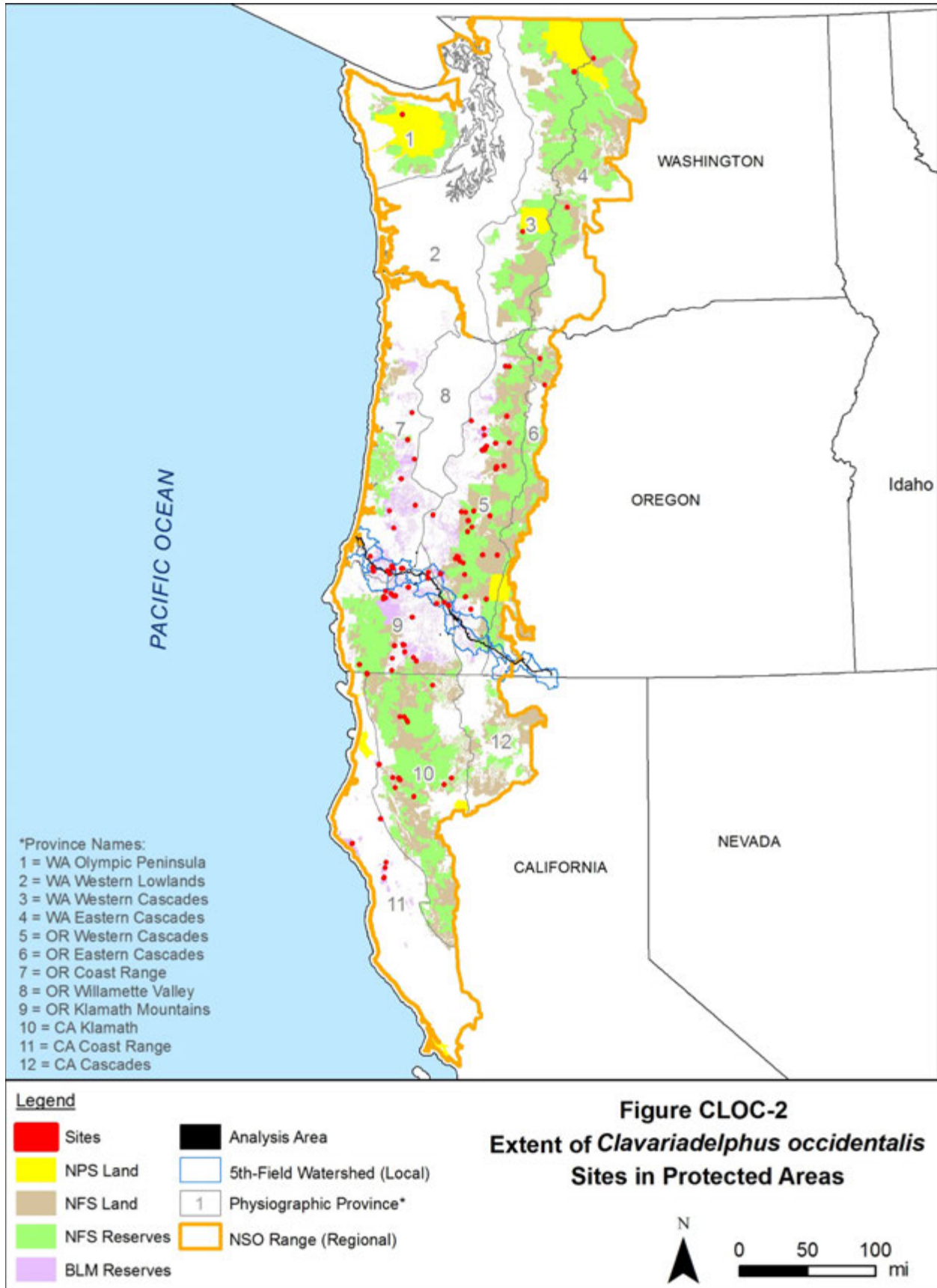
Clavariadelphus occidentalis is more common in LSOG forests based on available data (145 of 177 total sites are in LSOG), but it is also relatively common in non-LSOG forests and may not be as restricted to LSOG conditions. Based on current site locations, the species is found in all forest types below about 5,300 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 lands, 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 *C. occidentalis* 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 CLOC-4). Of this acreage, an estimated 6.1 million acres are LSOG (see Figure CLOC-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, LSOG forests are less common and primarily found in the Cascade and Coast Ranges and Klamath Mountains.

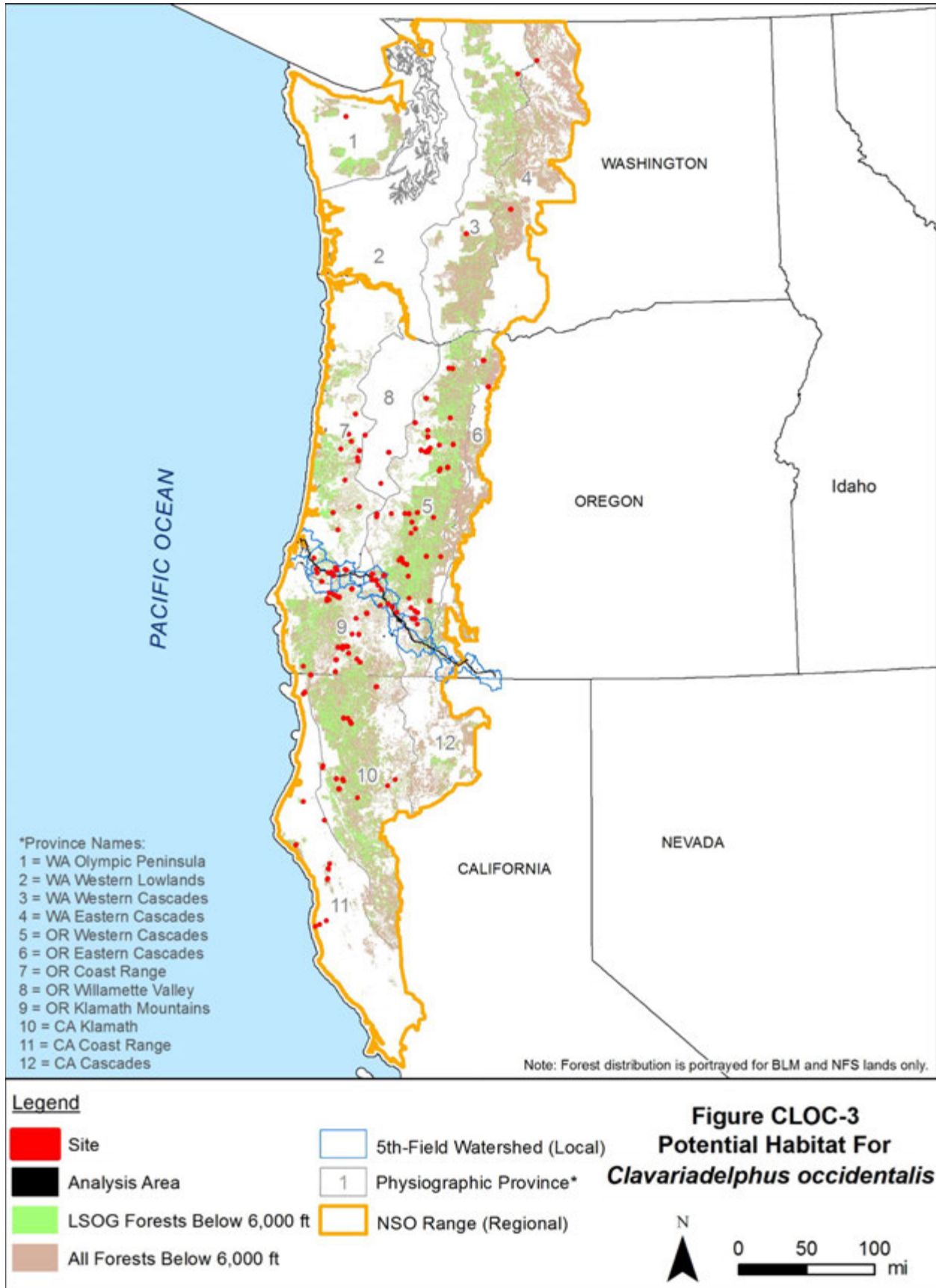
TABLE CLOC-4

Extent of Forests That Could Provide Habitat for <i>Clavariadelphus occidentalis</i> 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.







Local Distribution

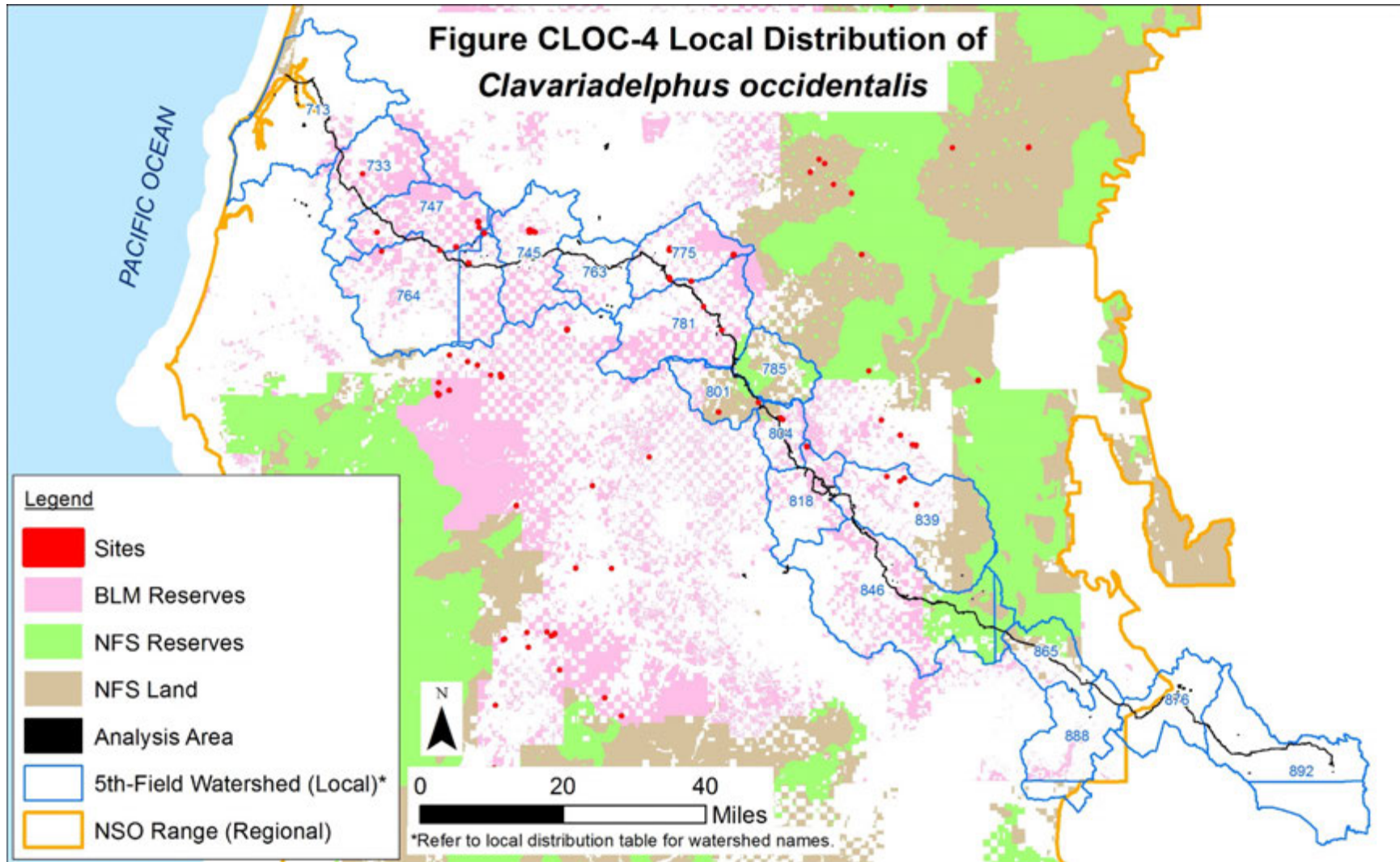
Within the local area, *C. occidentalis* is distributed across 10 5th-field watersheds that overlap the project area (see Table CLOC-5 and Figure CLOC-4). The sites tend to be clustered and near other sites within the watersheds throughout the majority of the local area. Across the watersheds, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl, and opportunities for dispersal exist within the local area and to nearby regional areas. Many regional sites are located within 20 miles to the northeast in the Cascade Range on NFS lands and within 15 miles to the south in the Klamath Mountains entirely in BLM reserves.

Of the 34 sites in the local area, two are on NFS lands designated as Other (Matrix). Four sites are partially on private lands, and 32 sites are at least partially on BLM lands. Of the 34 sites in the local area, 18 are entirely in BLM reserve lands, representing 53 percent of the local sites.

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	4		2
Coos Bay Frontal (713)	-		-
East Fork Coquille River (747)	6 <u>a/</u>		6
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)	5 <u>a/</u>		5
Middle South Umpqua River (763)	-		-
Myrtle Creek (775)	7 <u>b/</u>		7
North Fork Coquille River (733)	1		1
Olalla Creek-Lookingglass Creek (745)	4		4
Rogue River-Shady Cove (818)	1		1
South Umpqua River (781)	3 <u>b/</u>	-	3
Spencer Creek (865)	-		-
Trail Creek (804)	3		3
Upper Cow Creek (801)	2		-

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 in both East Fork and Middle Fork Coquille River watersheds.
b/ One site is in both Myrtle Creek and South Umpqua River watersheds.

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 of sites in the local area, distribution of those sites, and the extent of forests that may provide suitable habitat (see Figures CLOC-2 and CLOC-3).



Analysis/Project Area Distribution

The analysis area contains 6 sites while the project area contains 5 sites of *C. occidentalis*. These sites are distributed across five 5th-field watersheds in the central and western portions of the analysis area in three general areas (East Fork/Middle Fork Coquille River watersheds, Myrtle Creek/South Umpqua River watersheds, and Trail Creek watershed). The sites appear to be clustered and near one another within each area. Many sites are also located within the immediate vicinity of the analysis area (see Local Distribution), including several within 10 miles.

One site is located on NFS lands in the analysis area on lands designated as Other (Matrix). One of the five sites on BLM lands in the analysis area is located entirely in BLM reserves (LSR and Riparian Reserves).

Surveys for the PCGP Project resulted in 44 total observations of the species in 40 locations in or near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). An estimated six of these recorded observations comprise six sites in the analysis area; the other observations are in sites outside the analysis area or were affected by the Stout's fire. Within the project area, the sites are at MP 41.9, MP 90.0, MP 95.4, and MP 109.7. The remaining two sites are near road improvement areas outside the project corridor in the vicinity of MP 114.1.

Project Impacts

Analysis

The PCGP Project would affect one out of the 63 sites on NFS lands in the region, representing approximately 2 percent of the NFS sites. The PCGP Project may also affect another five sites on BLM lands. The total number of sites affected is six sites out of the 177 total sites on all lands. The site on NFS lands would not be directly affected by the project, as it is outside the project area but within the analysis area. 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 *C. occidentalis* 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.

Across the project area, the PCGP Project would remove an estimated 1,132 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl, including 243 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *C. occidentalis*. 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, 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 site on NFS lands as a result of the PCGP Project, one *C. occidentalis* site would remain on NFS lands in the local area, and 62 sites, including 21 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 PCGP project may also affect five sites on BLM lands. Assuming site persistence cannot be maintained, 27 sites, including 17 entirely in reserves, would remain on BLM lands in the local area and 92 sites, including 65 entirely in reserves would remain on BLM lands in the NSO range. While the sites on BLM lands are not subject to S&M Standards and Guideline protections, sites entirely in reserves would likely receive some level of protection under BLM reserve management.

Based on these site counts, approximately 33 percent of the remaining *C. occidentalis* sites on NFS lands in the NSO range would be protected in reserves and 54 percent of 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:

- *Clavariadelphus occidentalis* 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:
 - *Clavariadelphus occidentalis* has a wide distribution across 10 physiographic provinces and three states in the region and a moderate-high number of overall sites (63 on NFS lands and 177 on all lands). The species appears to be well distributed in the western Cascade Range in Oregon and is locally abundant in parts of the Klamath Mountains and Coast Range. The currently known number of sites on NFS and BLM lands has increased by 94 sites since 2007, with many sites documented during the PCGP Project surveys.
 - An estimated 33 percent of the NFS sites (21 sites) are in NFS reserves, while an estimated 554 percent of the sites on federal land (87 sites) are in reserves designated by NFS or BLM.
- 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 PCGP Project would affect one of 63 *C. occidentalis* 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 site, a moderate-high number of sites (62) would remain on NFS lands in the region with a wide distribution across Washington, Oregon, and California. One site would remain on NFS lands in the local vicinity of the analysis area and 17 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 would be similar to the currently documented distribution and range.
- The PCGP Project would affect five sites that are at least partially on BLM lands. Assuming site persistence cannot be maintained at the five sites, 27 sites would remain on BLM lands in the local area, including 17 entirely in reserves. These sites would continue to be distributed across 10 5th-field watersheds. The BLM reserve allocations that contain sites in the local area includes 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 that benefit LSOG forests; and Designated Reserves where management activities that may adversely affect *C. occidentalis* are unlikely.
- The PCGP Project would not affect site persistence at sites in NFS LSRs, and the percentage of sites in NFS reserves in the NSO range would remain at 33 percent. Seventeen sites are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, and four are at least partially in Congressionally Reserved areas where management activities that may adversely affect *C. occidentalis* are unlikely.
- The PCGP Project would result in the permanent loss of an estimated 246 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 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. occidentalis*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Clavariadelphus occidentalis* 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.

2.5.4 Conclusions

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

- With project implementation, 62 sites would remain on NFS lands across the region, and one site would remain on NFS lands in the local area. Additionally, 29 sites would remain on BLM lands in the local area, including 17 sites in reserves. The PCGP Project would affect site persistence of *C. occidentalis* at one site on NFS lands. Except for the single site remaining on NFS lands in the Klamath Mountains in the local area, the nearest NFS sites are located 15 miles to the northeast in the Cascade Range in Oregon and 60 miles to the south in the Klamath in California. Sites on BLM lands are much more abundant in the vicinity of the analysis area, and many sites are distributed across the Coast Range, 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 remaining on BLM lands in the local area (27) with a large proportion of sites entirely in BLM reserves (63 percent), it is presumed 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. *Clavariadelphus occidentalis* would persist in the region without considering the three sites as part of the population.
- The PCGP Project would remove approximately 1,132 acres of coniferous, mixed hardwood-coniferous, and hardwood forests and 243 acres of LSOG 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 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 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 sites in BLM reserves would likely receive some level of protection under the BLM 2016 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. occidentalis* 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 *C. occidentalis* 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 *C. occidentalis* 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.

2.6 CLAVARIADELPHUS SACHALINENSIS

Clavariadelphus sachalinensis is a club coral mushroom species in the Clavariadelphaceae family and does not currently have a common name.

2.6.1 Regulatory Status and Ranking

The 2001 ROD, including the 2003 NSR modifications to the S&M species list, identifies *C. sachalinensis* as a Category B (rare) species. ORBIC evaluated *C. sachalinensis* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and again in the 2013 update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2013). In 2013, the species was considered to be demonstrably common, widespread and abundant within its global range (G5) and was considered to be 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 was not included in the most recent ORBIC list (ORBIC 2016). It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.6.2 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 *C. sachalinensis*. It is a mycorrhizal fungus that depends on host trees for nutrients (carbohydrates) (ORBIC 2004). The mushroom has been documented fruiting from June through October (Castellano et al. 2003) and has a conspicuous and relatively large, brightly colored, and unusually shaped fruiting body (Holthausen et al. 1994). Fruiting may consist of a single basidiocarp, but more often contains between three and six basidiocarps.

Range

Clavariadelphus sachalinensis is widespread across Europe, Asia, and North America (ORBIC 2004). It is found in most Canadian provinces, Japan, Sweden, and several states in the United States. In the Pacific Northwest, it occurs from Mendocino County in California to the North Cascades in Washington and into Canada. This species has been considered common across its global range. 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 *C. sachalinensis* from approximately 183 element occurrences worldwide in 2004. An estimated 35 of these occurrences were in California, Oregon, and Washington, with the majority (29) found west of the Cascade Range in Oregon (ORBIC 2004). In 2004, the species

was considered to be fairly common, but population trends were unknown (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 30 new sites of *C. sachalinensis* between 1998 and 2006, and 35 total sites were documented by 2006, including four in reserves or protected areas. The 2007 Final SEIS reported 30 sites on NFS and BLM lands and 35 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 *C. sachalinensis*, and resulted in 47 new observations of individuals or populations of *C. sachalinensis*. Additional surveys for *C. sachalinensis* in LSRs in nearby areas resulted in 92 additional observations of the species. Based on the increased number of sites since 1998 as a result of increased surveys (a seven-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

Clavariadelphus sachalinensis is found in coniferous forests (ORBIC 2004). Based on data available in 1994, *C. sachalinensis* was presumed to be similar to other club coral fungi, which require cool, moist coniferous forests and are primarily found in LSOG forests (Holthausen et al. 1994). It may also require a well-developed humus layer and tends to be more common with increasing elevation and latitude. The species grows scattered or gregarious on soil or duff under mixed conifers (Castellano et al. 2003). Based on data available in 2007, all recorded observations were found below about 5,500 feet msl (Cushman and Huff 2007). *Clavariadelphus sachalinensis* is considered to be fairly common (ORBIC 2004) and may prefer specific microclimate conditions of LSOG forests, but may not be restricted to these conditions.

Threats

The primary threat to *C. sachalinensis* is from logging activities which result in host tree removal and soil disturbance (ORBIC 2004). Like other club coral fungi, *C. sachalinensis* is not subject to commercial harvest, but may be occasionally gathered by recreational pickers (Holthausen et al. 1994). Other specific threats to the species are not known.

Management Recommendations

As a Category B S&M species, the direction under the 2001 ROD was 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 *C. sachalinensis*:

- As a mycorrhizal species, *C. sachalinensis* 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.

2.6.3 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. sachalinensis* 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 CLSA-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 563 observations from BLM and Forest Service geodatabases were converted into 273 sites in the NSO range (region). Table CLSA-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table CLSA-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 CLSA-1 displays the regional distribution of the species across NFS lands, Figure CLSA-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure CLSA-3 displays the species’ regional distribution as well as the extent of coniferous forests and LSOG coniferous forests below 6,000 feet msl on BLM and NFS lands.

TABLE CLSA-1	
Number of <i>Clavariadelphus sachalinensis</i> Sites (2017)	
Location*	Number of Sites
Regional Area	273
Local Area	165
Analysis Area (Project Area)	15 (15)
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 CLSA-2			
Distribution of <i>Clavariadelphus sachalinensis</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	35	18	7
BLM	239	151	8
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	60	43	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 CLSA-3

Distribution of <i>Clavariadelphus sachalinensis</i> 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)	1	-	-
Congressionally Reserved (CR)	3	-	-
Late Successional Reserve (LSR)	18	9	2
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) ^{a/}	-	-	-
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	13	9	5
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	8	-	-
Congressional Reserve	-	-	-
District Designated Reserve	102	62	4
Harvest Land Base	160	99	7
Late Successional Reserve	107	69	5
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	79	55	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.

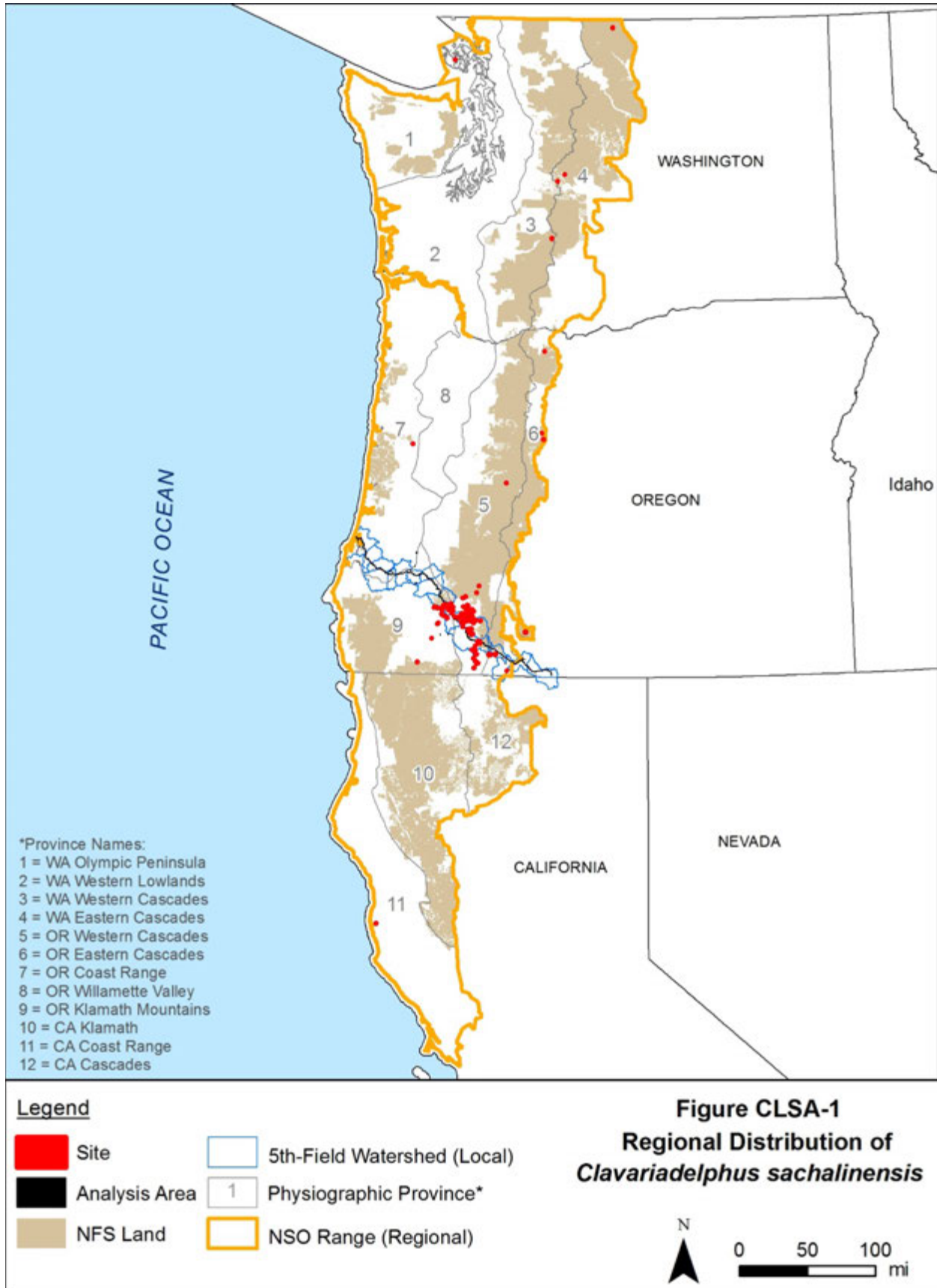
Regional Distribution

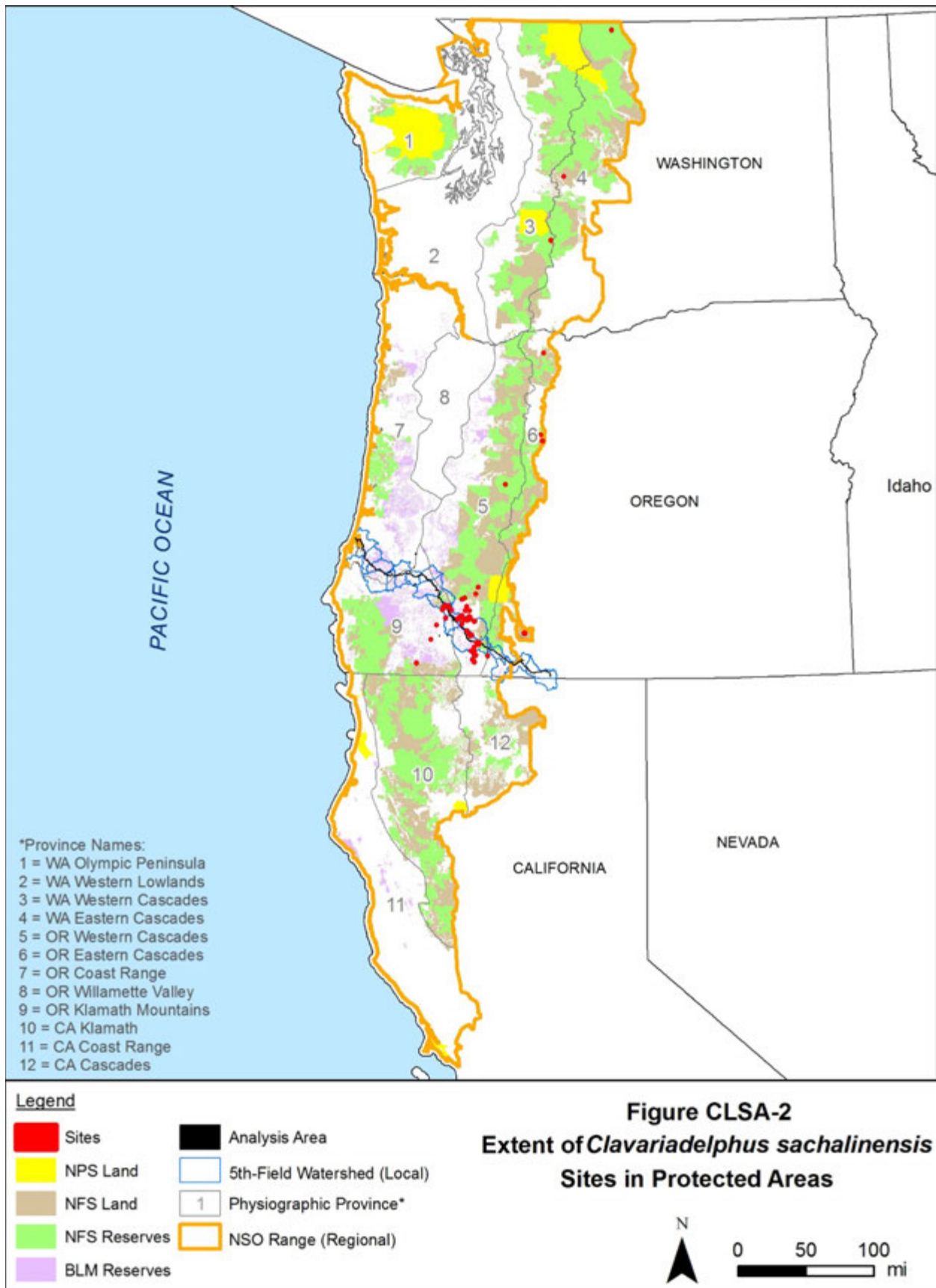
Clavariadelphus sachalinensis is widely distributed across eight physiographic provinces in Washington (Western and Eastern Cascades and Western Lowlands), Oregon (Coast Range, Cascades East and West, and Klamath Mountain), and California (Coast). Most sites are found along the western Cascade Range and eastern Klamath Mountains in southern Oregon, where the sites tend to be clustered or relatively close to one another in a large group. *Clavariadelphus sachalinensis* appears to be locally abundant in that area, but scattered sites are located in the Coast Range, Cascade Range in Washington and northern Oregon, and other outlying areas. *Clavariadelphus sachalinensis* is primarily found in southern Oregon and has a scattered distribution in other portions of the region 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 of 273 known sites are at least partially located on private or state lands, 239 sites are at least partially on BLM lands, and 35 are at least partially on NFS lands. Sites included on National Forests that encompass the project area include two sites on the Fremont-Winema National Forest, 16 sites on the Rogue River-Siskiyou National Forest and 10 sites on the Umpqua National Forest. Sites located on other National Forests include three sites on the Deschutes National Forest, one site on the Willamette National Forest, one site on the Mt. Hood National Forest, three sites on the Okanogan-Wenatchee National Forest, one site on the Mt. Baker-Snoqualmie National Forest, and one site on the Gifford Pinchot National Forest.

Across the NSO range, 20 sites are at least partially located in reserve lands managed by the Forest Service, including 18 at least partially in LSRs and three at least partially in Congressionally

Reserved areas (see Figure CLSA-2). These sites represent 57 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, 71 sites are entirely in reserve lands managed by BLM, which represents 30 percent of the total number of BLM sites in the region. While the sites on BLM lands are not covered by the S&M Standards and Guidelines, the sites in BLM reserves likely receive some level of protection through BLM reserve management.







Clavariadelphus sachalinensis is more common in LSOG forests based on available data (216 of 273 total sites are in LSOG), but it is also fairly common in non-LSOG forests and may not be as restricted to LSOG conditions. Based on current site locations, the species is found in coniferous forests below about 5,600 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 lands, both land ownerships are included in this potential habitat discussion. Coniferous forests below 6,000 feet msl, including the LSOG component of these forests, across the NSO range could provide habitat for *C. sachalinensis* and support additional sites. These forests encompass an estimated 15.1 million acres on BLM and NFS lands in the region, including an estimated 9.1 million acres in reserve land allocations (60 percent of the forests; Table CLSA-4). Of this acreage, an estimated 4.9 million acres are LSOG (see Figure CLSA-3), including 3.2 million acres in reserve land allocations (66 percent of the forests). Although coniferous forests are widespread in the NSO range, LSOG coniferous forests below 6,000 feet msl are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

Location	Coniferous Forests below 6,000 feet		LSOG Coniferous Forests below 6,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	15,108,825	9,057,899	4,869,845	3,235,553
Local Area	442,108	276,754	159,211	114,927
Project Area	10,23	691	298	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.

Local Distribution

Within the local area, *C. sachalinensis* is distributed across six 5th-field watersheds that overlap the project area (see Table CLSA-5 and Figure CLSA-4). The sites are located within the central and eastern portions of the local area, and most sites tend to be clustered and close to one another in groups. Across the watersheds, 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 are located within 20 miles to the northeast in the Cascade Range and to the southwest in the Klamath Mountains.

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	72	-	50
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)	42	9	33
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	-	-	-

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	-	-	-
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	7 <u>a/</u>	-	7
South Umpqua River (781)	-	-	-
Spencer Creek (865)	3	-	-
Trail Creek (804)	41 <u>a/</u>	-	34
Upper Cow Creek (801)	-	-	-

Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
 Note: Nu 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 partially in the Rogue-River Shady Cove and Trail Creek watersheds..

Of the 165 sites in the local area, 18 are at least partially on NFS lands and are on lands designated as Other (Matrix) and LSR. A total of 43 sites are at least partially on private lands and 151 sites are at least partially on BLM lands. Within the local area, nine sites are entirely in NFS reserve lands and 52 sites are entirely in BLM reserve lands, representing 37 percent of the local sites.

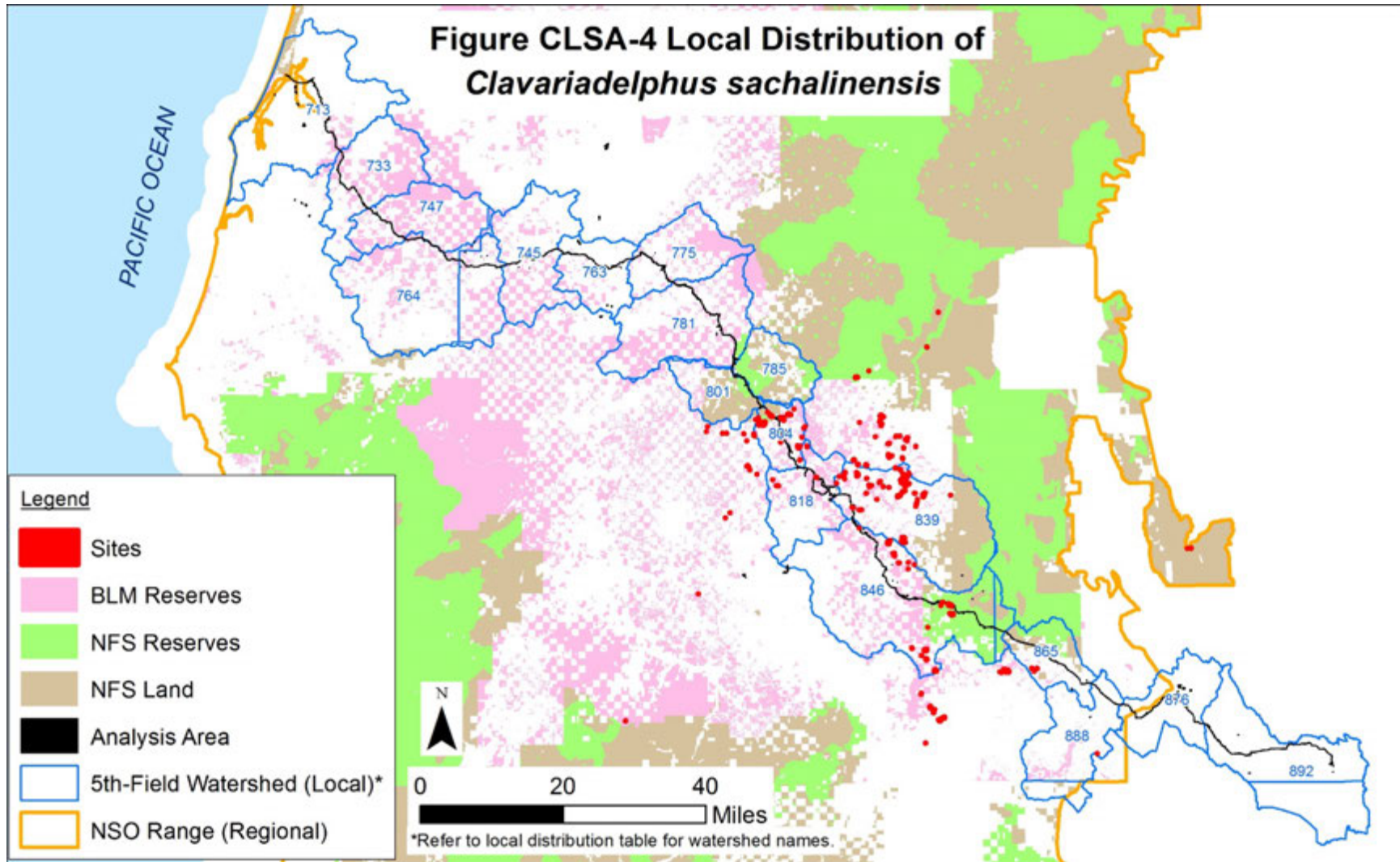
Coniferous forests below 6,000 feet msl encompass approximately 442,108 acres on BLM and NFS lands in the local area, with 276,754 acres in reserve land allocations (63 percent of the forests). Of this acreage, an estimated 159,211 acres are LSOG, including 114,927 acres in reserves (72 percent of the forests).

Analysis/Project Area Distribution

The analysis area contains 15 sites of *C. sachalinensis* and the project area contains 15 sites. The analysis area and project area contains seven sites on NFS lands, and the remaining sites are at least partially on BLM lands (two sites are partially on private land). The NFS sites are found in the central and eastern portion of the analysis area, and most of the sites are clustered in two groups. Many sites are also located within the immediate vicinity of the analysis area (see Local Distribution discussion above), including several within 5 miles.

The seven sites on NFS lands in the analysis area are designated as Other (Matrix) and LSR. Of the seven NFS sites in the analysis area, two sites are in reserve lands. Of the eight sites on BLM lands in the analysis area, one is located entirely in a BLM reserve..

Surveys for the PCGP Project resulted in an estimated 184 observations of the species in 137 locations in or near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). An estimated 86 of these recorded observations combined with other data in the agency databases comprise 12 of the sites in the analysis area; the other observations are in sites outside the analysis area. Within the project area, two sites are between MPs 100.28 and 100.53, five sites are between MPs 112.6 and 113.2, two sites are between MPs 125.1 and 125.34, one site is near MP 136.85, and two sites are between MPs 156.8 and 158.28.



Project Impacts

Analysis

The PCGP Project would affect seven sites out of the 35 sites on NFS lands in the region, representing approximately 20 percent of the NFS sites. Site impacts on other land ownerships include eight sites affected on BLM lands, two of which are at least partially on private lands as well. The total number of sites affected is 15 sites out of the 273 total sites on all lands. Table CLSA-6 provides an overview of the features of the PCGP Project that would affect the *C. sachalinensis* sites on NFS lands. The construction corridor and associated work and storage areas would affect approximately 20 acres within seven sites (about 13 percent of the NFS sites in the analysis area). 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. sachalinensis* 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 12.8 acres of vegetation and soil within seven sites and could result in the removal of *C. sachalinensis* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about 2 acres within six 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 *C. sachalinensis* 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. Material storage within UCSAs would disturb about 4.7 acres of understory habitat in seven sites, which could modify microhabitats near extant populations or individuals, potentially making the habitat no longer suitable for the species.

TABLE CLSA-6		
Impacts to <i>Clavariadelphus sachalinensis</i> Sites on NFS Lands in the Project Area		
Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	7	12.8ac
Temporary Extra Work Area (TEWA)	6	2.0 ac
Uncleared Storage Area (UCSA)	7	4.7 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.		

Across the project area, the PCGP Project would remove an estimated 809 acres of coniferous forests below 6,000 feet msl, including 224 acres of LSOG coniferous forests. These impacts

would result in a reduction of habitat that may be suitable for *C. sachalinensis*. Within this impact area, about 428 acres (about 53 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 191 acres of coniferous forests below 6,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests below 6,000 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the seven sites on NFS lands as a result of the PCGP Project, 11 sites of *C. sachalinensis* would remain on NFS lands in the local area, including seven entirely in reserves, and 28 sites, including 18 entirely 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 reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. The PCGP project may also affect eight sites on BLM lands. Assuming site persistence cannot be maintained, 143 sites, including 51 entirely in reserves would remain on BLM lands in the local area and 231 sites, including 70 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 level of protection under BLM management

Based on these site counts, approximately 64 percent of the remaining *C. sachalinensis* sites on NFS lands in the NSO range would be protected in reserves and approximately 33 percent of 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:

- *Clavariadelphus sachalinensis* 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:
 - *Clavariadelphus sachalinensis* has a wide distribution across eight physiographic provinces and three states in the region and a low-moderate number of sites on NFS lands (35 sites) and a moderate-high number of sites on all lands (273 sites). The species is locally abundant in the southern Cascade Range and eastern Klamath Mountains in Oregon. The currently known number of sites on NFS and BLM lands

has increased by 242 sites since 2007, with many sites documented during the PCGP Project surveys and during unrelated surveys in recent years in the vicinity of the project.

- An estimated 57 percent of the NFS sites (20 sites) are in NFS reserves, while an estimated 34 percent of the sites on federal land (91 sites) are in reserves designated by the NFS or BLM.
- Coniferous forests below 6,000 feet msl (general habitat for the species) are widespread across the region and encompass approximately 15.1 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 forests, but sites are more scattered in these areas. A subcomponent of these forests likely provides habitat for *C. sachalinensis*.
- The PCGP Project would affect seven of 35 NFS sites of *C. sachalinensis*, representing approximately 20 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the eight sites, a low-moderate number of sites (28) would remain on NFS lands in the region with a wide distribution across Washington and Oregon. Several sites (11) would remain in the local vicinity of the analysis area; these sites would be clustered in two groups in the Trail Creek and Little Butte Creek watersheds.
- The PCGP Project would also affect eight sites that are least partially on BLM lands. Assuming site persistence cannot be maintained at the eight sites, 143 sites would remain on BLM lands in the local area, including 51 entirely in reserves. These sites would continue to be distributed across seven 5th-field watersheds. The types of reserves that contain these local sites includes 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 that benefit LSOG forests; and District Designated Reserves, where management activities that may adversely affect *C. sachalinensis* are unlikely.
- The PCGP Project would affect site persistence at two sites in NFS reserves (LSRs), and the percentage of sites in reserves would increase by 6 percent. Of the remaining sites, 16 are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and three are in Congressionally Reserved areas where management activities that may adversely affect *C. sachalinensis* are unlikely.
- The PCGP Project would result in a permanent loss of an estimated 191 acres of coniferous forests below 6,000 feet msl (less than 1 percent of the total regional acreage). An estimated 9.1 million acres (60 percent) of coniferous forests and 3.2 million acres (66 percent) of LSOG coniferous forests below 6,000 feet msl would remain in reserves in the NSO range.
- The remaining forests could support additional populations of *C. sachalinensis*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Clavariadelphus sachalinensis* 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.

2.6.4 Conclusions

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

- With project implementation, 28 sites would remain on NFS lands across the region, and 11 sites would remain on NFS lands in the local area. Additionally, 143 sites would remain on BLM lands in the local area, including 51 sites entirely in reserves. The PCGP Project would affect site persistence of *C. sachalinensis* at eight sites on NFS lands; these sites are part of three small groups of NFS sites in the Klamath Mountains and western Cascades. Several scattered sites on NFS lands are located within 15 miles to the north in the western Cascades. Sites on BLM lands are much more abundant than sites on NFS lands, and many sites entirely in reserves are distributed across the Klamath Mountains and western Cascades 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 (143) with a moderate proportion of sites in BLM reserves (35 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. *Clavariadelphus sachalinensis* would persist in the region without considering the eight NFS sites as part of the population.
- The PCGP Project would remove approximately 809 acres of coniferous forests and 224 acres of LSOG coniferous forests below 6,000 feet msl (a negligible amount of the forests). An estimated 53 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 9.1 million acres (60 percent) of coniferous forests and 3.2 million acres (66 percent) of LSOG coniferous forests below 6,000 feet msl would remain in reserves in the NSO range.
- 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 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 *C. sachalinensis* 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 eight *C. sachalinensis* 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 the affected sites would waive implementation of Management Recommendations

for *C. sachalinensis* 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.

2.7 CLAVARIADELPHUS TRUNCATUS

Clavariadelphus truncatus (synonym *C. borealis*) is a club mushroom species in the Gomphaceae family (formerly in the Clavariadelphaceae family) and is commonly known as flat-topped, truncate, or club coral or the orange club.

2.7.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *C. truncatus* as a Category D (uncommon) species. ORBIC evaluated *C. truncatus* 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 demonstrably common, widespread and abundant within its global range (G5) and was considered to be uncommon but not rare with some cause for long-term concern due to declines or other factors in Oregon (S4). The species is not currently on any ORBIC lists. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.7.2 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 *C. truncatus*. It is a mycorrhizal fungus that depends on host trees for nutrients (carbohydrates) (ORBIC 2004). The mushroom has been documented fruiting from July through November in the NSO range (Castellano et al. 2003). In California, fruiting has been documented from late fall to mid-winter (The Fungi of California 2010).

Range

Clavariadelphus truncatus is widespread in Asia, Europe, and North America, including most Canadian provinces; 22 states from Alaska to California, Idaho, Utah, and east to Maine and Virginia; and Mexico (ORBIC 2004). Within the NSO range, populations are widely distributed from northern California, throughout Oregon, and north to the North Cascades and Olympic Mountains of Washington. The species is considered to be very common across its global range. 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, Europe, 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 *C. truncatus* from more than 300 element occurrences worldwide in 2004. An estimated 120 of these occurrences were in California, Oregon, and Washington, with the majority (more than 100) found in Oregon (ORBIC 2004). ORBIC estimated that 53 of the element occurrences were in protected areas in the NSO range in 2004. In 2004, *C. truncatus* was considered to be very common and likely to be secure across its range and was considered widespread in western Oregon (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 89 new sites of *C. truncatus* in the NSO range between 1998 and 2006, and 133 total sites were documented by 2006, including 54 in reserves or protected areas. The 2007 Final SEIS reported 118 sites on NFS and BLM lands and 130 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]). Incidental sightings of Category D species were recorded during these surveys and resulted in 57 new observations of individuals or populations of *C. truncatus*. The majority of the surveys (2010 to 2014) used the 2001 ROD as the target list, in which *C. truncatus* was a Category B species. During these surveys, *C. truncatus* was targeted along with all other Category B species. Additional persistence surveys for *C. truncatus* in LSRs in nearby areas resulted in 30 additional observations of the species. These observations have increased the number of sites documented in BLM and Forest Service records by about 20 percent. Based on the relatively high number of sites and the increased number of sites since 1998 with increased surveys (a three-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

Clavariadelphus truncatus is found in coniferous forests (ORBIC 2004). Based on data available in 1994, *C. truncatus* was presumed to be similar to other club coral fungi, which require cool or cold, moist coniferous forests, and are primarily found in LSOG forests (Holthausen et al. 1994). It may also require a well-developed humus layer and tends to be more common with increasing elevation and latitude. The species grows scattered or gregarious on soil or duff under mixed conifers (Castellano et al. 2003). *Clavariadelphus truncatus* is more widespread and abundant than many other S&M fungi species. It may prefer specific microclimate conditions of LSOG forests, but may not be restricted to these conditions.

Threats

The primary threat to *C. truncatus* is from logging activities, which result in removal of host trees and disturbance to soil (ORBIC 2004). Like other club coral fungi, *C. truncatus* is not subject to commercial harvest, but may be occasionally gathered by recreational pickers (Holthausen et al. 1994). Other specific threats to the species are not known.

Management Recommendations

As a Category D 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 *C. truncatus*:

- As a mycorrhizal species, *C. 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.

2.7.3 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. 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 CLTR-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 492 observations from BLM and Forest Service geodatabases were converted into 332 sites in the NSO range (region). Table CLTR-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table CLTR-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 CLTR-1 displays the regional distribution of the species across NFS lands, Figure CLTR-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure CLTR-3 displays the species' regional distribution as well as the extent of coniferous forests and LSOG coniferous forests on BLM and NFS lands.

TABLE CLTR-1	
Number of <i>Clavariadelphus truncatus</i> Sites (2017)	
Location*	Number of Sites
Regional Area	332
Local Area	147
Analysis Area (Project Area)	20 (19)

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 CLTR-2			
Distribution of <i>Clavariadelphus truncatus</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	127	16	9
BLM	193	132	11
NPS	3	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	59	35	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 CLTR-3			
Distribution of <i>Clavariadelphus truncatus</i> 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)	19	-	-
Congressionally Reserved (CR)	15	-	-
Late Successional Reserve (LSR)	39	4	3
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) ^{a/}	2	-	-
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	59	13	6
Riparian Reserve	1	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	1	-	-
District Designated Reserve	79	53	6
Harvest Land Base	139	94	9
Late Successional Reserve	97	68	10
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	77	49	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

Clavariadelphus truncatus is widely distributed across 11 physiographic provinces in Washington (Western and Eastern Cascades and Western Lowlands), Oregon (Coast Range, Cascades West and East, Willamette Valley, and Klamath Mountains), and California (Klamath, Cascades, and Coast) (see Figure CLTR-1). 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. Scattered sites are located in the Coast Range, and other outlying areas with some clusters of sites

in western Oregon and northwestern California. *Clavariadelphus truncatus* appears to be well distributed in the 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 range.

Fifty-nine of 332 sites are at least partially located on private, state, or other lands; three sites are on NPS lands (two are in Mount Rainier National Park and one is partially in Crater Lake National Park); 193 sites are at least partially on BLM lands; and 127 sites are at least partially on NFS lands across the region. Sites included on National Forests that encompass the project area include 17 sites on the Fremont-Winema National Forest, 21 sites on the Rogue River-Siskiyou National Forest, and 38 sites on the Umpqua National Forest. The remaining sites on NFS lands are on the Deschutes, Gifford Pinchot, Klamath, Lassen, Mendocino, Mt. Baker-Snoqualmie, Mt. Hood, Okanogan-Wenatchee, Shasta-Trinity, Siuslaw, Six Rivers, and Willamette National Forests.

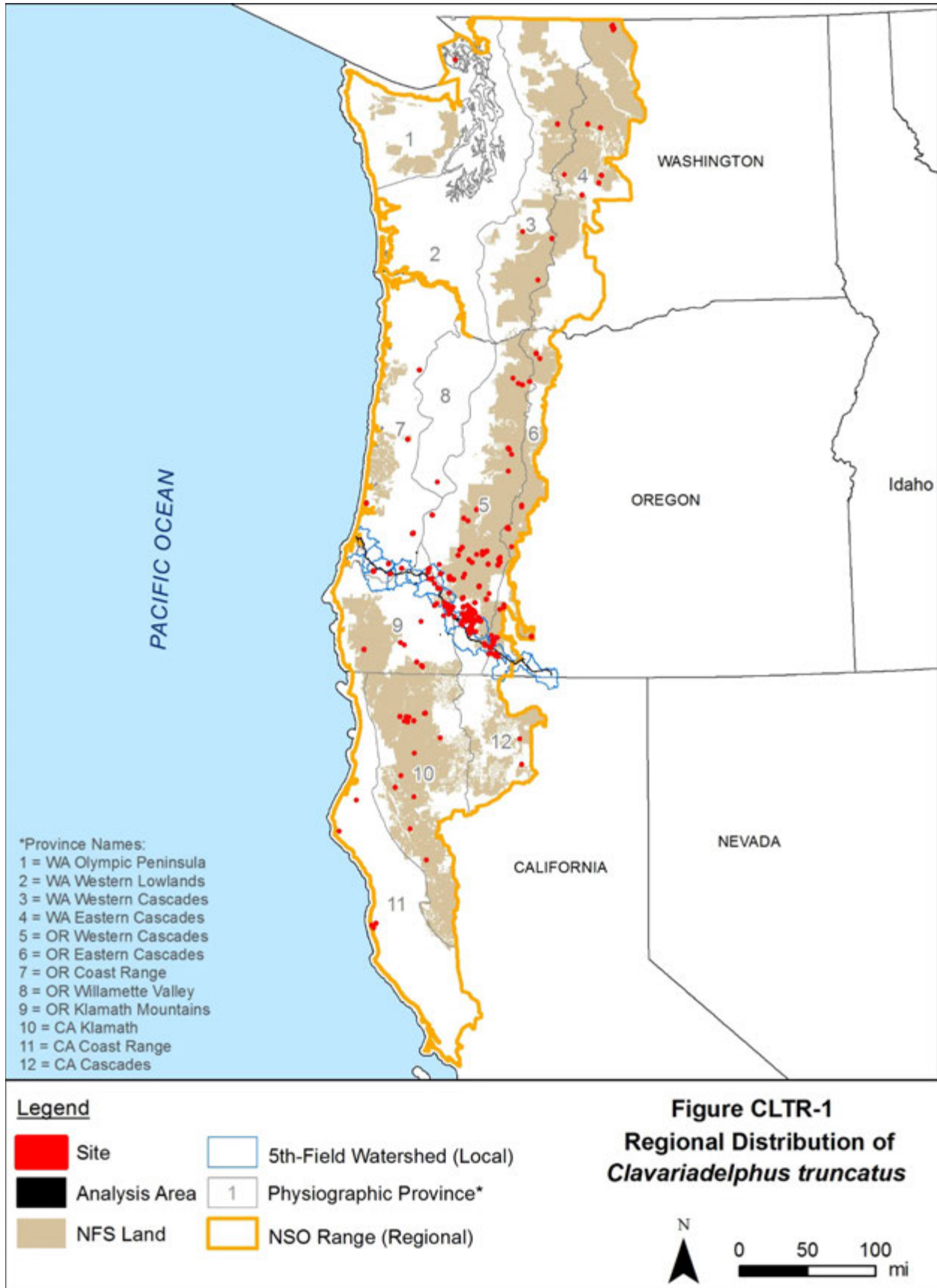
Across the NSO range, 56 sites are at least partially located in reserve lands managed by the Forest Service, including 39 at least partially in LSRs, two at least partially in Known Owl Activity Centers, 15 at least partially in Congressionally Reserved areas, and one at least partially in Riparian Reserves (see Figure CLTR-2). This represents 44 percent of the total sites on NFS lands 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. Across the region, 54 sites are entirely in BLM reserves. While the sites in BLM reserves and the three NPS sites are not covered by the S&M Standards and Guidelines, they likely receive some level of protection through BLM reserve management and National Park Management.

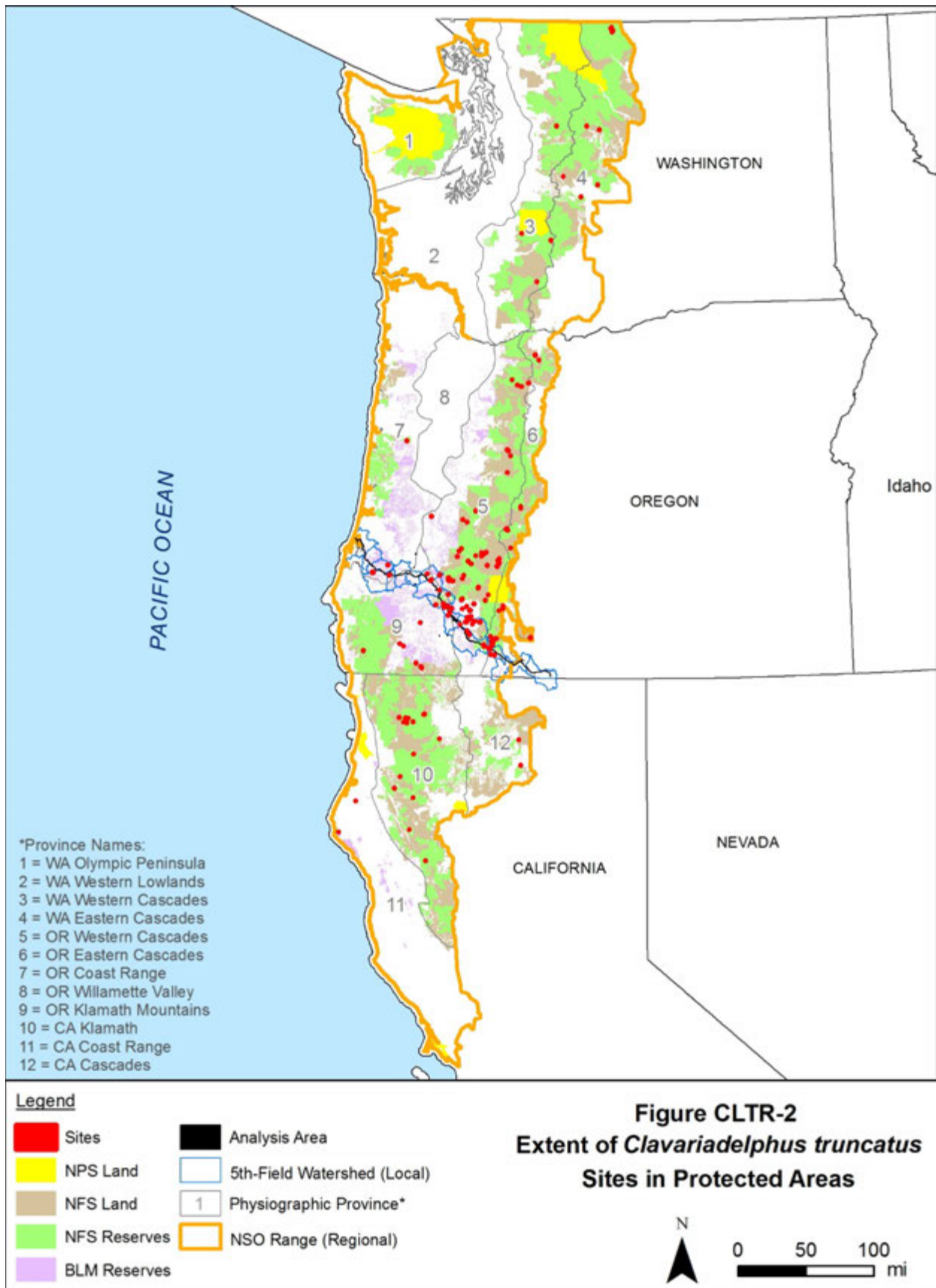
Clavariadelphus truncatus is more common in LSOG forests based on available data (274 of 332 total sites are in LSOG), but it is also relatively common in non-LSOG forests and may not be restricted to LSOG conditions. Based on current site locations, the species is found in coniferous forests across 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 forests, including the LSOG component of these forests, across the NSO range could provide habitat for *C. truncatus* and support additional sites. These forests encompass an estimated 16.3 million acres on BLM and NFS lands in the region, including an estimated 9.9 million acres in reserve land allocations (61 percent of the forests; Table CLTR-4). Of this acreage, an estimated 5 million acres are LSOG (see Figure CLTR-3), including 3.3 million acres in reserve land allocations (66 percent of the forests). Although coniferous forests are widespread across the region, LSOG coniferous forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

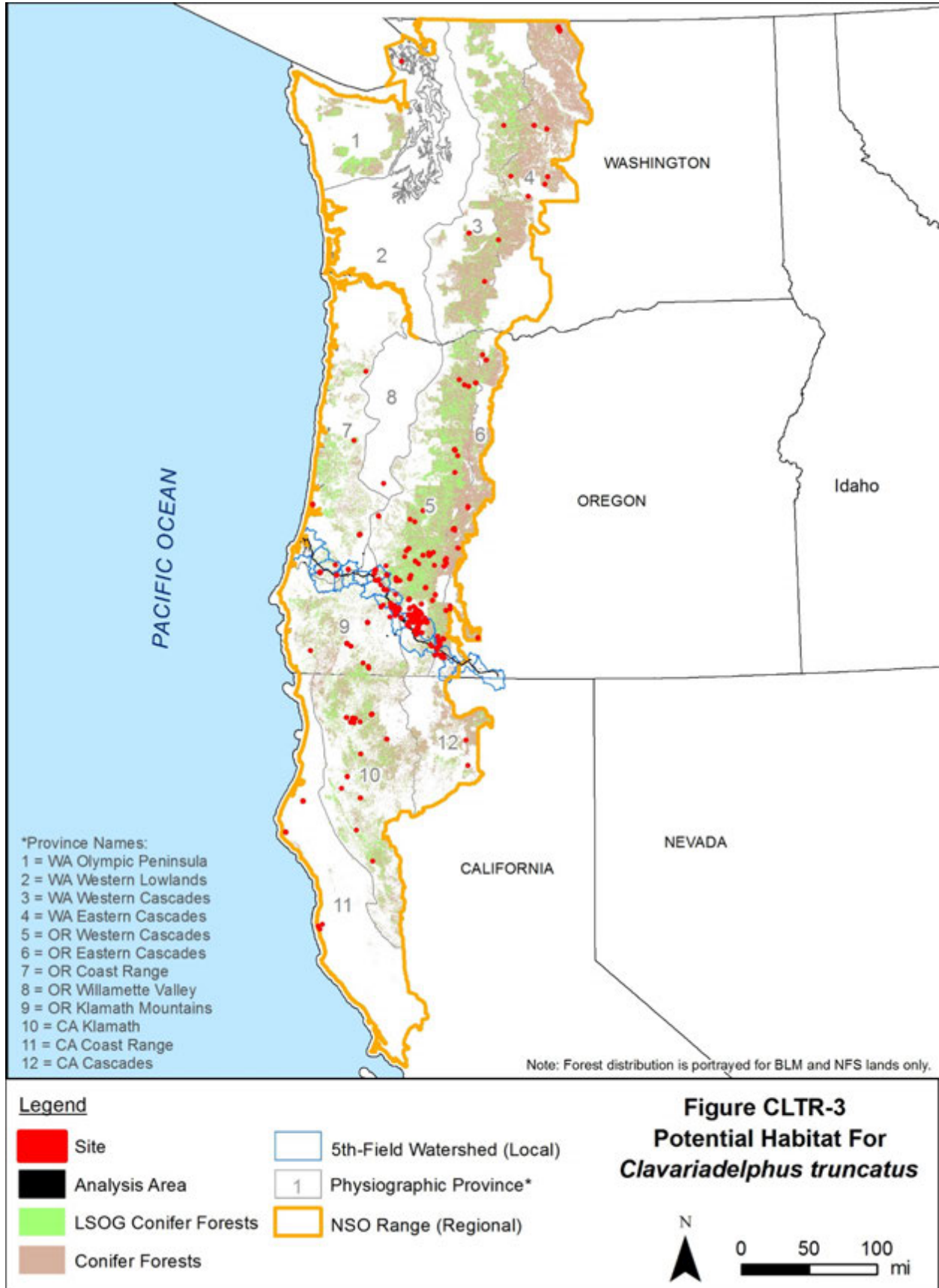
TABLE CLTR-4

Extent of Forests That Could Provide Habitat for <i>Clavariadelphus truncatus</i> on NFS and BLM Lands ^{a/}				
Location	Coniferous Forests		LSOG Coniferous Forests	
	Total	Reserves	Total	Reserves
Regional Area	16,275,479	9,902,802	5,025,899	3,337,509
Local Area	454,206	285,292	161,143	116,561
Project Area	1,018	686	294	207

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, *C. truncatus* is distributed across 12 5th-field watersheds that overlap the project area (see Figure CLTR-4 and Table CLTR-5.) Some sites are more scattered than others, while multiple clusters of sites are found in the Myrtle, South Umpqua River, Trail Creek, and Big Butte Creek watersheds. Across the watersheds, 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 are located within 10 miles to the northeast in the Cascade Range.

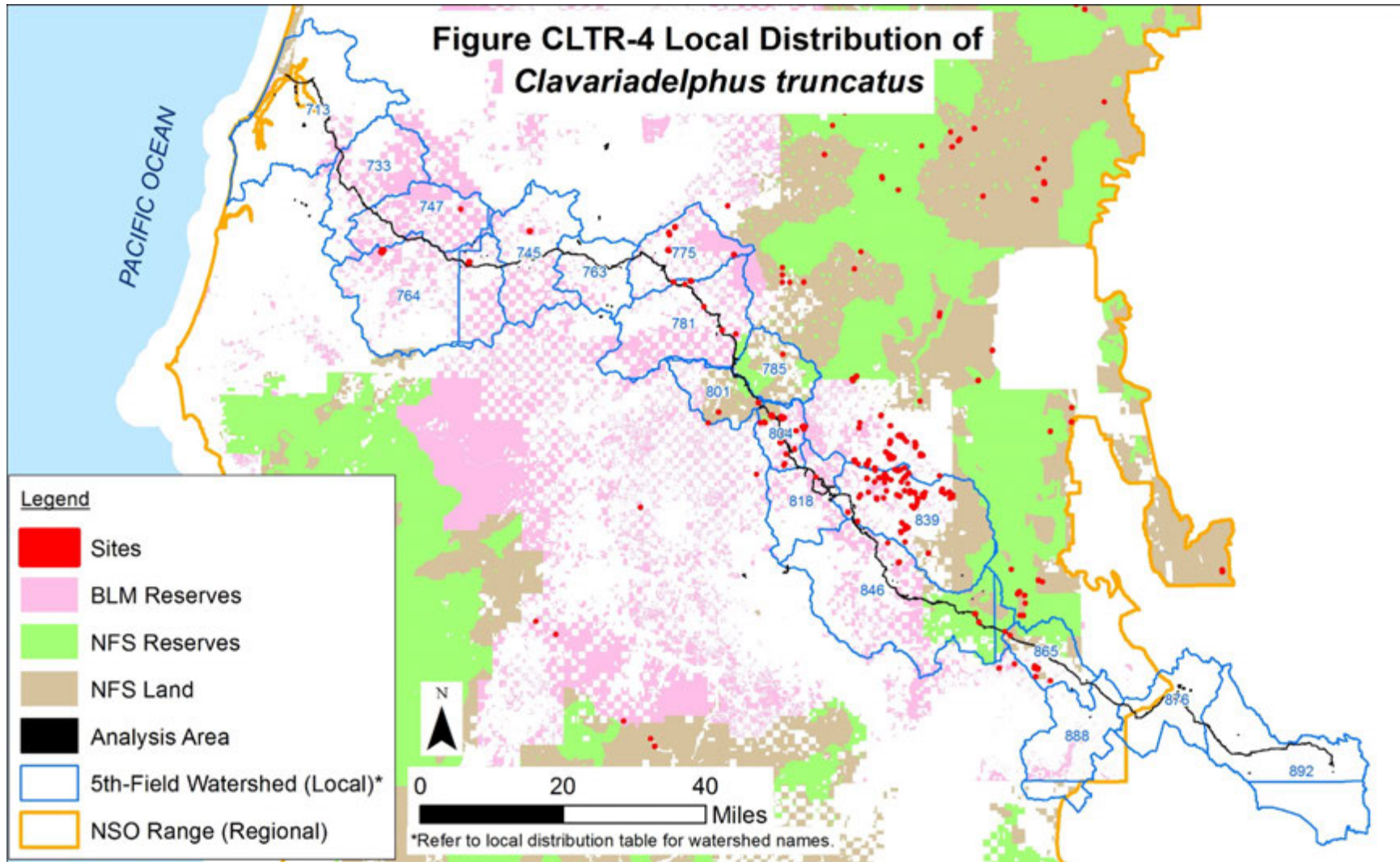
Of the 147 sites in the local area, 16 sites are at least partially on NFS lands. These sites are primarily located on lands designated as Other (Matrix) and LSR. Thirty-five sites are at least partially on private lands and 132 sites are at least partially on BLM lands. Of the 16 sites on NFS lands in the local area, four sites are at least partially in reserve lands, representing 25 percent of the local area sites on NFS lands. Of the 132 sites on BLM lands, 38 sites are entirely in BLM reserves, representing 29 percent of the local area sites on BLM lands.

Coniferous forests encompass approximately 454,206 acres on BLM and NFS lands in the local area, with 285,292 acres in reserve land allocations (63 percent of the forests). Of this acreage, an estimated 161,143 acres are LSOG, including 116,561 acres in reserves (72 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 CLTR-3 and CLTR-4).

TABLE CLTR-5			
Distribution of <i>Clavariadelphus truncatus</i> 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)	76	-	48
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	1	-	1
Elk Creek-South Umpqua (785)	1	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	7	4	3
Lower Lost River (892)	-	-	-
Middle Fork Coquille River (764)	4	-	4
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	8 a/	-	8
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	1	-	1
Rogue River-Shady Cove (818)	1	-	1
South Umpqua River (781)	7 a/	-	7
Spencer Creek (865)	10	-	8
Trail Creek (804)	30	-	25
Upper Cow Creek (801)	2	-	-

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 on both Myrtle Creek and South Umpqua River watersheds.



Analysis/Project Area Distribution

The analysis and project areas contain 20 sites of *C. truncatus*. A total of 9 sites in both the analysis area and project area are at least partially on NFS lands. Three of the sites on NFS lands in the analysis area are at least partially located in NFS reserve lands (LSRs). Three sites are partially on private lands and 11 sites are at least partially on BLM lands. The analysis area sites are distributed across six 5th-field watersheds (South Umpqua River, Elk Creek-South Umpqua, Upper Cow Creek, Trail Creek, Little Butte Creek, and Spencer Creek). The sites are widely distributed across much of the analysis area and tend to be found in several clusters, with a few scattered sites. Many sites are also located within the immediate vicinity of the analysis area (see Local Distribution discussion above), including several within 1 mile.

Surveys for the PCGP Project resulted in 121 total observations of the species in 84 locations in or near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). An estimated 69 of these recorded observations comprise 16 of the sites in the analysis area; the other observations are in sites outside the analysis area. Within the project area, 11 sites are between MPs 83 and 113.3, and four sites are between MPs 162 and 169.

Project Impacts

Analysis

The PCGP Project would affect 9 out of the 127 sites on NFS lands in the region, representing approximately 7 percent of the sites. Site impacts on other land ownerships include 11 sites at least partially on BLM lands, including three sites partially on private lands. The total number of sites affected is 11 sites out of the 332 total sites on all lands. Table CLTR-6 provides an overview of the features of the PCGP Project that would affect the *C. truncatus* sites on NFS lands. The construction corridor and associated work and storage areas would affect approximately 12.5 acres within 8 sites (about 25 percent of NFS sites in the analysis area). 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. truncatus* in and near the project area.

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	8	8.0 ac
Temporary Extra Work Area (TEWA)	6	2.0 ac
Uncleared Storage Area (UCSA)	5	2.5 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 in 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 8 acres of vegetation and soil within 8 sites and could result in the removal of *C. truncatus* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about

2.0 acres within six 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 *C. truncatus* 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. Material storage within UCSAs would disturb about 2.5 acres 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 806 acres of coniferous forests, including 222 acres of LSOG coniferous forests. These impacts would result in a reduction of habitat that may be suitable for *C. truncatus*. Within this impact area, about 427 acres (about 53 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 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. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the 9 sites on NFS lands as a result of the PCGP Project, seven sites of *C. truncatus* would remain on NFS lands in the local area, and 118 sites, including 53 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 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 53 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 45 percent of the remaining *C. truncatus* sites on NFS lands in the NSO range would be protected in reserves.

The PCGP project may also affect 11 additional sites that are at least partially on BLM lands. Assuming persistence cannot be maintained at the 11 sites, 121 sites, including 36 sites entirely in reserves, would remain on BLM lands in the local area, and 182 sites, including 52 sites 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 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:

- *Clavariadelphus 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 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:
 - *Clavariadelphus truncatus* has a wide distribution across 11 physiographic provinces and three states in the region and a moderate-high number of overall sites (127 on NFS lands, 332 on all lands). The species appears to be well distributed in the Cascade Range in Oregon and is fairly common and widespread outside the mountain range. The currently known number of sites on NFS and BLM lands has increased by 220 sites since 2007, with many sites documented during the PCGP Project surveys.
 - An estimated 40 percent of the sites (85 sites) are at least partially in reserves, which is an increase of about 31 sites in reserves since 2006 per Molina (2008).
- Coniferous forests (general habitat for the species) are widespread across the region and encompass approximately 16.3 million acres on BLM and NFS lands with an estimated 61 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 forests, but sites are more scattered in these areas.
- The PCGP Project would affect 9 of 127 NFS-managed sites of *C. truncatus*, representing approximately 7 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the 9 sites, a moderate-high number of sites (118) would continue to be documented on NFS lands in the region with a wide distribution across Washington, Oregon, and California. Several sites (seven) would remain on NFS lands in the local vicinity of the analysis area; these sites would be distributed across five 5th-field watersheds. An additional 36 sites would remain in BLM reserves in the local area; these sites would be distributed across eight 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 affect site persistence of five sites in LSRs, but the percentage of sites in reserves would be about the same (45 percent). Of the remaining sites on NFS lands, 36 are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, and 15 are at least partially in Congressionally Reserved areas where management activities that may adversely affect *C. truncatus* are unlikely. One site is at least partially in a Riparian Reserve where management actions are restricted to those activities that benefit the conservation of aquatic and riparian-dependent terrestrial resources. A total of 52 sites would remain entirely within BLM reserves, including District Designated and Congressional Reserved areas where management activities that may adversely affect *C. truncatus* are unlikely; Riparian Reserves where management actions are restricted to those activities that benefit the conservation of

riparian areas and riparian-associated species; and LSRs where management actions are restricted to those activities that benefit LSOG forests.

- The PCGP Project would result in a permanent loss of an estimated 190 acres of coniferous forests (less than 1 percent of the total regional acreage). An estimated 9.9 million acres (61 percent) of coniferous forests and 3.3 million acres (66 percent) of LSOG coniferous forests would remain in reserves in the NSO range.
- The remaining forests could support additional populations of *C. 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.

2.7.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *C. truncatus* at 9 sites on NFS lands and 11 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, 118 sites would remain on NFS lands across the region, including 53 sites in reserves, and seven sites would remain on NFS lands in the local area. Additionally, 192 sites would remain on BLM lands across the region, including 52 entirely in reserves, and 121 sites would remain on BLM lands in the local area, including 36 entirely in reserves. Although the PCGP Project would affect site persistence of *C. truncatus* at 9 sites on NFS lands, these sites are part of the many sites in southern Oregon where the species is fairly common. In addition, it is expected that BLM management would allow the majority of sites in BLM reserves to persist. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Clavariadelphus truncatus* would persist in the region without considering the 9 sites as part of the population.
- The PCGP Project would remove approximately 806 acres of coniferous forests and 222 acres of LSOG coniferous forests (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 9.9 million acres (61 percent) of coniferous forests and 3.3 million acres (66 percent) of LSOG coniferous 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 in BLM reserves would likely receive some level of protection under BLM reserve management. 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. 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 9 *C. truncatus* 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 the affected sites would waive implementation of Management Recommendations for *C. 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.

2.8 COLLYBIA BAKERENSIS

Collybia bakerensis is a gilled wood-decaying mushroom species in the Tricholomataceae family and is commonly known as common snow agaric.

2.8.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *C. bakerensis* as a Category F (uncommon) species. ORBIC evaluated *C. bakerensis* 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.

2.8.2 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 *C. bakerensis*. It is a saprophytic mushroom found on standing or dead conifer trees (ORBIC 2004). It is most commonly found on true firs, spruces (*Picea* spp.), and hemlocks and is scattered to gregarious (Castellano et al. 1999). In the Sierra Nevada and Cascade Range of California, *C. bakerensis* fruits shortly after snowmelt; in Washington, Colorado, and Idaho, it fruits in late summer and fall (Castellano and O'Dell 1997, ORBIC 2004). In the NSO range, *C. bakerensis* has been documented fruiting between May and October (Castellano et al. 1999).

Range

Collybia bakerensis is endemic to western North America (ORBIC 2004). The species' range extends from British Columbia south to California, and it has also been documented in Colorado and Idaho. Based on data available in 2004, the species was found in the NSO range from northern

California to the central Cascade Range in Oregon and in the northern Cascade Range and Olympic Mountains in Washington. *Collybia bakerensis* exhibits irregular distributions that are directly proportional to the presence of suitable substrate. 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 *C. bakerensis* from 155 element occurrences in California, Oregon, and Washington in 2004. An estimated 120 occurrences were in California and Washington, with an unknown number in Oregon (ORBIC 2004). ORBIC estimated that 128 of these occurrences were in protected areas in the NSO range. In 2004, *C. bakerensis* was considered resilient, stable, and common across its global range and was considered stable in Oregon (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 120 new sites of *C. bakerensis* in the NSO range between 1998 and 2006, and 134 total sites were documented by 2006, including 83 in reserves or protected areas. The 2007 Final SEIS reported 124 sites on NFS and BLM lands and 129 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 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These equivalent-effort surveys targeted all Category B species and also included incidental observations of S&M fungi under other categories, and no new observations of *C. bakerensis* were recorded. Despite the lack of observations during PCGP surveys, the increased number of sites since 1998 with increased surveys (a nine-fold increase between 1998 and 2006 per Molina 2008 records) demonstrates that this species is likely 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

C. bakerensis grows on the trunks of conifer trees or on fallen trees, usually directly after snowmelt (Castellano and O'Dell 1997, ORBIC 2004). In the Sierra Nevada and Cascade Range of California, it has been documented primarily on fir trees above about 8,200 feet msl. In Washington, the species is primarily found on hemlock trees and rarely on spruce trees. *C. bakerensis* may require forest litter, duff, or debris as a habitat component (Cushman and Huff 2007). *C. bakerensis* may prefer specific microclimate conditions of LSOG forests, but it may not be restricted to these conditions.

Threats

The primary threat to *C. bakerensis* is hot fires that can damage trees and modify the general habitat, microclimate, and growth substrate inhabited by the mushroom (ORBIC 2004). Anthropogenic activities also threaten localized occurrences of *C. bakerensis* through disturbance of microclimates, coarse woody debris, or damage to conifer trees. These activities include

building of roads, campgrounds, and trails; stream diversions; and timber harvests (Holthausen et al. 1994). Populations not located in reserves or protected areas are at particular risk from habitat loss. *Collybia bakerensis* is not collected for human consumption and is therefore not subject to commercial harvest. Other specific threats to the species are not currently known.

Management Recommendations

For Category F S&M species, known sites are not required to be managed per the 2001 ROD; these species are expected to be assigned to another category or be removed from the list (USDA and USDI 2001).

2.8.3 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. bakerensis* 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 COBA-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 149 sites in the NSO range (region). Table COBA-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table COBA-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 COBA-1 displays the regional distribution of the species across NFS lands, Figure COBA-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure COBA-3 displays the species’ regional distribution as well as the extent of coniferous forests and LSOG coniferous forests on BLM and NFS lands.

TABLE COBA-1	
Number of <i>Collybia bakerensis</i> Sites (2017)	
Location*	Number of Sites
Regional Area	149
Local Area	21
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.	

Distribution of <i>Collybia bakerensis</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	145	21	2
BLM	-	-	-
NPS	3	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	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.

Distribution of <i>Collybia bakerensis</i> 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)	36	-	-
Congressionally Reserved (CR)	3	-	-
Late Successional Reserve (LSR)	62	2	-
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) ^{a/}	-	-	-
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	54	19	2
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

Collybia bakerensis is somewhat widely distributed across seven physiographic provinces in Washington (Western and Eastern Cascades and Olympic Peninsula), Oregon (Cascades West and East), and California (Klamath and Cascades) (see Figure COBA-1). The highest density of sites is found in the eastern Cascade Range in southern Oregon, where several sites are clustered near one another and the species appears to be locally abundant. Other sites are scattered across the Cascade Range throughout the NSO range, while one isolated site is located in the Olympic Peninsula of Washington and another is located in the Klamath Mountains of California. Although *C. bakerensis* is fairly common based on the overall number of sites, its distribution is scattered across the NSO range with a grouping of sites in the Cascade Range, and the species does not appear to be well distributed in its range within the region.

One of 149 known sites is located on private land; three sites are on NPS lands (Mount Rainier, North Cascades, and Olympic National Parks); and 145 sites are on NFS lands across the region.

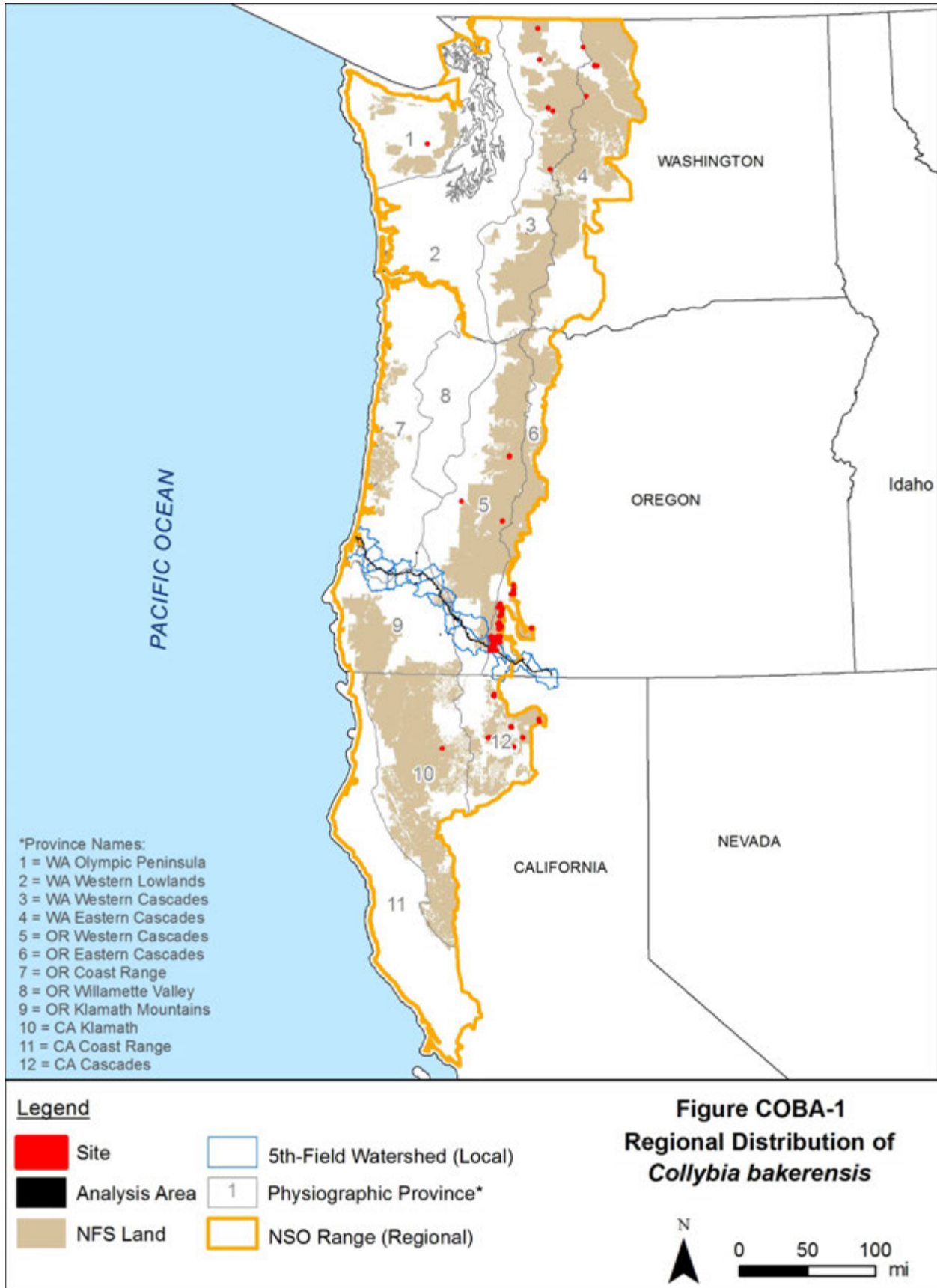
Sites included on National Forests that encompass the project area include one site on the Rogue River-Siskiyou National Forest and 119 sites on the Fremont-Winema National Forest. Sites managed by other National Forests include four sites on the Klamath National Forest, six sites on the Shasta-Trinity National Forest, two sites on the Modoc National Forest, five sites on the Willamette National Forest, four sites on the Mt. Baker-Snoqualmie National Forest, three sites on the Okanogan National Forest, and one site on the Wenatchee National Forest.

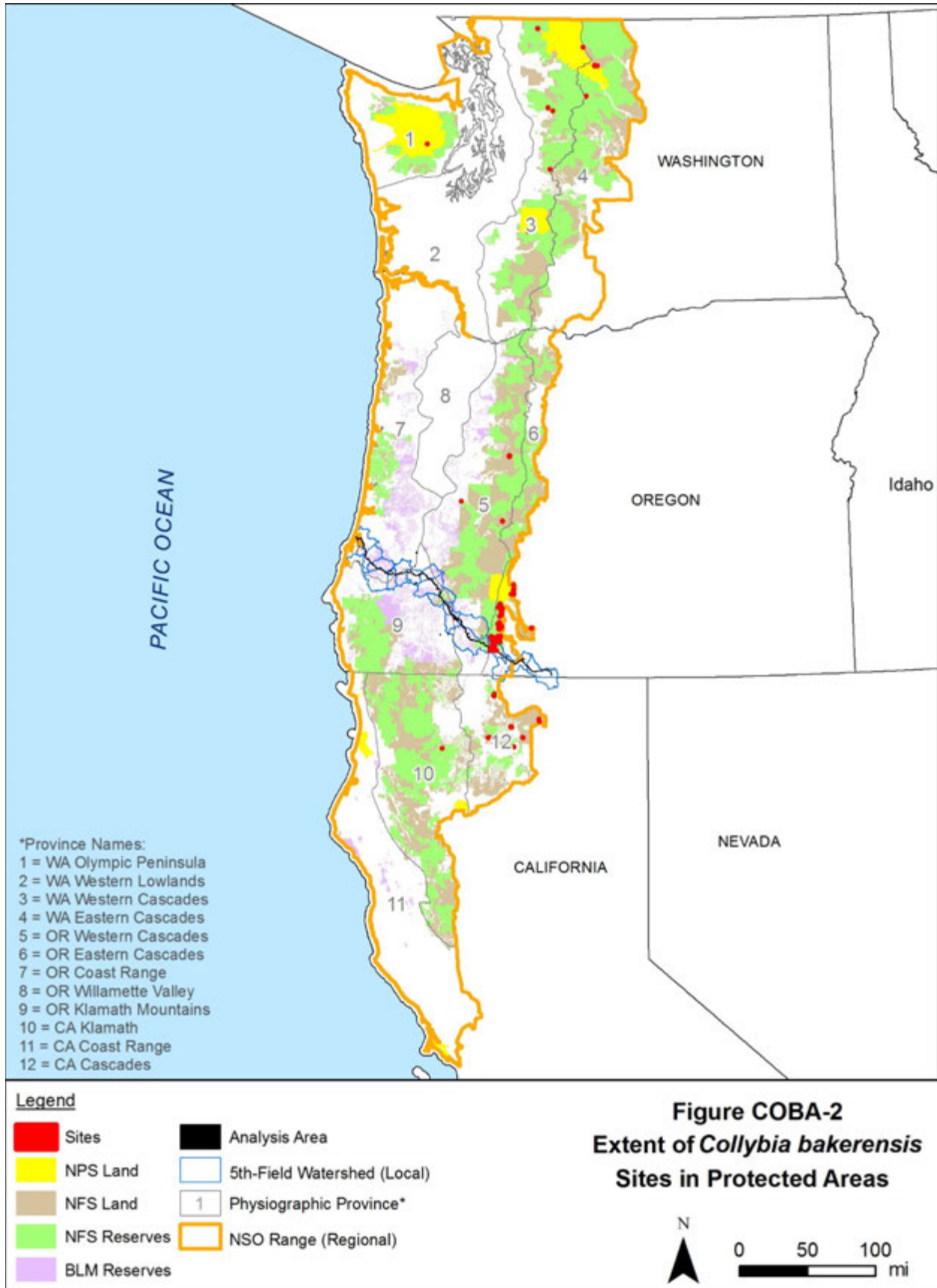
Across the NSO range, 64 sites are at least partially in reserve lands managed by the Forest Service, including 62 at least partially in LSRs and three at least partially in Congressionally Reserved areas (see Figure COBA-2). This represents 44 percent of the total NFS sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. The three NPS sites, while not covered by the S&M Standards and Guidelines, also likely receive some degree of protection through National Park management.

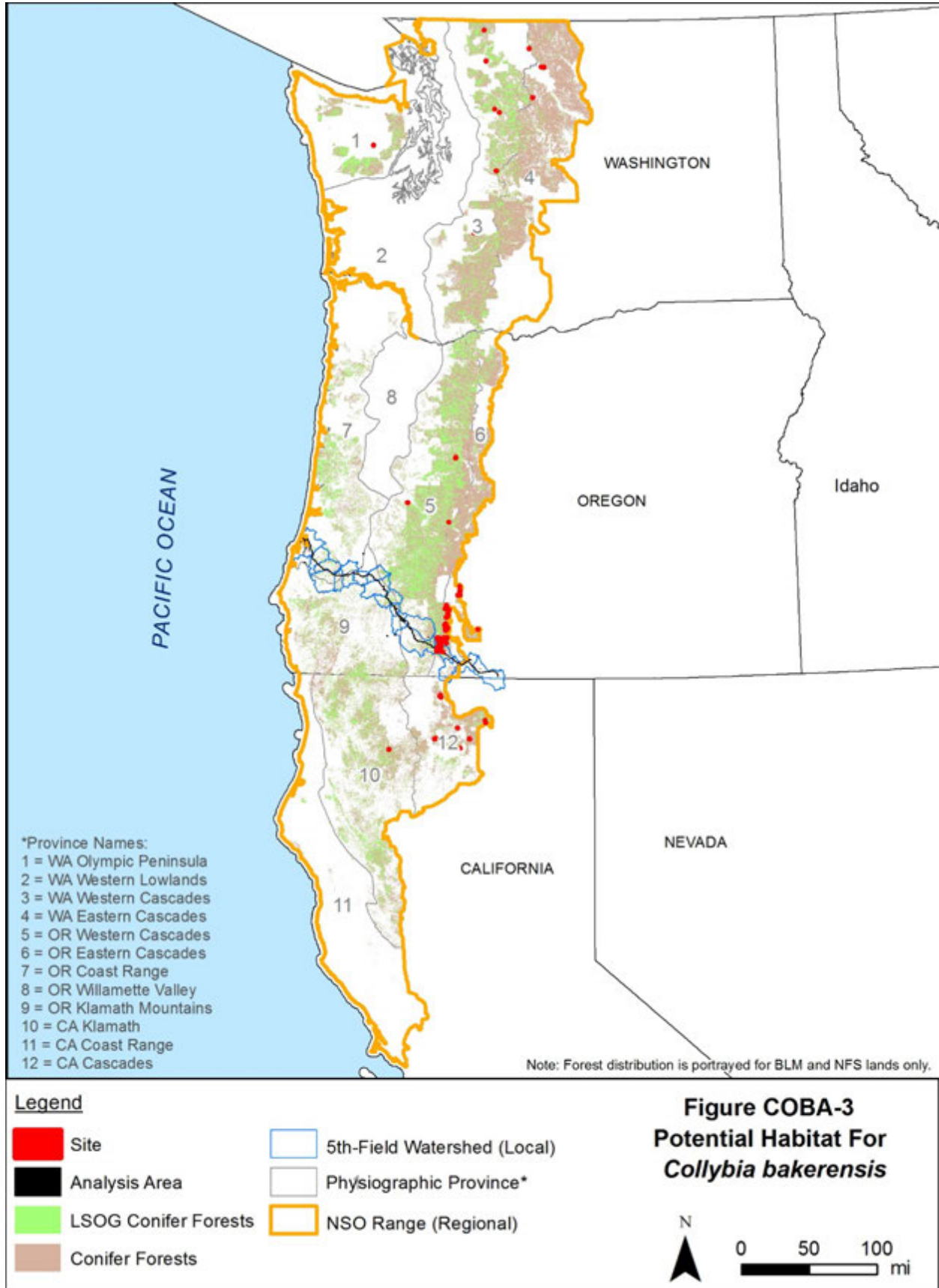
Collybia bakerensis is more common in LSOG forests based on available data (125 of 149 total sites are in LSOG), but it is also somewhat common in non-LSOG forests and may not be restricted to LSOG conditions. Based on current site locations, the species is found in coniferous forests across a wide elevation 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 forests, including the LSOG component of these forests, across the NSO range could provide habitat for *C. bakerensis* and support additional sites. These forests encompass an estimated 16.3 million acres on BLM and NFS lands in the region, including an estimated 9.9 million acres in reserve land allocations (61 percent of the forests; Table COBA-4). Of this acreage, an estimated 5 million acres are LSOG (see Figure COBA-3), including 3.3 million acres in reserve land allocations (66 percent of the forests). Although coniferous forests are widespread across the region, LSOG coniferous forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

Location	Coniferous Forests		LSOG Forests	
	Total	Reserves	Total	Reserves
Regional Area	16,275,479	9,902,802	5,025,899	3,337,509
Local Area	454,206	285,292	161,143	116,561
Project Area	1,018	686	294	207

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.







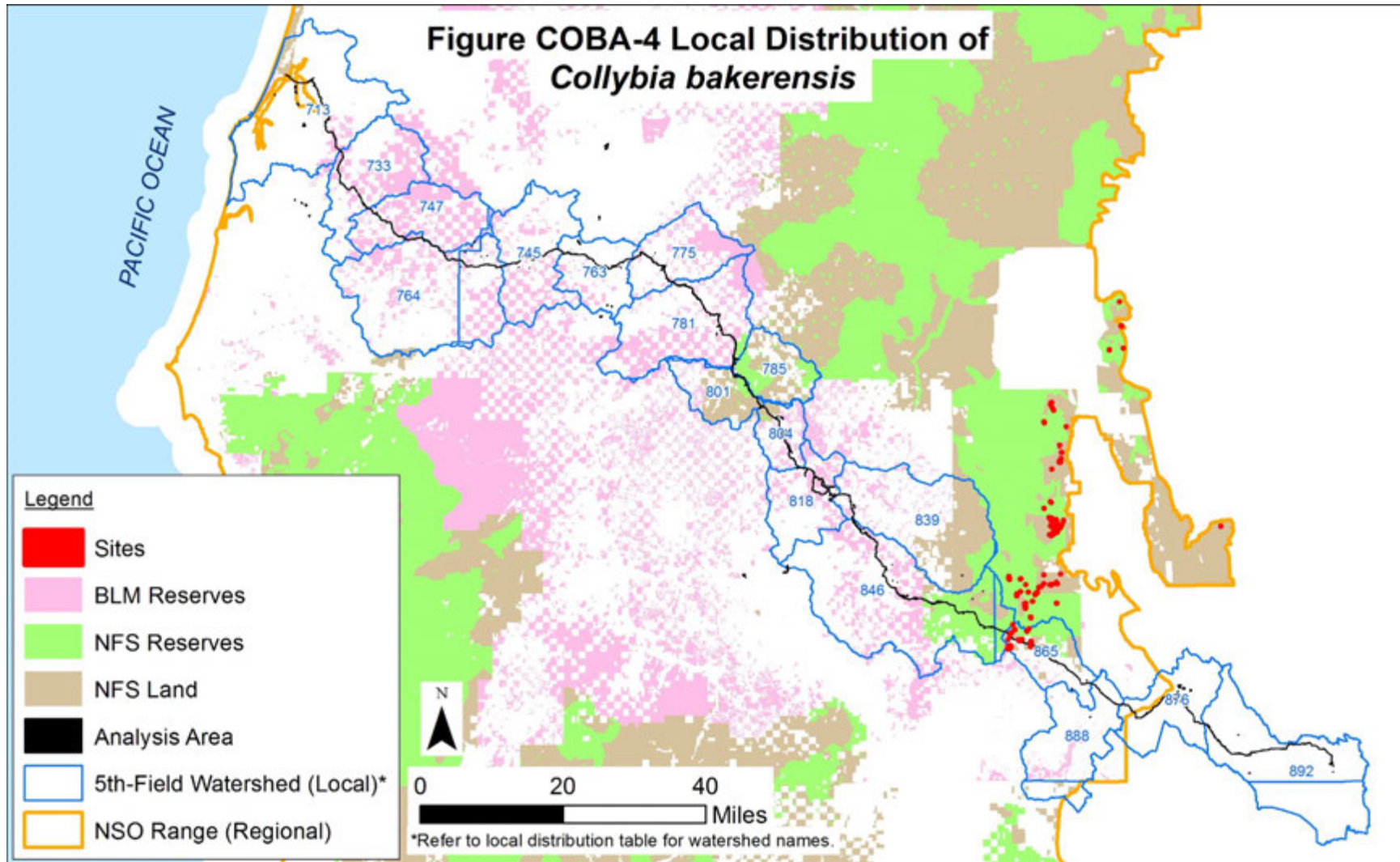
Local Distribution

Within the local area, *C. bakerensis* is found in two 5th-field watersheds that overlap the project area (see Fogire COBA-4 and Table COBA-5.) The sites in the local area are part of the large cluster of sites in the eastern Cascade Range in southern Oregon. Many regional sites are located within 20 miles of the local area to the north in the Cascade Range. All of the 21 sites in the local area are on NFS lands. These sites are primarily located on lands designated as Other (Matrix). Of the 21 sites in the local area, two sites are in reserve lands, representing 10 percent of the sites.

Coniferous forests encompass approximately 454,206 acres on BLM and NFS lands in the local area, with 285,292 acres in reserve land allocations (63 percent of the forests). Of this acreage, an estimated 161,143 acres are LSOG, including 116,561 acres in reserves (72 percent of the forests).

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)	3	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)	18	1	-
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 two sites of *C. bakerensis*. These sites are two of the many in the Spencer Creek watershed, as described in the Local Distribution discussion above. Both are on NFS land designated as Other (Matrix).

Surveys for the PCGP Project resulted in no observations of *C. bakerensis* in the survey area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). The recorded observations of the species in the analysis area are from agency databases and were recorded in 2000. Within the project area, one site is at MP 168.8, and one site is between MPs 173.7 and 173.8.

Project Impacts

Analysis

The PCGP Project would affect two out of the 145 sites on NFS lands in the region (no sites are on BLM lands), representing approximately 1 percent of the sites (or two out of 149 total sites on all lands in the NSO range). Table COBA-6 presents an overview of the features of the PCGP Project that would affect the *C. bakerensis* site. The construction corridor would affect approximately 1.4 acres within the sites (about 26 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 *C. bakerensis* 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.

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	2	1.1 ac
Temporary Extra Work Area (TEWA)	1	0.2 ac
Uncleared Storage Area (UCSA)	1	0.2 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.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 1.1 acres of vegetation and soils within the sites and could remove individuals of *C. bakerensis*. Disturbance in the TEWAs would result in similar impacts on about 0.2 acre within one site. The establishment of the corridor could modify microclimate conditions in the sites after the corridor is established. The removal of trees and woody debris and disturbance to soil could negatively affect site persistence by removing habitat and disturbing trees and understory components. 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 0.2 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.

Across the project area, the PCGP Project would remove an estimated 806 acres of coniferous forests, including 222 acres of LSOG coniferous forests. These impacts would result in a reduction of habitat that may be suitable for *C. bakerensis*. Within this impact area, about 427 acres (about 53 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 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. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the two sites as a result of the PCGP Project, 19 sites of *C. bakerensis* would remain on NFS lands in the local area, including two in reserves, and 143 sites, including 64 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 64 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 45 percent of the remaining *C. bakerensis* 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:

- *Collybia bakerensis* is a Category F (uncommon) S&M species throughout the NSO range. Per the 2001 ROD, information on Category F species is insufficient to determine what level of management is needed for reasonable assurance of species persistence, and known sites are not required to be managed. 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:
 - *Collybia bakerensis* changed from a Category B (rare) to Category F (uncommon) via the 2003 ASR.
 - *Collybia bakerensis* has a somewhat wide distribution across seven physiographic provinces and three states in the region and a moderate-high number of overall sites (145 on NFS lands, 149 on all lands). This species is locally abundant in the southern Cascade Range in Oregon, but is less abundant in other parts of its range within the

NSO range. The currently known number of sites on NFS and BLM lands has increased by 21 sites since 2007.

- Coniferous forests (general habitat for the species) are widespread across the region and encompass approximately 16.3 million acres on BLM and NFS lands with an estimated 61 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 145 sites of *C. bakerensis* on NFS lands, representing about 1 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 (143) would continue to be documented on NFS lands in the region with a somewhat wide distribution across Washington, Oregon, and California. Several sites (19 sites) would remain in the local vicinity of the analysis area; these sites would continue to be distributed across two 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 any sites in reserves, and the percentage of sites in reserves would be the same. Of the remaining sites on NFS lands, 62 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 *C. bakerensis* are unlikely.
- The PCGP Project would result in a permanent loss of an estimated 190 acres of coniferous forests (less than 1 percent of the total regional acreage). An estimated 9.9 million acres (61 percent) of coniferous forests and 3.3 million acres (66 percent) of LSOG coniferous forests would remain in reserves in the NSO range.
- The remaining forests could support additional populations of *C. bakerensis*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Collybia bakerensis* is a Category F species for which its status is undetermined; therefore, pre-disturbance surveys are not applicable. 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.

2.8.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *C. bakerensis* 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, 143 sites would remain on NFS lands across the region, and 19 sites would remain on NFS lands in the local area. Although the PCGP Project would affect site persistence of *C. bakerensis* at two sites, these sites are part of a group of sites in the Cascade Range in southern 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. *Collybia bakerensis* would persist in the region without considering the sites as part of the population.

- The PCGP Project would remove approximately 806 acres of coniferous forests and 222 acres of LSOG coniferous forests (a negligible amount of the forests). An estimated 53 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 9.9 million acres (61 percent) of coniferous forests and 3.3 million acres (66 percent) of LSOG coniferous 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 the NFS land management plan 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, many sites are scattered across the region and are less likely to be collectively affected by a single event.

As a Category F species, the Forest Service does not require management of *C. bakerensis*. This analysis is provided to assess potential impacts and to fulfill National Environmental Policy Act disclosure. The PCGP Project would not be able to avoid impacts to the *C. bakerensis* sites in the analysis area, although some individuals within the sites may persist following project implementation. Based on the above conclusions, avoidance of the two *C. bakerensis* sites is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence.

2.9 COLLYBIA RACEMOSA

Collybia racemosa is a gilled mushroom species in the Tricholomataceae family and is commonly known as branched collybia or branched shanklet. *Collybia racemosa* is also known as *Dendrocollybia racemosa*.

2.9.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *C. racemosa* as a Category B (rare) species. ORBIC evaluated *C. racemosa* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and again in the update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2013). In 2013, the species was considered to be at high to moderate risk of extinction due to very restricted range, very few populations, steep declines, or other factors, within its global range (G2G3). In Oregon, it was considered to be at high risk of extinction due to rarity and at high risk of extinction due to very restricted range, very few populations, steep declines, or other factors (S1S2). In 2016, the species was considered too common and was dropped from the ORBIC lists (ORBIC 2016). In Oregon, it is not considered a BLM Sensitive or Strategic species, however, it is considered a Forest Service Strategic species

2.9.2 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

Collybia racemosa is mycoparasitic and fruits after rapidly digesting its host (fleshy mushrooms) (ORBIC 2004). It appears to prefer the Nigricans group of *Russula* species (Trappe, pers. comm. 2013), although it has also been found on rotting or mummified remnants of Agarics (gilled mushrooms) and occasionally in nutrient-rich leaf mulch (Castellano et al. 2003). It has been documented fruiting in autumn in the range of the NSO (Castellano et al. 2003). *Collybia racemosa* forms protective sclerotia which likely enable it to lie dormant for long periods of time. After dormancy, the species utilize the sclerotia to grow vegetatively or produce new fruit bodies (ORBIC 2004). The mushroom produces both sexual and asexual spores.

Range

Collybia racemosa is widespread but locally uncommon in the northern hemisphere (ORBIC 2004). Its range in the Pacific Northwest extends from California north to coastal British Columbia, and most recorded observations are from the California coast (Trappe, pers. comm. 2013). In Oregon, *C. racemosa* is widely distributed from Mount Hood south along the western slope of the Cascade Range to the California border and west to the Siuslaw National Forest near the Pacific Ocean. Based on data available in 2004, it had a spotty distribution throughout its range. 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 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 reported *C. racemosa* from 33 element occurrences in the Pacific Northwest in 2004. Most of these occurrences were in California (16), with fewer in Oregon (9) and Washington (8) (ORBIC 2004). In 2004, *C. racemosa* was considered to be widespread, but locally rare (ORBIC 2004). The species was found in four locations during Random Multi-Species surveys across the NSO range from 2001 to 2004 (USDA and USDI 2007). Molina (2008) documented 12 new sites of *C. racemosa* in the NSO range between 1998 and 2006, and 43 total sites were documented by 2006, including 14 in reserves or protected areas. The 2007 Final SEIS reported 19 sites on NFS and BLM lands and 36 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 between 2010 and 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 equivalent-effort surveys targeted all Category B

species and also included incidental observations of S&M fungi under other categories, and no new observations of *C. racemosa* were recorded. Based on the increased number of known sites since 1998 as a result of the increased number of surveys (a 40 percent increase between 1998 and 2006 per Molina 2008 records), additional surveys would be expected to locate additional populations within the NSO range, particularly in the Cascade Range, 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

Prior to 1994, *C. racemosa* was primarily found in LSOG coastal forests (Holthausen et al. 1994). It has been documented in mixed hardwood-coniferous forests in California (The Fungi of California 2010) and may be associated with forest litter, duff, or debris (Cushman and Huff 2007). Based on available information, *C. racemosa* may prefer specific microclimate conditions of LSOG forests, but it may also be found in other forests with host mushrooms and favorable conditions. The mushroom grows gregarious or solitary on the fruit bodies or the remains of fruit bodies of other mushroom species (Castellano et al. 2003, The Fungi of California 2010, Holthausen et al. 1994). Hughes et al. (2001) and Aurora (1986) have suggested that hosts include members of the *Lactarius* and *Russula* genera. Additionally, one study has documented thick-shirted brittle gills (*Russula crassotunicata*) as a *C. racemosa* host (Machnicki et al. 2006).

Threats

Threats to *C. racemosa* are those that affect its host mushroom, general habitat, microclimates, and the substrate or symbiotic partner of the host (ORBIC 2004). *Collybia racemosa* is particularly vulnerable to removal of the host mushroom and substrate prior to fruiting or sclerotia formation. The removal or destruction of the sclerotia and destruction of the habitat that fosters growth of the intended host could affect populations of the species. It is also presumably vulnerable to alteration of microhabitats and microclimate regimes (e.g., stream diversion, road construction, development). Other threats include incidental catastrophic events (wildfires), road construction, development, heavy logging activities, and other activities that displace the protective sclerotia or host mushroom populations.

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 *C. racemosa*:

- As a parasitic fungus, *C. racemosa* use other living fungi as hosts. Consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.9.3 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. racemosa* 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 CORA-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 83 observations from BLM and Forest Service geodatabases were converted into 71 sites in the NSO range (region). Table CORA-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table CORA-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 CORA-1 displays the regional distribution of the species across NFS lands, Figure CORA-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure CORA-2 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.

Number of <i>Collybia racemosa</i> Sites (2017)	
Location*	Number of Sites
Regional Area	71
Local Area	7
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.	

Distribution of <i>Collybia racemosa</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	24	1	1
BLM	24	6	-
NPS	4	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	26	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.			

Distribution of <i>Collybia racemosa</i> 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)	2	-	-
Congressionally Reserved (CR)	3	-	-
Late Successional Reserve (LSR)	8	-	-
Marbled Murrelet Area (LSR3)	1	-	-
Northern Spotted Owl Activity Center (LSR4) a/	1	-	-
Managed Late Successional Area (MLSA)	-	-	-

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Not Designated (ND)	-	-	-
Other (Matrix, Other)	3	1	1
Riparian Reserve	1	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	-	-	-
District Designated Reserve	8	3	-
Harvest Land Base	9	4	-
Late Successional Reserve	13	1	-
Not Designated (ND)	9	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	10	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

Collybia racemosa has a wide, but scattered, distribution across nine physiographic provinces in Washington (Western and Eastern Cascades, Western Lowlands, and Olympic Peninsula), Oregon (Coast Range, Cascades West, and Klamath Mountain), and California (Klamath and Coast) (see Figure CORA-1). The sites are scattered primarily along the Cascade and Coast Ranges and Klamath Mountains. A few groups of clustered sites are located in the Coast Range in California. Although *C. racemosa* is widely distributed across the NSO range, its distribution is scattered with few clusters of sites, despite the extent of forests that may provide suitable habitat. Based on the species' currently known distribution, *C. racemosa* does not appear to be well distributed within its range in the NSO range.

Twenty-six of the 71 known sites are at least partially located on private, state, or other lands; four sites are on NPS lands (Mount Rainier, Olympic, and Redwood National Parks); 24 sites are at least partially on NFS lands; and 24 sites are at least partially on BLM lands. Sites managed by the Forest Service that encompass the project area include three sites on the Rogue River-Siskiyou National Forest and one site on the Umpqua National Forest. The remaining sites on NFS lands occur on the Mt. Baker-Snoqualmie, Okanogan-Wenatchee, Mt. Hood, Siuslaw, Willamette, and Six Rivers National Forests.

Across the NSO range, 13 sites are located in reserve lands managed by the Forest Service, including eight in LSRs; one each in a Marbled Murrelet Area, Known Owl Activity Center, and Riparian Reserve; and three in Congressionally Reserved areas. One of these sites partially occurs in both LSRs and Riparian Reserves (see Figure CORA-2). These sites represent 54 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, 12 sites are located entirely in reserve lands managed by BLM, which represent 50 percent of the total number of BLM-managed sites in the region. While the 12 BLM sites in reserve lands and the four NPS sites are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through the BLM reserve system and National Park management.

Collybia racemosa is more common in LSOG forests based on available data (60 of 71 total sites are in LSOG), but it is somewhat common in non-LSOG forests and may not be restricted to LSOG conditions. 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, across the NSO range could provide habitat for *C. racemosa* 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 CORA-4). Of this acreage, an estimated 6.1 million acres are LSOG (see Figure CORA-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 region, LSOG forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

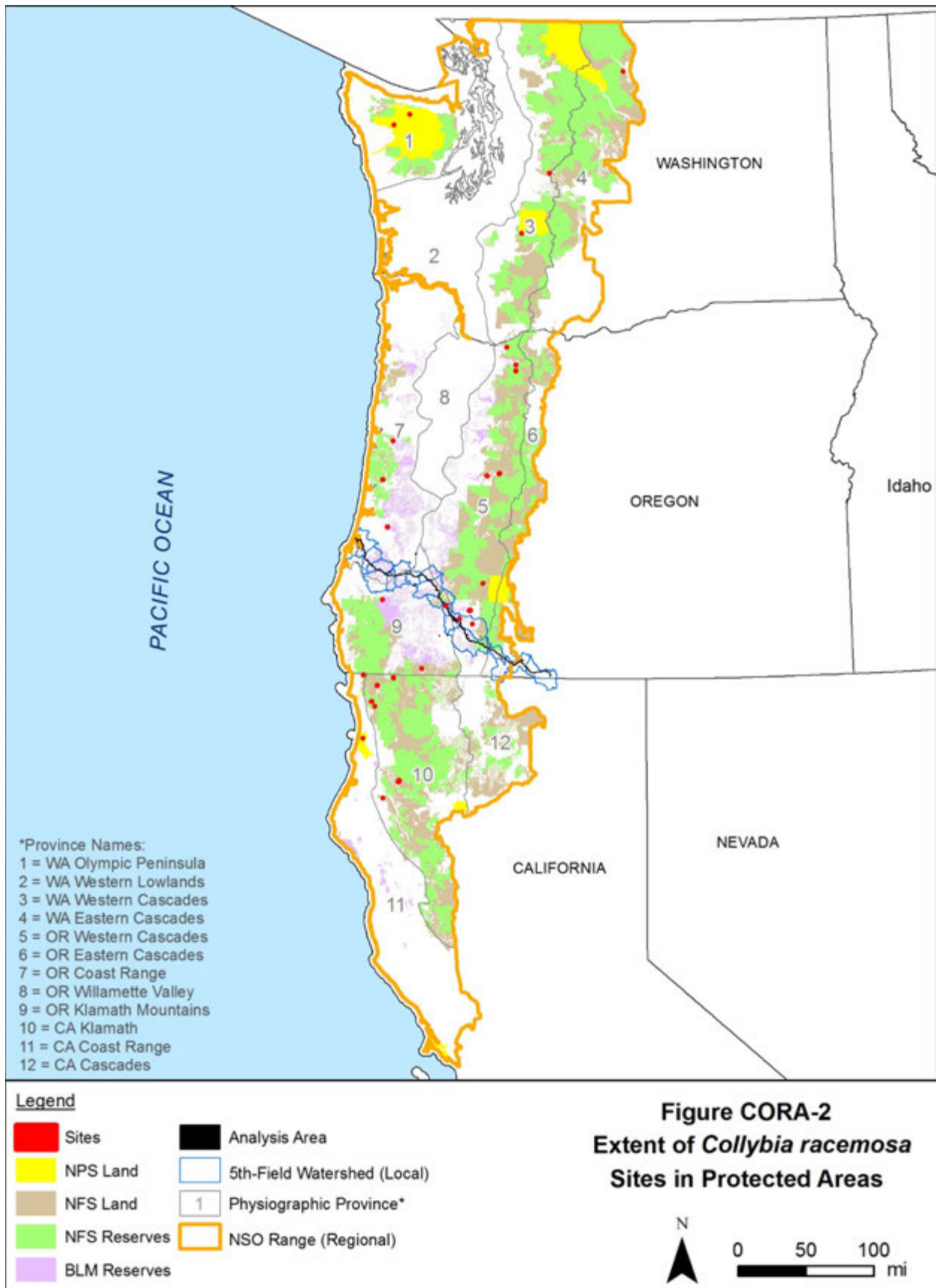
TABLE CORA-4

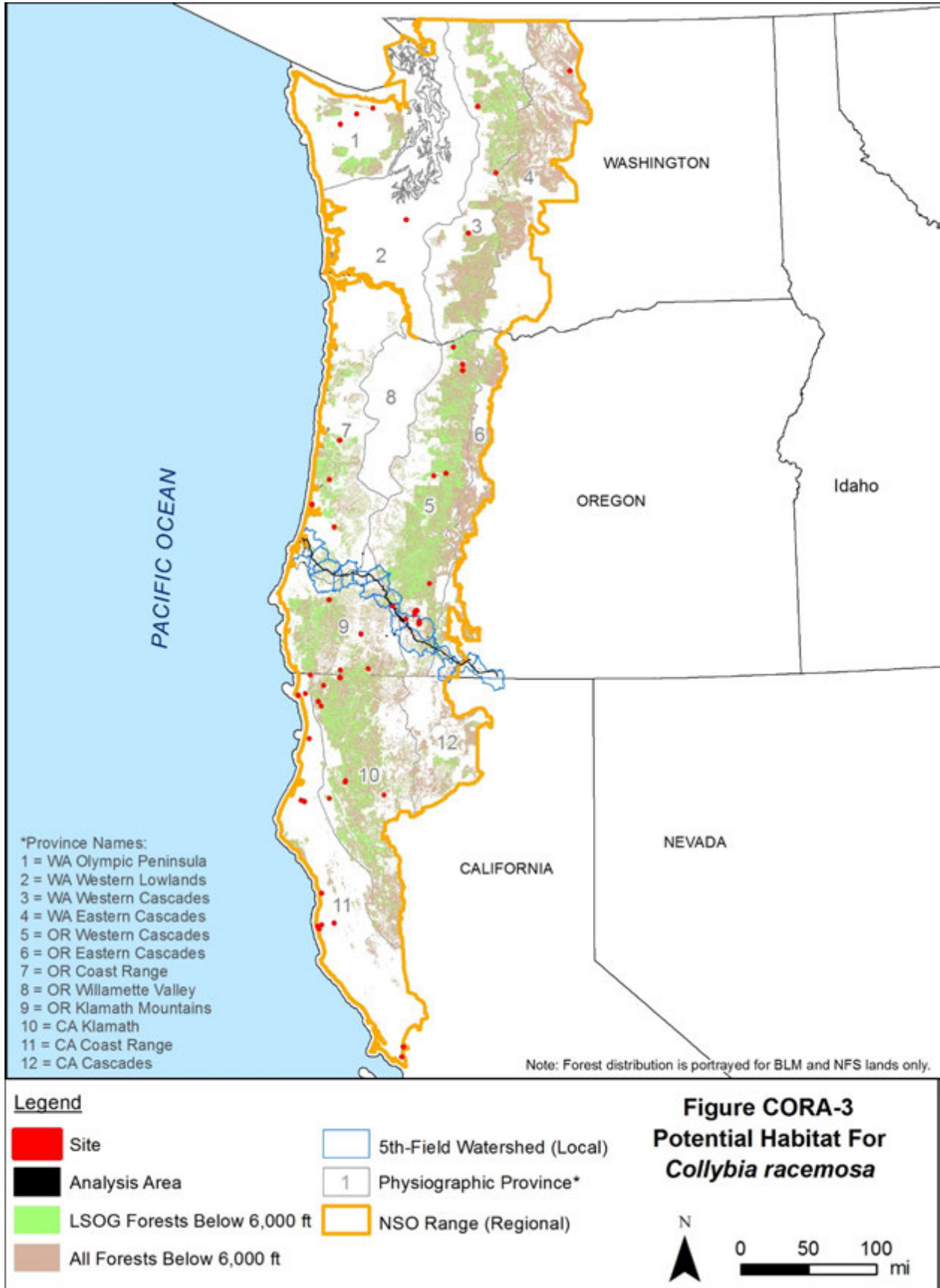
Extent of Forests That Could Provide Habitat for *Collybia racemosa* on BLM and NFS Lands ^{a/}

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.







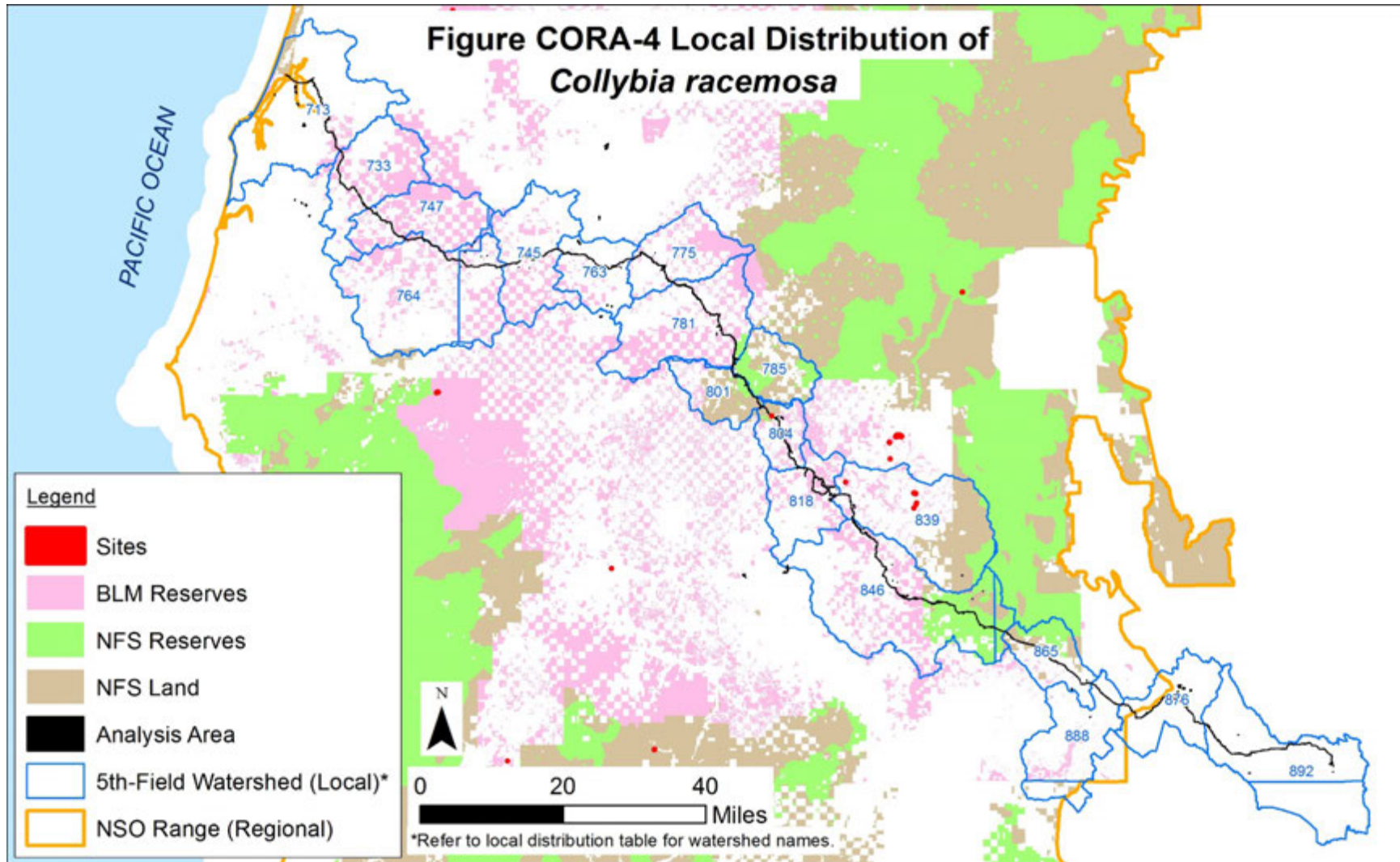
Local Distribution

Within the local area, *C. racemosa* is found in two 5th-field watersheds (Big Butte Creek and Trail Creek) that overlap the project area (see Figure CORA-4 and Table CORA-5.) One local site is located on NFS lands in the Trail Creek watershed, on lands designated as Other (Matrix). The remaining six sites are located on BLM lands in the Big Butte Creek watershed, two of which are entirely in reserves. The NFS site in the Trail Creek watershed appears to be isolated from other sites in the region, with the nearest site located on BLM land in the local area, approximately 13 miles to the southeast. The six sites on BLM lands in the Big Butte Creek watershed are part of a larger group of sites, with several clustered sites located about 8 miles north in the Cascade Range. Some connectivity appears to be available between the local sites and the nearby group of sites in the Cascade Range in Oregon (see Figure CORA-4). The distribution patterns of the regional sites indicate that dispersal opportunities likely exist between sites in the Cascade Range and Klamath Mountains.

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 (73 percent of the forests).

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	6	-	6
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)	-	-	-
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)	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.



Analysis/Project Area Distribution

The analysis and project areas contain one site of *C. racemosa*. This site is on NFS land designated as Other (Matrix) on the Umpqua National Forest. The site is fairly isolated, with the nearest sites located approximately 13 miles east and south east in the Cascade Range and 30 miles south in the Klamath Mountains in southern Oregon.

Surveys for the PCGP Project resulted in one observation of *C. racemosa* in the survey area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]).

Project Impacts

Analysis

The PCGP Project would affect one site out of the 24 sites on NFS lands in the region, representing approximately 4 percent of the sites (or one out of 71 total sites on all lands in the NSO range). Table CORA-6 presents an overview of the features of the PCGP Project that would affect the *C. racemosa* site. The construction corridor and associated storage areas would affect approximately 0.9 acre (39 percent) of the site (the site is approximately 2.3 acres), and the corridor would cross through the central portion of the site (see Figure CORA-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 *C. racemosa* in and near the project area. Due to the scattered distribution of the species and relatively few sites near the project area, 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.

The PCGP Project would result in ground disturbance and vegetation removal across the central portion of the site near MP 113. The recorded observation of the species is in the center of the project area and would be directly affected by activities within the corridor (see Figure CORA-5).

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	1	0.7 ac
Temporary Extra Work Area (TEWA)	-	-
Uncleared Storage Area (UCSA)	1	0.2 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.

Establishment of the 95-foot wide construction corridor would disturb vegetation and soils around the recorded observation within the site and would result in removal of individuals. The area within the site is forested and appears to be on a ridgetop, and a dirt road is located just outside the site to the north and east. The establishment of the corridor could modify microclimate conditions around the recorded observation. The removal of forests and host mushrooms and disturbance to soil would negatively affect *C. racemosa* by removing its habitat and affecting its association with other mushrooms, 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-

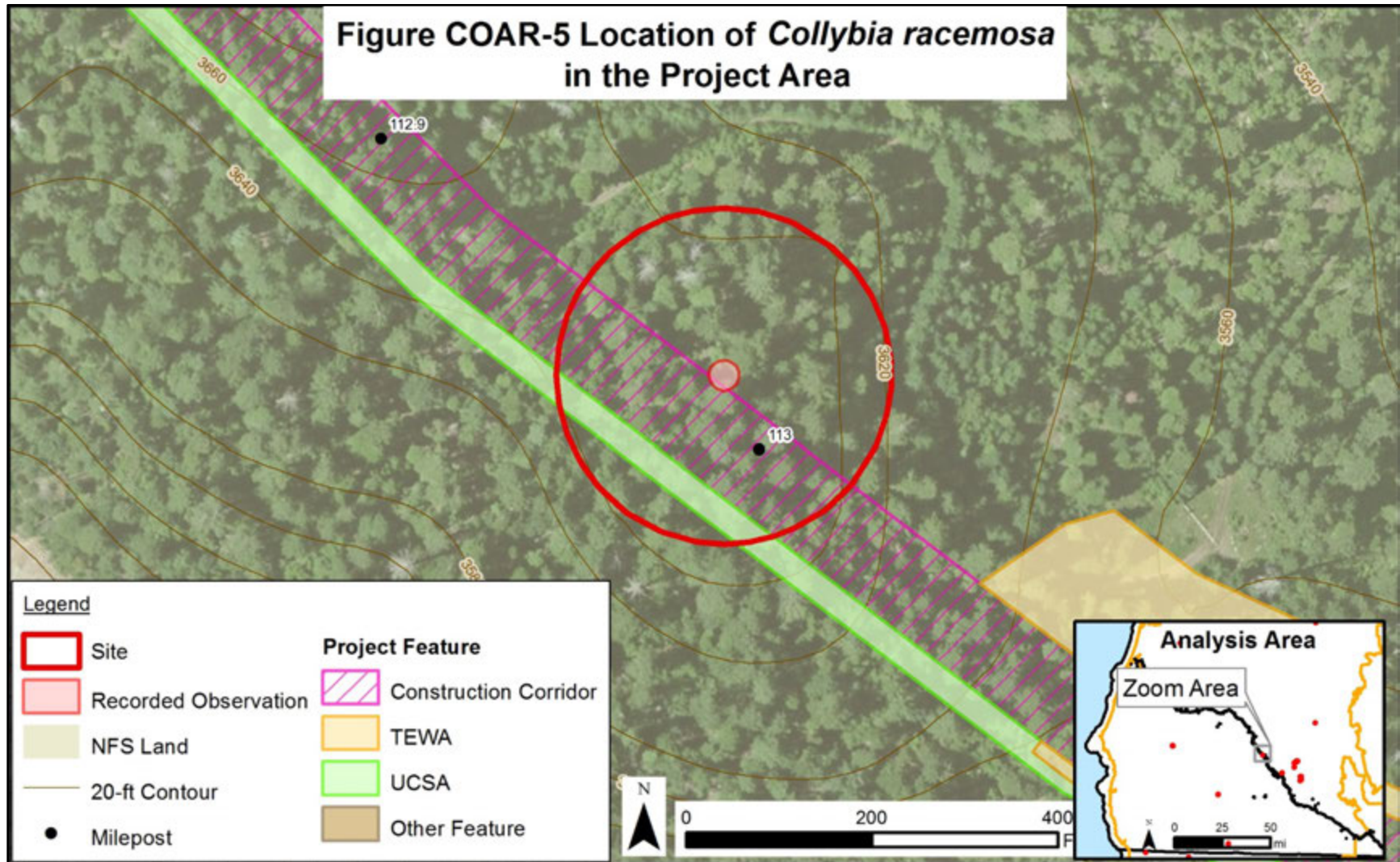
term changes to habitat conditions. A 30-foot wide portion of the corridor would be maintained in low-growing vegetation for pipeline maintenance and would not provide habitat for the species during the life of the project. Material storage within a UCSA could remove host mushrooms and would disturb understory habitat within the site, which could also modify microhabitats, potentially making the habitat no longer suitable for the species.

Based on this analysis, *C. racemosa* is not likely to persist at the site following project implementation. This site is one of only seven sites in the local area and is one of several scattered sites across the Klamath Mountains and Cascade Range. It may contribute to dispersal of the species between other sites to the north in the Cascade Range and sites to the southwest in the Klamath Mountains in Oregon and California. However, if the species does not persist at this site, *C. racemosa* would still be found in the Klamath Mountains in California and Oregon and the Cascade Range in Oregon, and opportunities for dispersal across the mountain ranges would still exist based on the distribution of other sites in the region.

Across the project area, the PCGP Project would remove an estimated 1,132 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl, including 244 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *C. racemosa*. 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 245 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 site as a result of the PCGP Project, six *C. racemosa* sites would remain on BLM lands in the local area, two of which are entirely in reserves. A total of 23 sites would remain on NFS lands in the regional area, including 13 in reserves, and 24 sites would remain on BLM lands in the regional area, including 12 entirely in reserves. The remaining sites could be affected by natural hazards (e.g., fire, drought), but the sites on NFS lands would be subject to the S&M Standards and Guidelines and applicable management recommendations with regard to agency-related actions. The 13 sites in NFS 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 12 sites in reserves would likely receive some level of protection under BLM management. Based on these site counts, approximately 56 percent of the remaining *C. racemosa* sites on NFS lands in the NSO range would be protected in NFS 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:

- *Collybia racemosa* 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:
 - *Collybia racemosa* has a wide, but scattered, distribution across nine physiographic provinces and three states in the region and a low-moderate number of overall sites (24 on NFS lands, 71 on all lands). *Collybia racemosa* does not appear to be well distributed in any part of its range because sites are fairly scattered. The currently known number of sites on NFS and BLM lands has increased by 33 sites since 2007, with one site documented during the PCGP Project surveys.
 - An estimated 69 percent of the sites (33 sites) are in reserves, which is an increase of about 19 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 PCGP Project would affect one of 24 NFS-managed sites of *C. racemosa*, 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 (23) would remain on NFS lands in the region. Twenty sites would remain in BLM reserves in the regional area, including six sites 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 reserves. Of the remaining NFS sites, 10 are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and three are in Congressionally Reserved areas where management activities that may adversely affect *C. racemosa* are unlikely. Twelve BLM sites are entirely in 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 District Designated Reserves where management activities that may adversely affect *C. racemosa* are unlikely.

- The PCGP Project would result in a permanent loss of an estimated 246 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 below 6,000 feet msl and 4million acres (66 percent) of LSOG forests would remain in reserves in the NSO range.
- The remaining forests may support additional populations of *C. racemosa*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Collybia racemosa* 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.

2.9.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *C. racemosa* 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, while no sites would remain on NFS lands in the local area, 23 sites would remain on NFS lands across the region. Additionally, six sites would remain on BLM lands in the local area (all in reserves), and 24 sites would remain on BLM lands in the regional area, including 20 in reserves. Although the PCGP Project would affect site persistence of *C. racemosa* at one site, the site is part of several scattered sites in the Klamath Mountains and Cascade Range in Oregon and California. It is expected that BLM management would enable the majority of the sites in reserves to persist. Due to the presence of several sites in BLM reserves in the local area and several more sites located on both NFS lands and BLM reserves in the vicinity of the local area, it can be assumed that *C. racemosa* would be protected and remain scattered across the Klamath Mountains and Cascade Range in southern Oregon. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Collybia racemosa* would persist in the region without considering the site as part of the population.
- The PCGP Project would remove approximately 1,132 acres of coniferous, mixed hardwood-coniferous, and hardwood forests and 243 acres of LSOG 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 be maintained across the project area. An estimated 11.3 million acres (59 percent) of coniferous, mixed, and hardwood forests below 6,000 feet msl 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 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 sites in BLM reserves are expected to receive some level of

protection under the BLM 2016 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. racemosa* site in the analysis area. Based on the above conclusions, avoidance of the *C. racemosa* 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 *C. racemosa* 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.

2.10 CORTINARIUS MAGNIVELATUS

Cortinarius magnivelatus is a gilled mushroom species in the Cortinariaceae family and has no common name.

2.10.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *C. magnivelatus* as a Category B (rare) species. ORBIC evaluated *C. magnivelatus* 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 and in Oregon (G3, S3, respectively). The species is on ORBIC List 3. It is not considered a BLM Sensitive or Strategic species in Oregon but it is considered a Forest Service Strategic species in Oregon.

2.10.2 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

Cortinarius magnivelatus is a mycorrhizal fungus that depends on host trees for nutrients (carbohydrates) and forms sporocarps beneath the soil surface (Castellano and O'Dell 1997). Fruiting occurs from May through August (Castellano et al. 1999). Its persistent membranous veil makes it a likely candidate for dispersal via mycophagy (consumption by animals) (Castellano and O'Dell 1997); however, spore prints confirm that the species can also forcibly discharge its spores (Arora 1986, Trappe et al 2009). The species has moderate dispersal capability such that extirpated populations generally become reestablished through natural recolonization (unaided by humans) (ORBIC 2004). It was originally described in 1941 as *Pholiota magnivelatus* from Sequoia

National Park in California and in 1969 it was transferred to *Cortinarius* (Castellano and O'Dell 1997).

Range

Cortinarius magnivelatus is restricted to western North America, including Nevada, Utah, Oregon, and California. It is also known from the Great Basin in eastern Nevada. It is recorded in several locations within Oregon: along Interstate 5 near Mount Ashland, in the Blue Mountains of the Umatilla National Forest and in the southern and eastern portion of the Cascades (ORBIC 2004). In California it is known from Bear Springs near Mt. Shasta, Lassen Volcanic National Park, and from high country in the northern to southern Sierra Nevada (Castellano et al 1999, ORBIC 2004). 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 six to 20 occurrences of *C. magnivelatus* distributed across the species' range. An estimated one to five of these occurrences were in Oregon and six to 20 occurrences were in California (ORBIC 2004). The number of occurrences in Nevada and Utah are unknown. Long term trends for the species show moderate decline to relatively stable in both its global range and in Oregon (ORBIC 2004). The species was not found in any locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented seven new sites of *C. magnivelatus* in the NSO range between 1998 and 2006, and 11 total sites were documented by 2006, including four in reserves or protected areas. The 2007 Final SEIS reported 10 sites on NFS and BLM lands and 10 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 *C. magnivelatus*, and resulted in five new observations of individuals or populations of *C. magnivelatus*. Based on the increased number of known sites since 1998 as a result of the increased number of surveys (an approximately 3-fold increase between 1998 and 2006 per Molina 2008 records), additional surveys would be expected to locate additional populations within the NSO range, particularly in the Cascade Range 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

Cortinarius magnivelatus occurs in old growth, montane coniferous forests (ORBIC 2004) at elevations above 4,500 feet (Castellano and O'Dell 1997). It is associated with the roots of various true fir species, Engelmann spruce (*Picea engelmannii*), sugar pine (*Pinus lambertiana*), and

ponderosa pine at elevations above 4,500 feet (Castellano and O'Dell 1997). It is solitary to gregarious under conifers and usually buried in the duff (Arora 1986). *Cortinarius magnivelatus*' environmental specificity is very narrow and it is considered a specialist species; because of this, its preferred habitat is limited (ORBIC 2004).

Threats

This taxon is believed to be at high risk under the Northwest Forest Plan because of its rarity and dependent mycorrhizal association with old-growth legacy, high-elevation conifers (Castellano and O'Dell 1997). Actions that disrupt stand conditions necessary for *C. magnivelatus* survival, particularly damage to host trees and soil disturbance, are major threats to this species. This includes logging that removes its presumed mycorrhizal host and other actions that cause disturbance to the soil, particularly road, trail, and campground construction (Castellano and O'Dell 1997). Other possible threats include hot fires, drought, climate change and insect infestations.

Management Requirements

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 *C. magnivelatus* along with several other species (a subset of Group 10 of Castellano and O'Dell 1997). The primary guidance is to identify likely habitats on federal lands that may support populations, survey these sites to reveal populations, and manage them to retain forest structure and soil conditions. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *C. magnivelatus*:

- As a mycorrhizal species, *C. magnivelatus* 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.

2.10.3 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. magnivelatus* 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 COMA-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

55 observations from BLM and Forest Service geodatabases were converted into 47 sites in the NSO range (region). Table COMA-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table COMA-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 COMA-1 displays the regional distribution of the species across NFS lands, Figure COMA-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure COMA-3 displays the species' regional distribution as well as the extent of coniferous forests and LSOG coniferous forests above 4,000 feet on BLM and NFS lands.

TABLE COMA-1	
Number of <i>Cortinarius magnivelatus</i> Sites (2017)	
Location*	Number of Sites
Regional Area	47
Local Area	16
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 COMA-2			
Distribution of <i>Cortinarius magnivelatus</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	28	7	5
BLM	20	10	-
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	2	2	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 COMA-3			
Distribution of <i>Cortinarius magnivelatus</i> 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)	8	-	-
Congressionally Reserved (CR)	-	-	-
Late Successional Reserve (LSR)	8	1	-
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) a/	-	-	-
Managed Late Successional Area (MLSA)	2	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	15	6	5
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	-	-	-
District Designated Reserve	5	1	-
Harvest Land Base	12	3	-
Late Successional Reserve	11	8	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	1	1	-

TABLE COMA-3			
Distribution of <i>Cortinarius magnivelatus</i> across 1994 ROD and 2016 RMPs Land Allocations			
National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
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

Cortinarius magnivelatus has a somewhat limited distribution across four physiographic provinces in Oregon (Klamath Mountains and Cascades East and West) and California (Cascades) (see Figure COMA-1). Most sites are found along the Cascade Range, with one group of sites located in the Klamath Mountains in Oregon. The species appears to only occur in southern Oregon and northern California in the NSO range and has a low-moderate number of sites. *Cortinarius magnivelatus* does not appear to be well distributed within its range in the NSO range.

Two of 47 sites are at least partially located on private or other lands; 20 sites are at least partially on BLM lands; and 28 sites are at least partially on NFS lands across the region. Sites included on National Forests that encompass the project area include 19 sites on the Fremont-Winema National Forest and three sites on the Rogue River-Siskiyou National Forest. The remaining sites on NFS lands include three sites on the Klamath National Forest and six sites on the Shasta-Trinity National Forest.

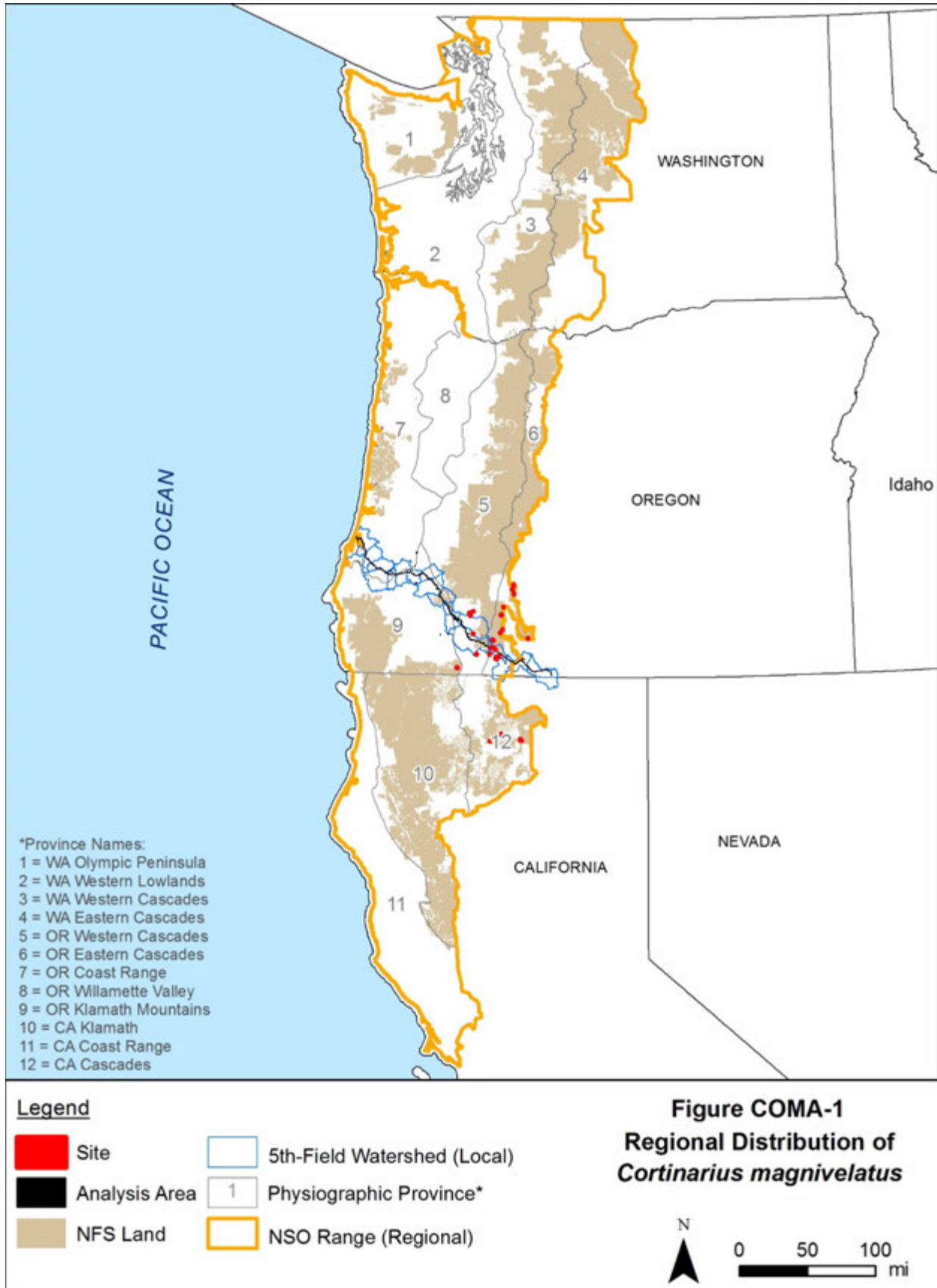
Across the NSO range, eight sites are at least partially located in reserve lands managed by the Forest Service (LSRs) (see Figure COMA-2). This represents 29 percent of the total Forest Service-managed sites in the region. The remaining Forest Service-managed sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, eight sites are entirely in reserve lands managed by BLM, which represents 40 percent of the total number of BLM-managed sites in the region. While sites on BLM lands are not covered by the S&M Standards and Guidelines, the sites entirely in reserves will likely receive some degree of protection under BLM reserve management.

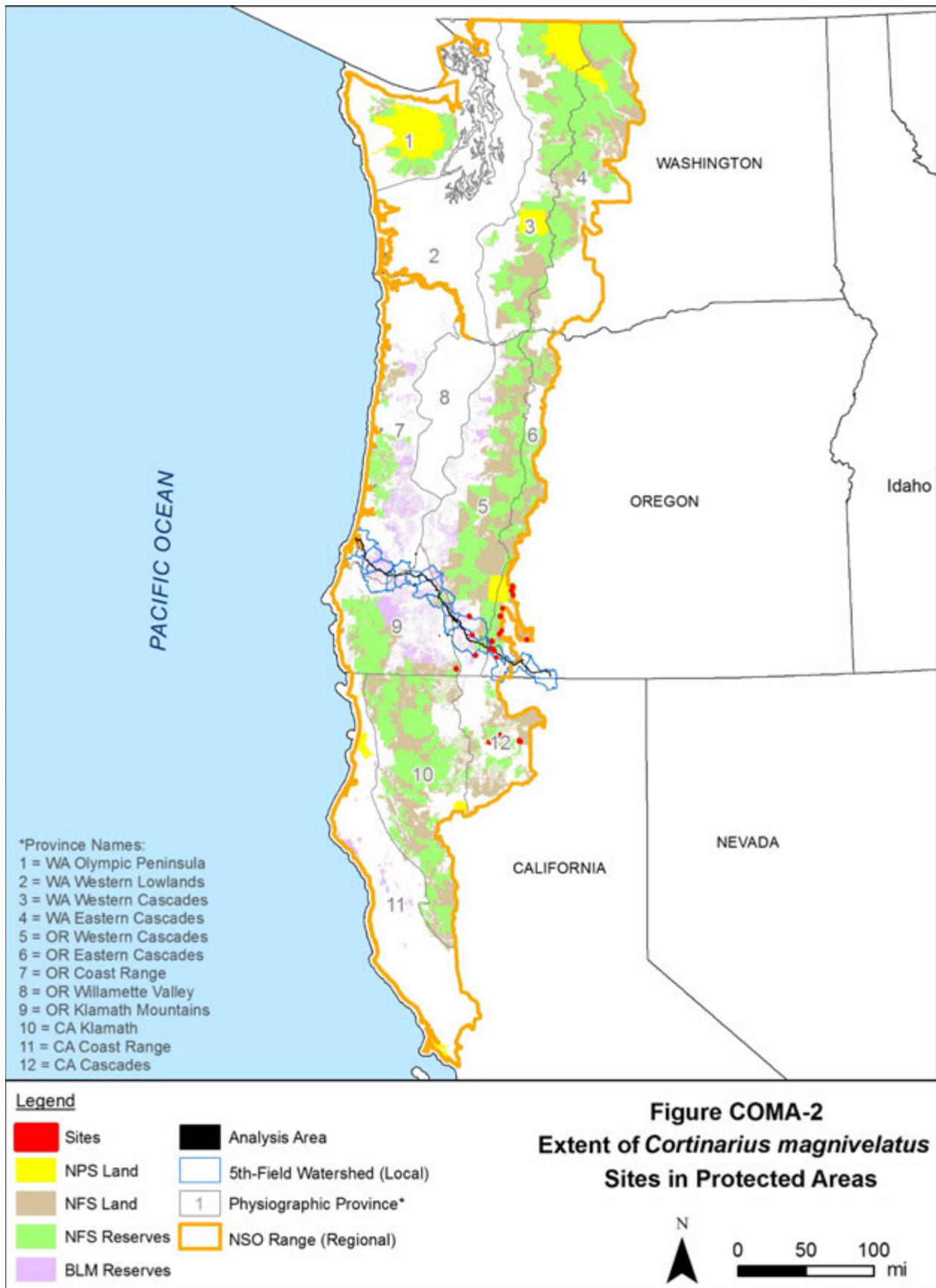
Cortinarius magnivelatus is primarily found in LSOG forests based on available data (31 of 47 total sites are in LSOG), but it is also found in non-LSOG forests and may not be restricted to LSOG conditions based on available information on its life history and habitat requirements. Based on current site locations, the species is found in coniferous forests above 4,000 feet msl and has only been documented 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 are included in this potential habitat discussion. Coniferous forests, including the LSOG component of these forests, across the NSO range could provide habitat for *C. magnivelatus* and support additional sites. These forests encompass an estimated 7.5 million acres on BLM and NFS lands in the region, including an estimated 4.7 million acres in reserve land allocations (63 percent of the forests; Table COMA-4). Of this acreage, an estimated 1.7 million acres are LSOG (see Figure COMA-3), including 1.1 million acres in reserve land allocations (67 percent of the forests). Although coniferous forests

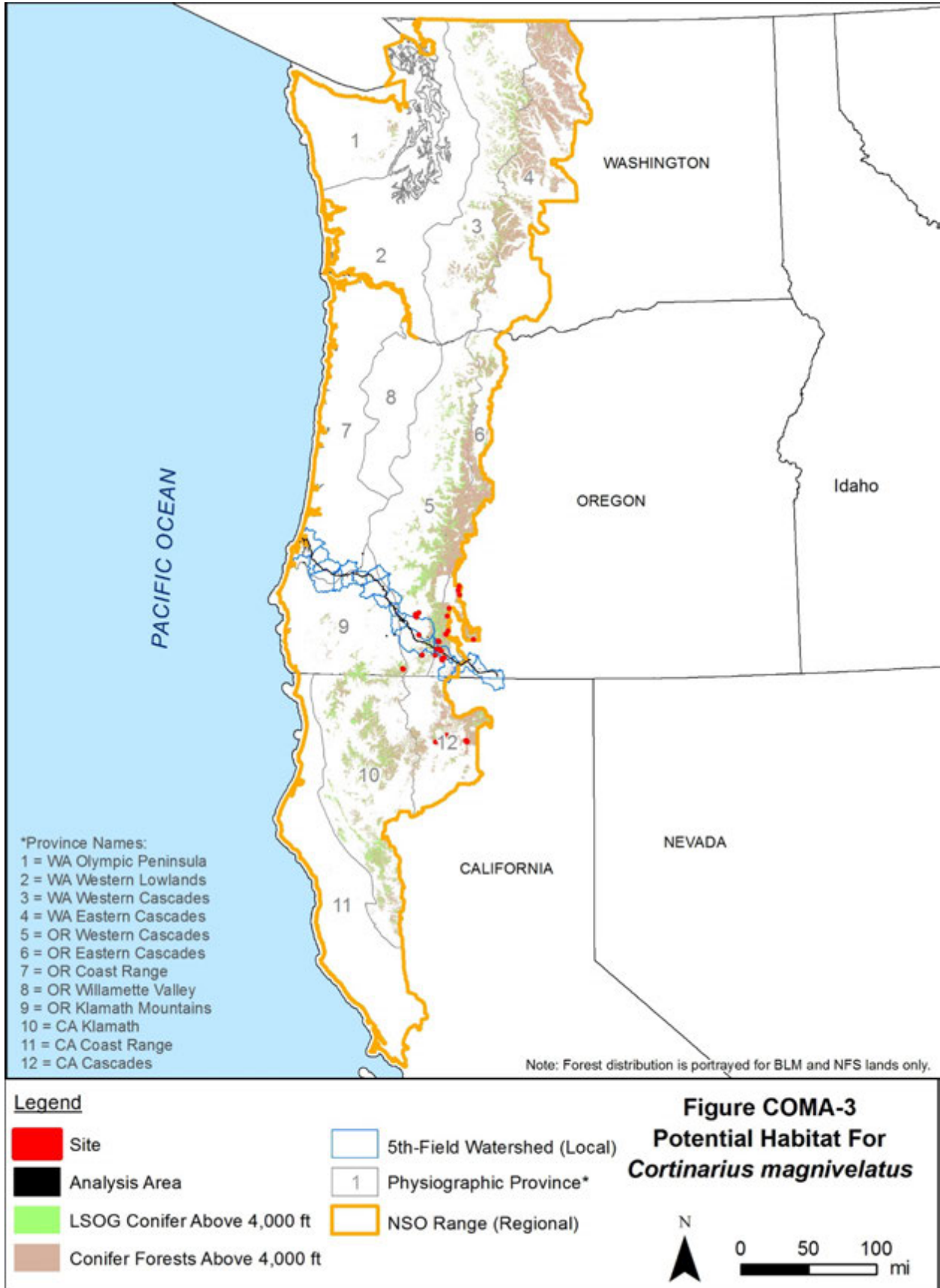
are widespread across the region, LSOG coniferous forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

TABLE COMA-4				
Extent of Forests That Could Provide Habitat for <i>Cortinarius magnivelatus</i> on NFS and BLM Lands ^{a/}				
Location	Coniferous Forests above 4,000 feet		LSOG Coniferous Forests above 4,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	7,471,720	4,733,729	1,688,359	1,127,276
Local Area	149,778	76,805	40,914	24,405
Project Area	422	277	122	76

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

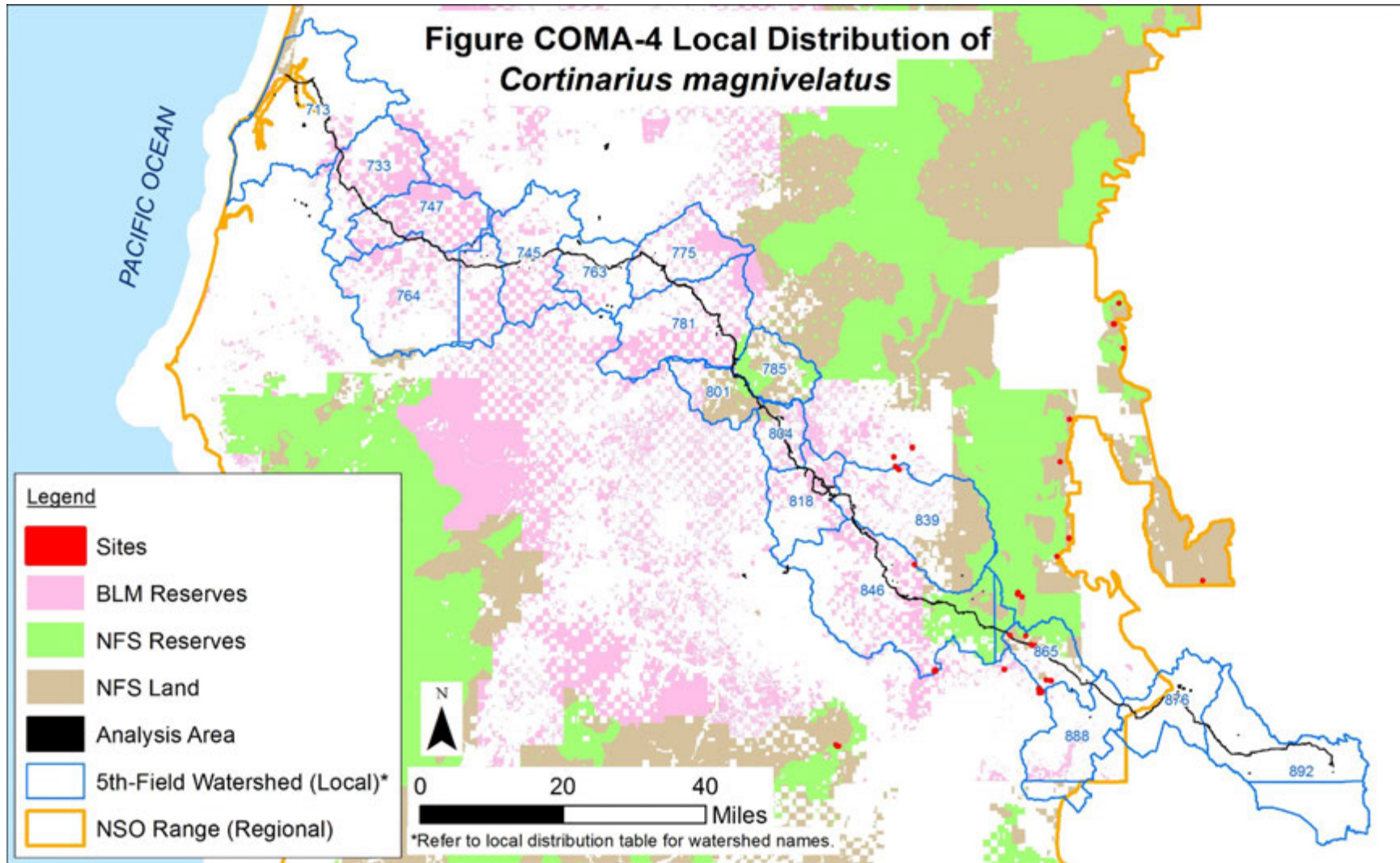
Within the local area, *C. magnivelatus* is distributed across three 5th-field watersheds that overlap the project area (see Figure COMA-4 and Table COMA-5.) The 16 sites in the local area are mainly clustered with some scattered sites located in the Cascade Range. Across these watersheds, multiple avenues 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 based on the proximity of other sites in the region. Within the Cascade Range, several sites are located on NFS lands or entirely in BLM reserves within 10 miles north and south of the local area.

Of the 16 sites in the local area, seven are at least partially on NFS lands. Most of these sites are located on lands designated as Other (Matrix), with one site located on LSR lands. Two sites are partially on private lands and 10 sites are at least partially on BLM lands. Of the local area sites, one site is in NFS reserve lands, representing 14 percent of the NFS sites and seven sites are entirely in BLM reserve lands, representing 70 percent of the BLM sites. All of the sites in the Big Butte Creek and Little Butte Creek watersheds are at least partially in reserves.

Coniferous forests encompass approximately 149,778 acres on BLM and NFS lands in the local area, with 76,805 acres in reserve land allocations (51 percent of the forests). Of this acreage, an estimated 40,914 acres are LSOG, including 24,405 acres in reserves (60 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 COMA-3 and COMA-4).

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	2	-	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)	5	-	5
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)	9	1	1
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 includes those that are partially in reserves.



Analysis/Project Area Distribution

The analysis and project areas contain five sites of *C. magnivelatus*, all of which are on NFS lands on the Fremont-Winema National Forest, and one site is partially on private lands as well. The analysis area sites are located in the Spencer Creek watershed on lands designated as Other (Matrix). Four sites are clustered and near one another, while the fifth site is more isolated. Many sites are also located within the immediate vicinity of the analysis area in the Cascade Range (see Local Distribution discussion above), including several sites on NFS lands within 10 miles north of the analysis area. While several sites are located on BLM lands approximately 7 miles south of the analysis area, these sites are at least partially on Harvest Land Base and would not likely be protected under BLM management. Several sites that are entirely in BLM reserves are located 13 miles southwest of the analysis area; these sites would likely receive some level of protection under BLM reserve management.

Surveys for the PCGP Project resulted in six total observations of the species in five locations in or near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). An estimated six of these recorded observations comprise the five sites in the analysis area; the other observations are in sites outside the analysis area. Within the project area, one site is located at approximately MP 168.8 and four sites are located between MPs 172.1 and 172.7.

Project Impacts

Analysis

The PCGP Project would affect five sites out of the 28 sites on NFS lands in the region, representing approximately 18 percent of the sites (or five out of 47 total sites on all lands in the NSO range). Table COMA-6 presents an overview of the features of the PCGP Project that would affect the *C. magnivelatus* sites. The construction corridor and associated work and storage areas would affect approximately 5.4 acres within the sites (about 31 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 *C. magnivelatus* in and near the project area. Due to the proportion of sites affected, the effects on five 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.

TABLE COMA-6		
Impacts to <i>Cortinarius magnivelatus</i> Sites on NFS Lands in the Project Area		
Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	5	3.9 ac
Temporary Extra Work Area (TEWA)	3	0.6 ac
Uncleared Storage Area (UCSA)	5	1.0 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 all five sites in the analysis area (Table COMA-7). The only recorded observations of the species in two of the sites (MP 168.8 and MP 172.4) would likely be removed during activities within the corridor (see Figures COMA-5 and COMA-6). The sites at MP 172.5 and MP 172.7 include observations that are 60 feet and 90 feet away from the project area, respectively. These observations outside the project area would not be directly affected, but may be subject to indirect effects. The site at MP 172.2 is a large site and includes three observations, two of which are within the corridor and would likely be removed. The remaining observation is 180 feet south of the project area and would not be directly affected. 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.

Site Location	Source of Impacts	Area of Disturbance	Individuals Likely to Persist?
MP 168.8	Corridor	0.8 ac	No
	TEWA	0.3 ac	
	UCSA	0.2 ac	
MP 172.2	Corridor	1.2 ac	Yes
	TEWA	0.1 ac	
	UCSA	0.4 ac	
MP 172.4	Corridor	0.8 ac	No
	UCSA	0.2 ac	
MP 172.5	Corridor	0.7 ac	No
	UCSA	0.1 ac	
MP 172.7	Corridor	0.3 ac	No
	TEWA	0.2 ac	
	UCSA	0.1 ac	

Notes: MP = milepost; ac = acres

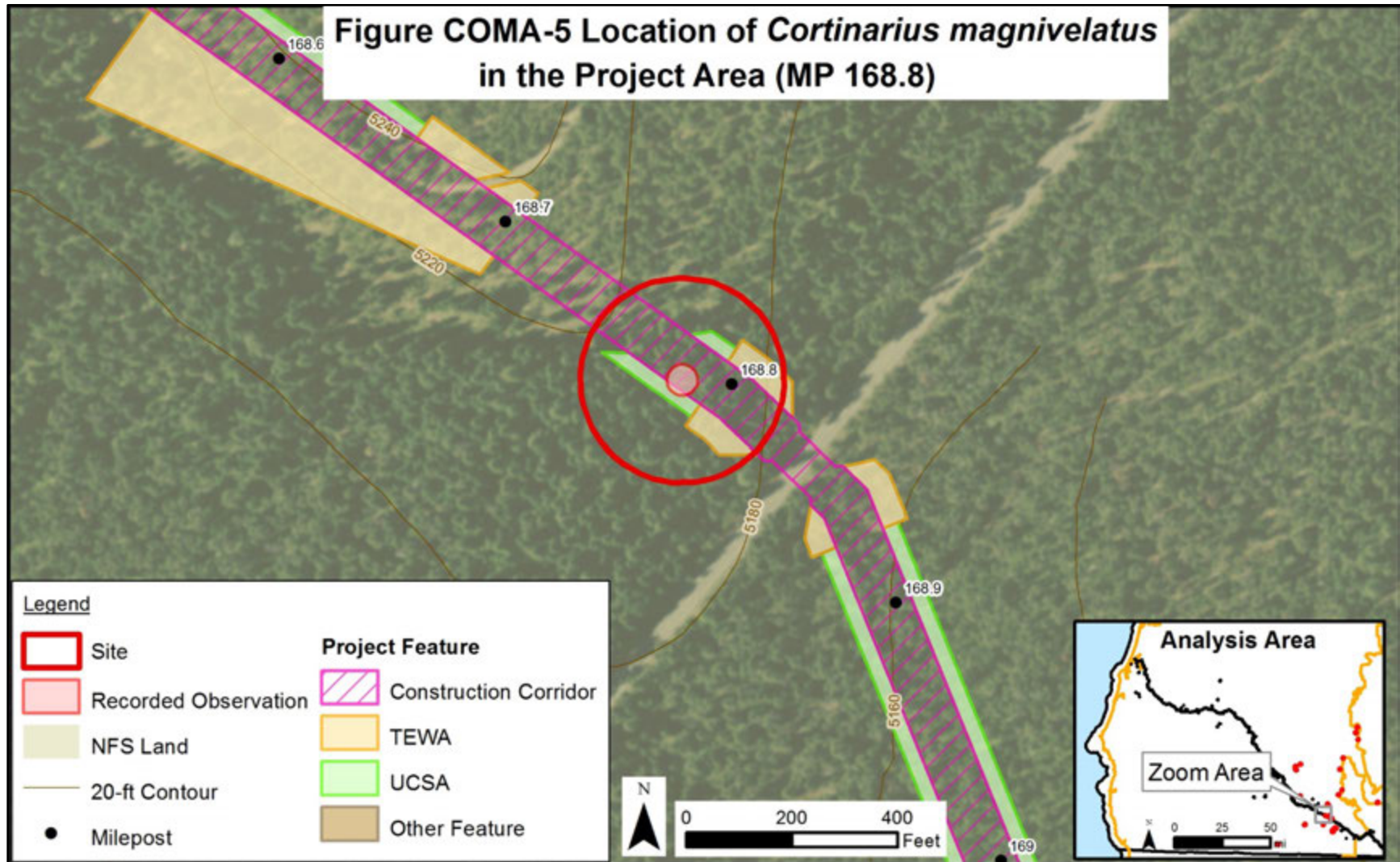
Establishment of the 95-foot wide construction corridor and TEWAs would likely remove individuals of *C. magnivelatus* in five sites and modify microclimate conditions around individuals that are not removed. The removal of forests and host trees and disturbance to soil could negatively affect *C. magnivelatus* in adjacent areas by removing its habitat, disturbing the roots of host trees, and affecting its mycorrhizal association with the trees, although the species appears to be somewhat resilient to edge effects in some areas (e.g., it has been found along roadsides). 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. *Cortinarius magnivelatus* is not likely to persist at four of the sites because of the extent of impacts within the sites and the proximity of the recorded observations to the corridor (see Table COMA-7). *Cortinarius magnivelatus* is likely to persist at the larger site at MP 172.2, despite impacts to some individuals, because one observation within the site is 180 feet from the corridor, where direct effects are not anticipated and indirect effects are unlikely. A road crosses through the southern end of this site, and the corridor would follow the north side of the road where two observations have been recorded and cannot be avoided.

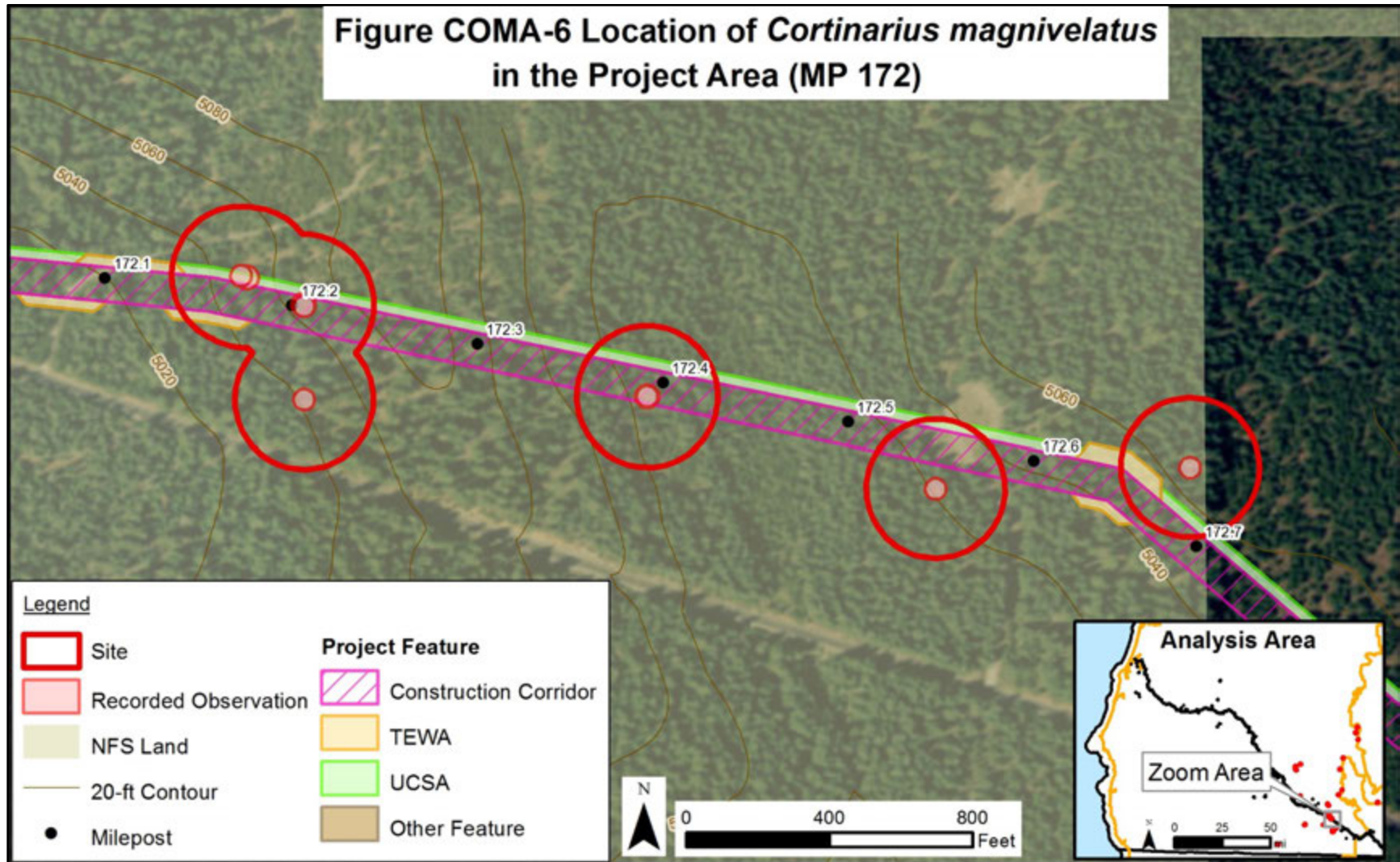
Based on this analysis, *C. magnivelatus* is not likely to persist at four of the five sites in the analysis area following project implementation. In addition to the single site remaining in the analysis area, several sites are located in its vicinity in the Cascade Range.

Across the project area, the PCGP Project would remove an estimated 335 acres of coniferous forests above 4,000 feet msl, including 91 acres of LSOG coniferous forests. These impacts would result in a reduction of habitat that may be suitable for *C. magnivelatus*. Within this impact area, about 187 acres (about 56 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 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 85 acres of coniferous forests above 4,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests above 4,000 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at four sites as a result of the PCGP Project, three sites of *C. magnivelatus* would remain on NFS lands in the local area, including one in reserves (LSRs) and 24 sites, including eight in reserves, would remain on NFS lands in the NSO range. A total of 10 sites, including seven entirely in reserves would remain on BLM lands in the local area and a total of 20 sites, including eight entirely in reserves would remain on BLM 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 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, the eight sites entirely 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:

- *Cortinarius magnivelatus* is a Category B (rare) S&M species across 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 more information about the species’ distribution is available, as described below:
 - *Cortinarius magnivelatus* has a somewhat limited distribution across four physiographic provinces and two states the region and a low-moderate number of overall sites (28 on NFS lands, 47 on all lands). The species is most abundant in the Cascade Range in southern Oregon, but it does not appear to be well distributed due to its limited distribution. The currently known number of sites on NFS and BLM lands has increased by 37 sites since 2007.
 - An estimated 34 percent of the sites (16 sites) on NFS and BLM lands are in at least partially in reserves, which is an increase of about 18 sites in reserves since 2006 per Molina (2008).
- Coniferous forests above 4,000 feet msl (general habitat for the species) are widespread across the region and encompass approximately 7.5 million acres on BLM and NFS lands with an estimated 63 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 four of 28 Forest Service-managed sites of *C. magnivelatus*, representing approximately 14 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the four sites, a low-moderate number of sites (24) would remain on NFS lands in the region with a somewhat limited distribution across Oregon and California. Three sites would remain on NFS lands in the local vicinity of the analysis area, including one in reserves (LSRs). Seven sites would remain entirely in BLM reserves in the local area and eight sites would remain entirely in BLM reserves in 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 site persistence of any sites in reserves, and the percentage of sites in NFS reserves would increase (from 29 to 33 percent). All eight sites in reserves are in LSRs where management actions are restricted to those activities that benefit LSOG forests. A total of 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 *C. magnivelatus* 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 85 acres of coniferous forests above 4,000 feet msl (less than 1 percent of the total regional acreage). An estimated 4.7 million acres (63 percent) of coniferous forests above 4,000 feet msl and 1.1 million acres (67 percent) of LSOG coniferous forests above 4,000 feet msl would remain in reserves in the NSO range.
- The remaining forests could support additional populations of *C. magnivelatus*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Cortinarius magnivelatus* 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.

2.10.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *C. magnivelatus* 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, 24 sites would remain on NFS lands across the region and three sites would remain on NFS lands in the local area. Additionally, eight sites would remain in BLM reserves in the region and seven sites would remain in BLM reserves in the local area. Several sites on NFS lands are within 10 miles north of the analysis area in the Cascade Range. Several more sites are located entirely in BLM reserves approximately 13 miles southwest of the analysis area. The remaining *C. magnivelatus* sites would allow for dispersal between the Cascade Range and the Klamath Mountains. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Cortinarius magnivelatus* would persist in the region without considering the four sites as part of the population.
- The PCGP Project would remove approximately 335 acres of coniferous forests above 4,000 feet msl and 91 acres of LSOG coniferous forests above 4,000 feet msl (a negligible amount of the forests). An estimated 56 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 4.7 million acres (63 percent) of coniferous forests above 4,000 feet msl and 1.1 million acres (67 percent) of LSOG coniferous forests above 4,000 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 in BLM reserves are expected to receive some level of protection under BLM management. Although a single natural disturbance event or combination of events could affect a significant portion of sites in the Cascade Range,

other sites are scattered across four provinces and are less likely to be affected by a single event.

The PCGP Project would not be able to avoid impacts to all *C. magnivelatus* 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 four *C. magnivelatus* 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 *C. magnivelatus* 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.

2.11 CORTINARIUS OLYMPIANUS

Cortinarius olympianus is a gilled mushroom species in the Cortinariaceae family and has no common name.

2.11.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *C. olympianus* as a Category B (rare) species. ORBIC evaluated *C. olympianus* 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.

2.11.2 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

Cortinarius olympianus is a mycorrhizal fungus that depends on host trees for nutrients (carbohydrates) (Castellano and O'Dell 1997). It fruits on the humus layer and in association with roots of various conifer trees between September and November (Castellano and O'Dell 1997, Castellano et al. 1999). According to ORBIC (2004), individuals are dispersed through mycelial interactions with other individuals and their mycorrhizal partners, rather than through spore dispersal. However, spores may also be dispersed by animals (Holthausen et al. 1994). Populations of the mushroom are believed to be long-lived (ORBIC 2004).

Range

Cortinarius olympianus is endemic to the Pacific Northwest (Castellano et al. 1999). It is known from the Bainbridge Island and the Olympic Peninsula east to Easy Pass in Okanogan County, Washington, and south to Shasta County, California (ORBIC 2004). It is found in the Washington Olympic Range and Cascade Range, the Oregon Cascade Range and Siskiyou Mountains, and northern California (Castellano and O'Dell 1997). Based on data available in 1997, the species' distribution was considered spotty across its range. 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' current range may be more restricted than it was historically. This restriction may be a result of habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported *C. olympianus* from an estimated 51 element occurrences across the Pacific Northwest in 2004. An estimated 28 of these occurrences were in Oregon and 27 were in reserves or protected areas (ORBIC 2004). In 2004, *C. olympianus* was considered uncommon, but had stable populations with more than half in protected areas (ORBIC 2004). The species was found in five locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented 26 new sites of *C. olympianus* in the NSO range between 1998 and 2006, and 50 total sites were documented by 2006, including 33 in reserves or protected areas. The 2007 Final SEIS reported 44 sites on NFS and BLM lands and 45 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 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 *C. olympianus*, and resulted in eight new observations of individuals or populations of *C. olympianus*. Additional persistence surveys for *C. olympianus* in LSRs in nearby areas resulted in one additional observation of the species. Based on the increased number of known 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

Cortinarius olympianus is found in complex coniferous forests and is generally restricted to the western hemlock zone of the NSO range (ORBIC 2004). Sporocarps of *C. olympianus* usually occur in association with the roots of various species in family Pine family (Castellano et al. 1999). It is symbiotic with true fir, spruce, and hemlock species and is reported to prefer drier, rather than wetter, gradients of western hemlock-Douglas fir stands in the Olympic National Forest in Washington (O'Dell et al. 1999). It is historically reported from LSOG forests (ORBIC 2004)

which suggest that it may prefer specific microclimate conditions of that habitat type, but it may not be restricted to these conditions.

Threats

Primary threats to *C. olympianus* are actions that affect its host trees, such as hot fires, road construction, other development, and clear-cutting (ORBIC 2004). Other threats to forest habitat, such as drought or insect infestations, and degraded air quality can also threaten the species. Other specific threats to the species are not 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 *C. olympianus* with several other species (Group 9 of Castellano and O'Dell 1997). The primary guidance is to maintain habitat conditions at all known sites by retaining old-growth forest structure and soil conditions, including coarse woody debris, and avoid disturbance at or around known sites, such as from removal of host trees or modification of canopy. 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 *C. olympianus*:

- As a mycorrhizal species, *C. olympianus* 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.

2.11.3 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. olympianus* 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 COOL-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 101 observations from BLM and Forest Service geodatabases were converted into 73 sites in the NSO range (region). Table COOL-2 shows the total number of sites on NFS land and other land

ownerships across the regional, local, and analysis areas. Table COOL-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 COOL-1 displays the regional distribution of the species across NFS lands, Figure COOL-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure COOL-3 displays the species' regional distribution as well as the extent of coniferous forests and LSOG coniferous forests on BLM and NFS lands.

TABLE COOL-1	
Number of <i>Cortinarius olympianus</i> Sites (2017)	
Location*	Number of Sites
Regional Area	73
Local Area	17
Analysis Area (Project Area)	4 (4)

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 COOL-2			
Distribution of <i>Cortinarius olympianus</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	44	6	4
BLM	26	11	-
NPS	1	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	6	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 COOL-3			
Distribution of <i>Cortinarius olympianus</i> 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)	8	-	-
Congressionally Reserved (CR)	11	-	-
Late Successional Reserve (LSR)	16	5	3
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) a/	-	-	-
Managed Late Successional Area (MLSA)	6	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	10	1	1
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressionally Reserved	-	-	-
District Designated Reserve	9	3	-
Harvest Land Base	17	11	-
Late Successional Reserve	11	4	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	9	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

Cortinarius olympianus has a wide, but scattered, distribution across nine physiographic provinces in Washington (Western and Eastern Cascades and Olympic Peninsula), Oregon (Coast Range, Cascades East and West, and Klamath Mountain), and California (Klamath and Cascades) (see Figure COOL-1). Most sites are found along the Cascade Range, with scattered sites or groups of sites in the Klamath Mountains and other outlying areas. Some clusters of sites are located in the Cascade Range and Klamath Mountains; however, most sites appear scattered and somewhat isolated across the NSO range. Although *C. olympianus* is widely distributed across the NSO range, its distribution is scattered with few clusters of sites, despite the extent of forests that may provide suitable habitat, and the species does not appear to be well distributed within its range in the NSO range.

Six of 73 known sites are at least partially located on private or other lands; one site is on NPS land (Olympic National Park); 26 sites are at least partially on BLM lands; and 44 sites are at least partially on NFS lands across the region. Sites included on National Forests that encompass the project area include 12 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 Gifford Pinchot, Klamath, Mt. Baker-Snoqualmie, Mt. Hood, Okanogan-Wenatchee, Six Rivers, and Willamette National Forests.

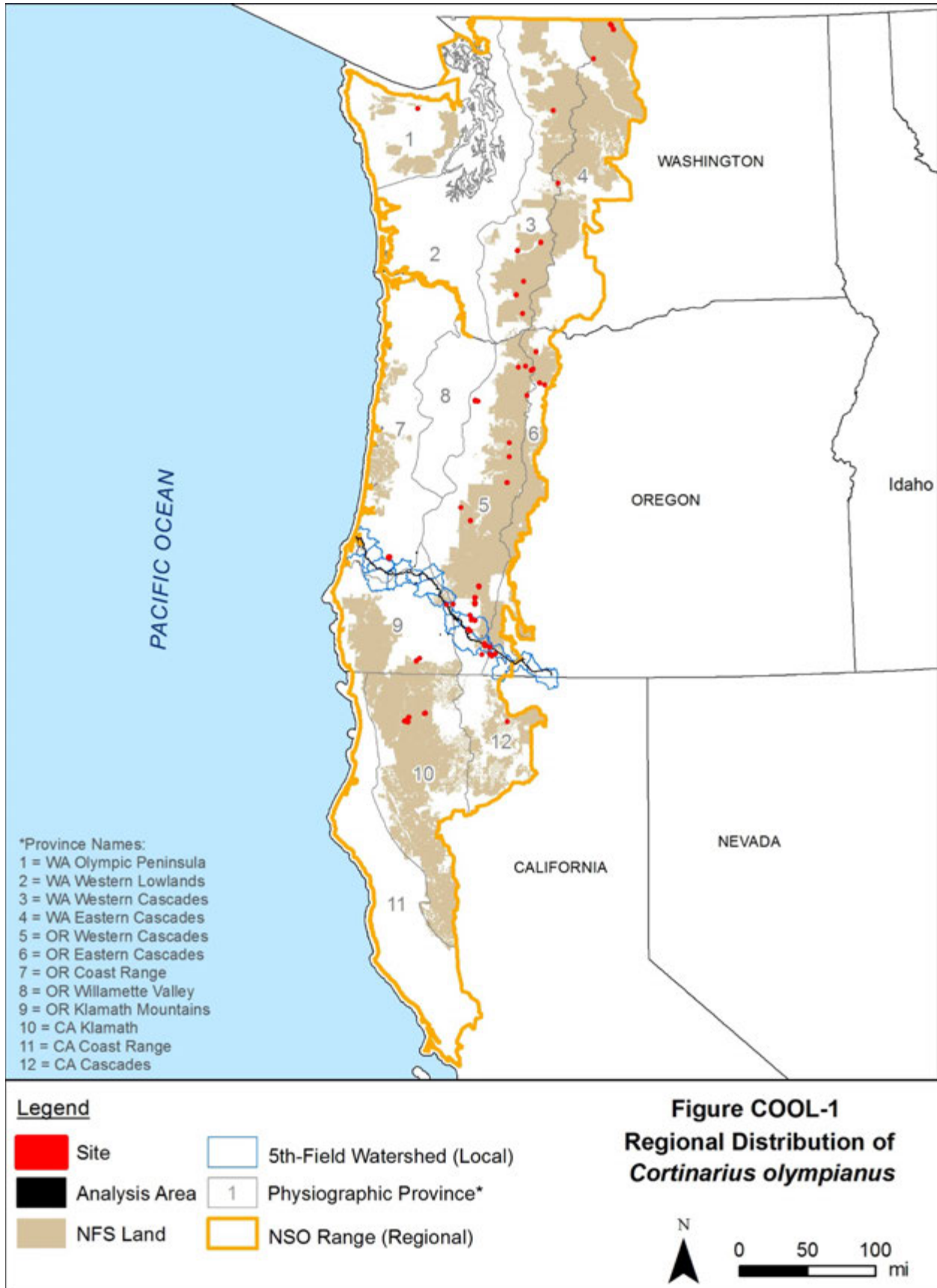
Across the NSO range, 27 sites are at least partially located in reserve lands managed by the Forest Service, including 16 in LSRs and 11 in Congressionally Reserved areas (see Figure COOL-2). This represents 61 percent of the total NFS-managed sites in the region. The remaining Forest Service-managed sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, nine sites are entirely in reserve lands managed by BLM, which represents 35 percent of the total number of BLM-managed sites in the region. While the sites in BLM reserves and the single NPS site are not covered by the S&M Standards and Guidelines, they will likely receive some degree of protection under BLM reserve management and National Park management.

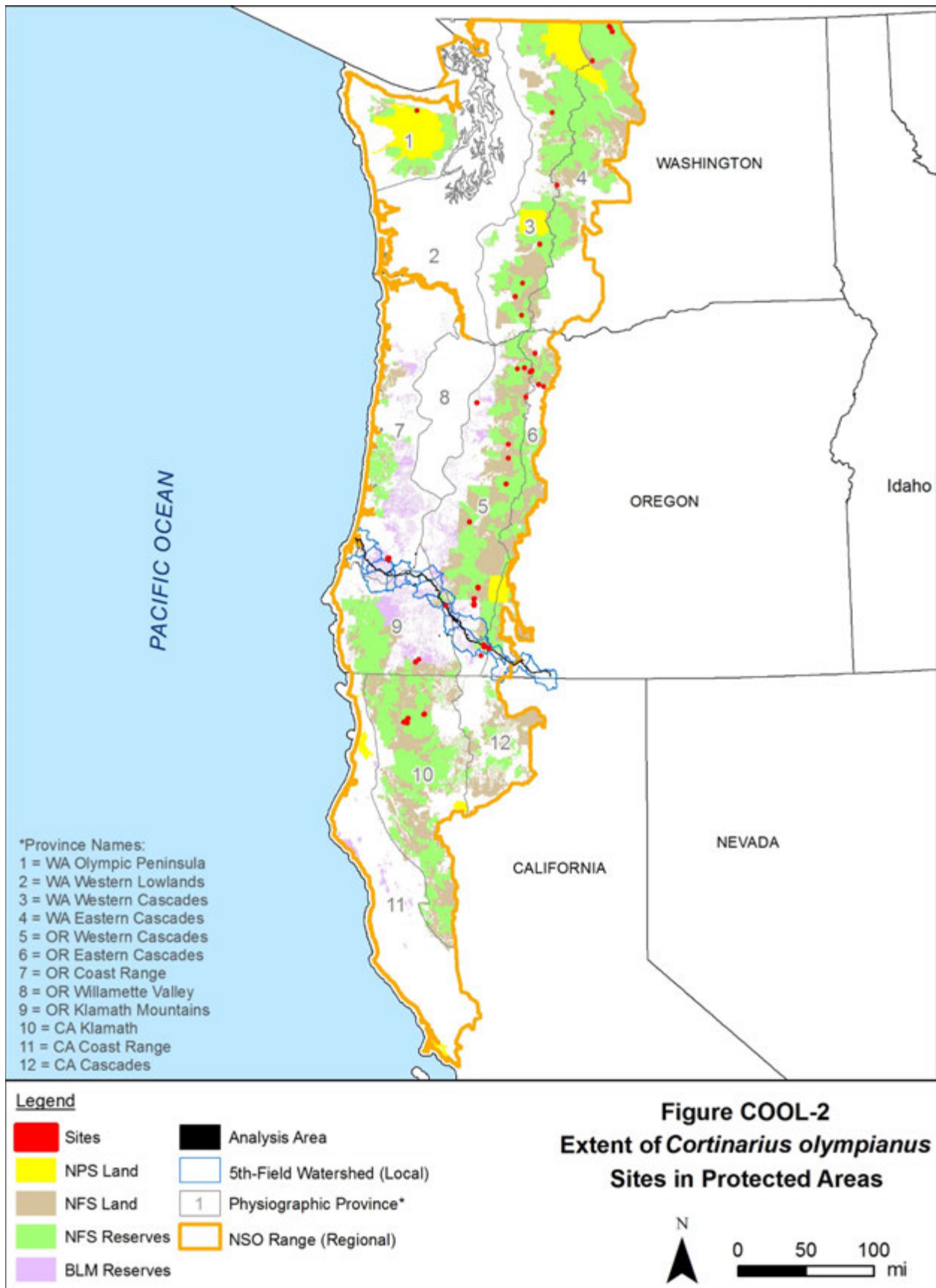
Cortinarius olympianus is primarily found in LSOG forests based on available data (65 of 74 total sites are in LSOG), but it is also found in non-LSOG forests and may not be restricted to LSOG conditions based on available information on its life history and habitat requirements. Based on current site locations, the species is found in 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 forests, including the LSOG component of these forests, across the NSO range could provide habitat for *C. olympianus* and support additional sites. These forests encompass an estimated 16.3 million acres on BLM and NFS lands in the region, including an estimated 9.9 million acres in reserve land allocations (61 percent of the forests; Table COOL-4). Of this acreage, an estimated 5 million acres are LSOG (see Figure COOL-3), including 3.3 million acres in reserve land allocations (66 percent of the forests). Although coniferous forests are widespread across the region, LSOG coniferous forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

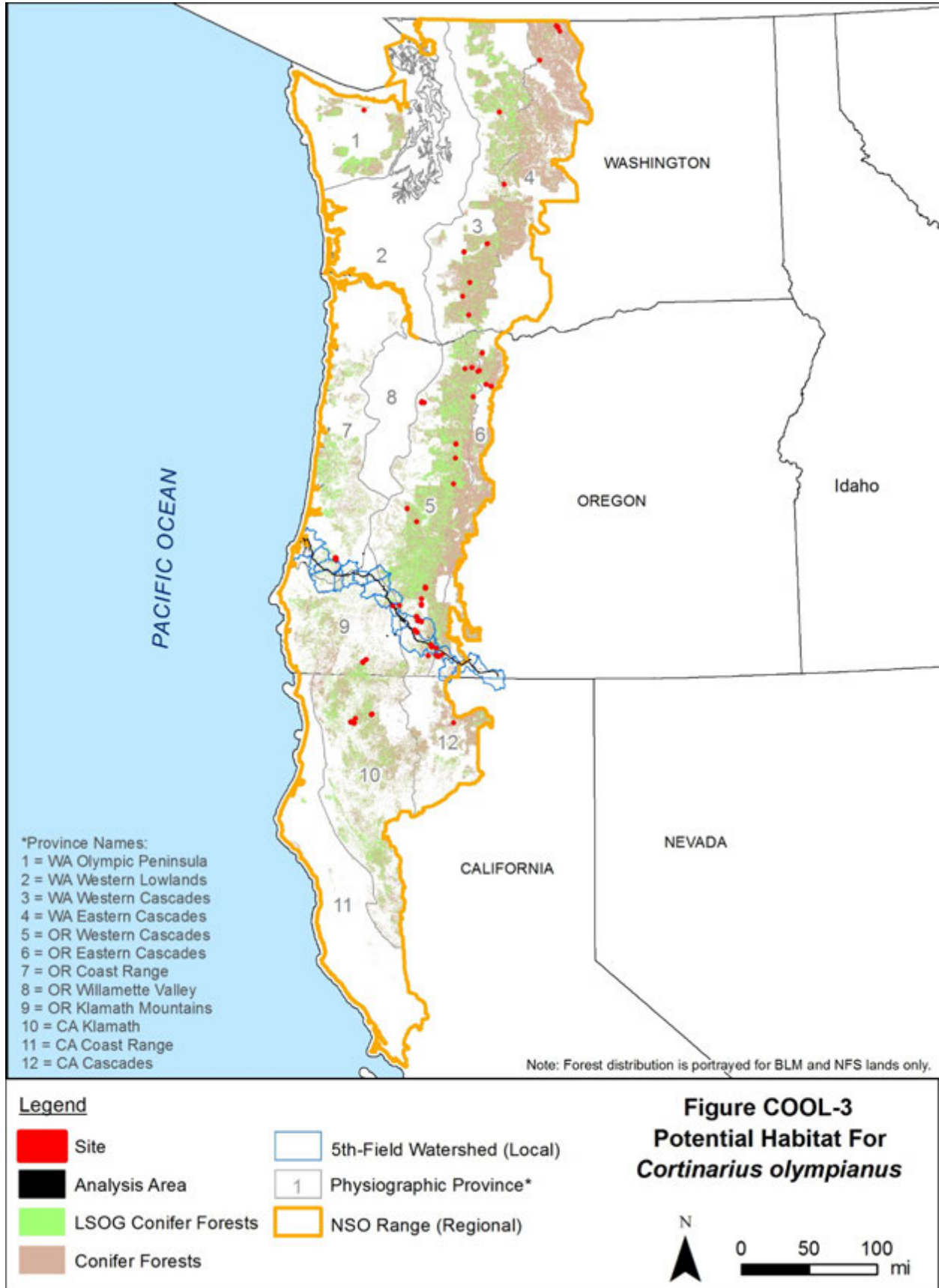
TABLE COOL-4

Extent of Forests That Could Provide Habitat for <i>Cortinarius olympianus</i> on NFS and BLM Lands ^{a/}				
Location	Coniferous Forests		LSOG Coniferous Forests	
	Total	Reserves	Total	Reserves
Regional Area	16,275,479	9,902,802	5,025,899	3,337,509
Local Area	454,206	285,292	161,143	116,561
Project Area	1,018	686	294	207

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, *C. olympianus* is distributed across seven 5th-field watersheds that overlap the project area (see Figure COOL-4 and Table COOL-5.) The 17 sites in the local area are scattered across the eastern half of the project area, with several clustered sites located in the Cascade Range. Across these watersheds, 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 based on the proximity of other sites in the region. Within the Cascade Range, several sites are located on NFS lands within 15 miles north of the project area. Several more sites occur approximately eight miles south of the project area in the Cascade Range, however, these sites are at least partially on Harvest Land Base and would not likely be protected under BLM management.

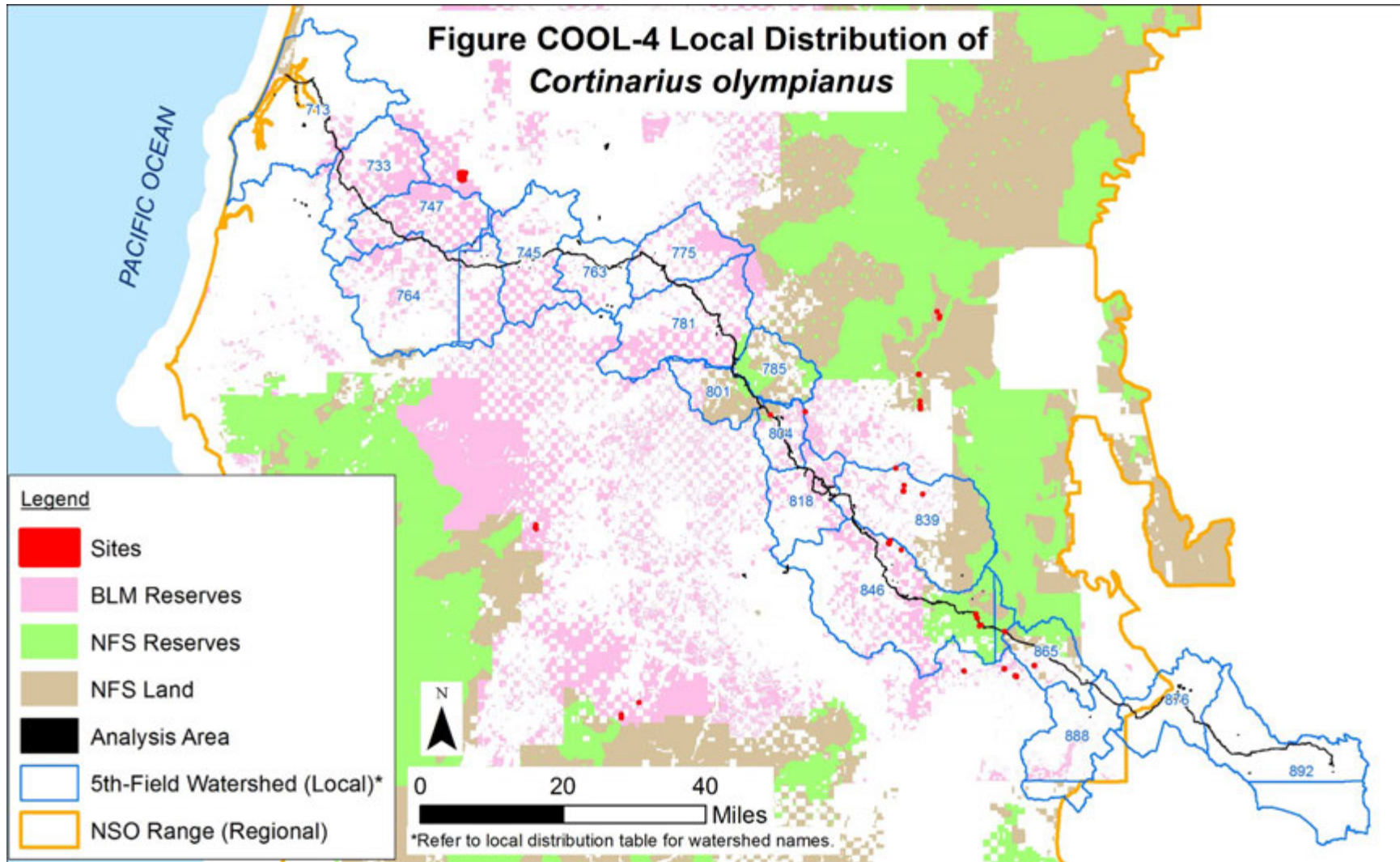
Of the 17 sites in the local area, six are at least partially on NFS lands. Most of these sites are located on lands designated as LSR, with one site located on Other (Matrix). Three sites are partially on private lands and 11 sites are at least partially on BLM lands. Of the local area sites, five sites are in NFS reserve lands, representing 29 percent of the NFS sites. While several sites on BLM lands in the local area are partially in reserves, all 11 sites on BLM lands in the local area are at least partially in Harvest Land Base.

Coniferous forests encompass approximately 454,206 acres on BLM and NFS lands in the local area, with 285,292 acres in reserve land allocations (63 percent of the forests). Of this acreage, an estimated 161,143 acres are LSOG, including 116,561 acres in reserves (72 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 COOL-3 and COOL-4).

TABLE COOL-5			
Distribution of <i>Cortinarius olympianus</i> 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)	5	-	3
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	5	4
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)	2	-	1
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
 Notes: Number of sites in reserves include sites that are only partially in reserves.



Analysis/Project Area Distribution

The analysis and project areas contain four sites of *C. olympianus*, all of which are on NFS lands on the Umpqua National Forest and Rogue River-Siskiyou National Forest. The analysis area sites are distributed across four 5th-field watersheds in the central to eastern portion of the analysis area. These sites occur in both the Western Cascade Range and in the Klamath Mountains. The two sites in the Western Cascade Range are clustered together, while the two sites in the Klamath Mountains are more scattered. Many sites are also located within the immediate vicinity of the analysis area in the Cascade Range (see Local Distribution discussion above), including several sites within 15 miles. A single site is located four miles east of the two sites in the Klamath Mountains, however, the site is located on BLM Harvest Land Base and would not likely be protected under BLM management. Several sites are located approximately 30 miles to the southwest of the two analysis area sites in the Klamath Mountains. These sites are located entirely in BLM reserves and thus are likely protected under BLM management.

Of the four sites in the analysis area, three are in reserves (LSRs) and one is located on lands designated as Other (Matrix).

Surveys for the PCGP Project resulted in nine total observations of individuals of the species in or near the project area during 2010 (Siskiyou BioSurvey LLC 2012a, 2016 [unpublished surveys]). Seven of these recorded observations comprise the four sites in the analysis area; the other two observations are in sites outside the analysis area. Within the project area, one site is located at MP 112.7 and the other three sites are located between approximately MPs 162.6 and 167.8.

Project Impacts

Analysis

The PCGP Project would affect four sites out of the 44 sites on NFS lands in the region, representing approximately 9 percent of the sites (or four out of 73 total sites on all lands in the NSO range). Table COOL-6 presents an overview of the features of the PCGP Project that would affect the *C. olympianus* sites. The construction corridor and associated work and storage areas would affect approximately 6.5 acres within the sites (about 19 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 *C. olympianus* 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 COOL-6		
Impacts to <i>Cortinarius olympianus</i> Sites on NFS Lands in the Project Area		
Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	5	4.5 ac
Temporary Extra Work Area (TEWA)	2	0.7 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.		

The PCGP project would result in ground disturbance and vegetation removal in all four sites in the analysis area (Table COOL-7). The only recorded observations of the species in two of the sites (MP 163.1, MP 164.2-164.4) would likely be removed during activities within the corridor (see Figures COOL-5 and COOL-6). The only recorded observations of the species in one additional site (MP 112.7) is outside the project area and would not be directly affected; however, the observations are within 30 feet of the project area and would be subject to indirect effects associated with the PCGP project. One site (MP 162.6) includes two observations, one of which is within the corridor and would likely be removed, and the other is approximately 285 feet outside the project area and would not be directly affected. 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.

Vegetation removal and grading activities in the 95-foot wide construction corridor would disturb about 4.5 acres of vegetation and soil within four sites and could result in the removal of *C. olympianus* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about 0.7 acres within two 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 *C. olympianus* 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 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; however, the mushroom appears to be somewhat resilient to open canopy and edge effects based on the proximity of some observations to roads. 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 no longer suitable for the species. *Cortinarius olympianus* is not likely to persist at three of the sites because of the extent of impacts within the sites and the proximity of the recorded observations to the corridor (see Table COOL-7). *Cortinarius olympianus* is likely to persist at one of the sites (MP 162.6), despite impacts to some individuals, because one of the two observations within the site is located approximately 380 feet from the corridor, where direct effects are not anticipated and indirect effects are unlikely.

Site Location	Source of Impacts	Area of Disturbance	Individuals Likely to Persist?
MP 112.7	Corridor	0.5 ac	No
	UCSA	0.2 ac	
MP 162.6	Corridor	0.8 ac	Yes
	UCSA	0.5 ac	
MP 163.1	Corridor	0.9 ac	No
	TEWA	0.2 ac	
	UCSA	0.2 ac	
MP 164.2-164.4	Corridor	2.2 ac	No
	TEWA	0.5 ac	
	UCSA	0.4 ac	

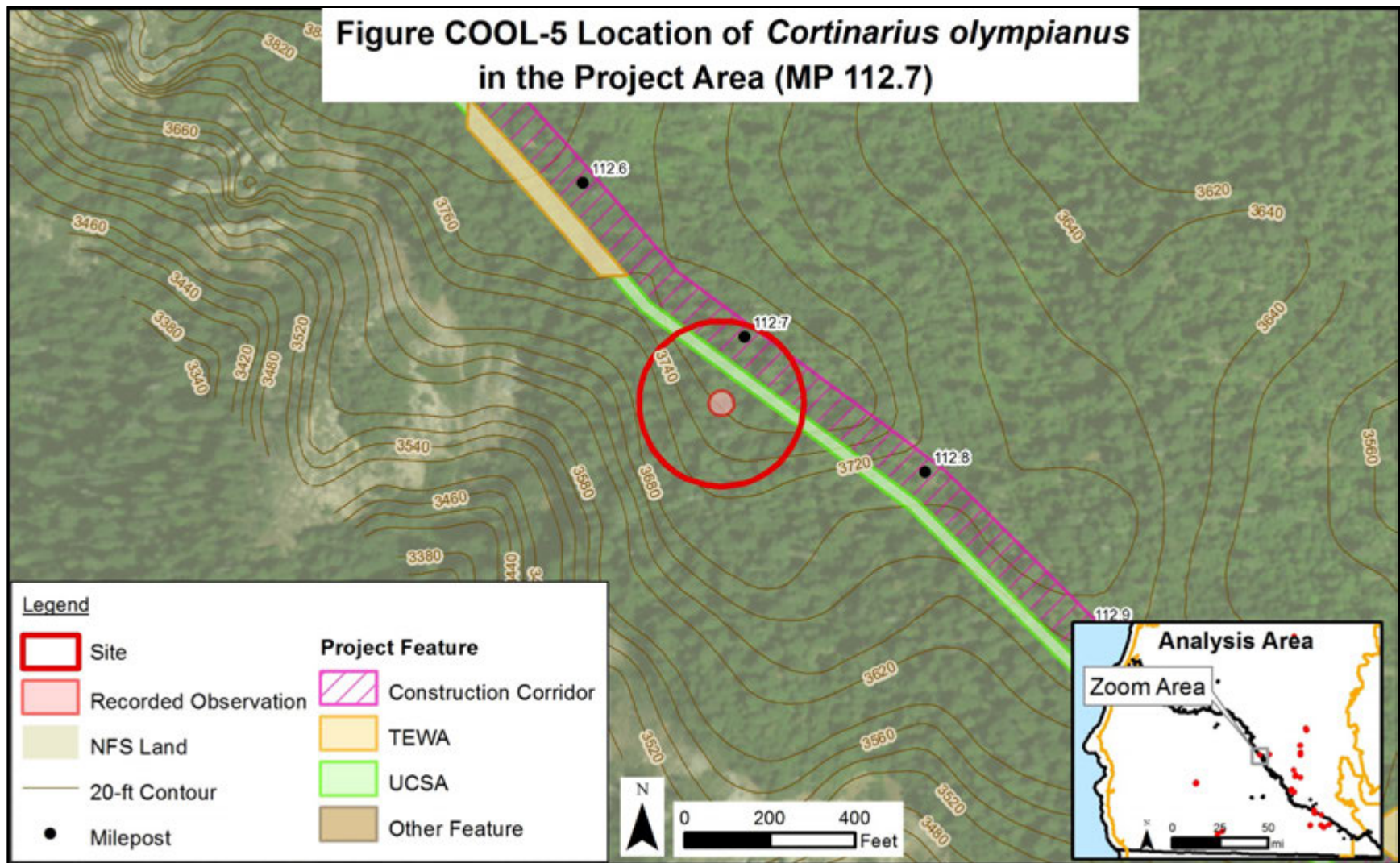
Notes: MP = milepost; ac = acres

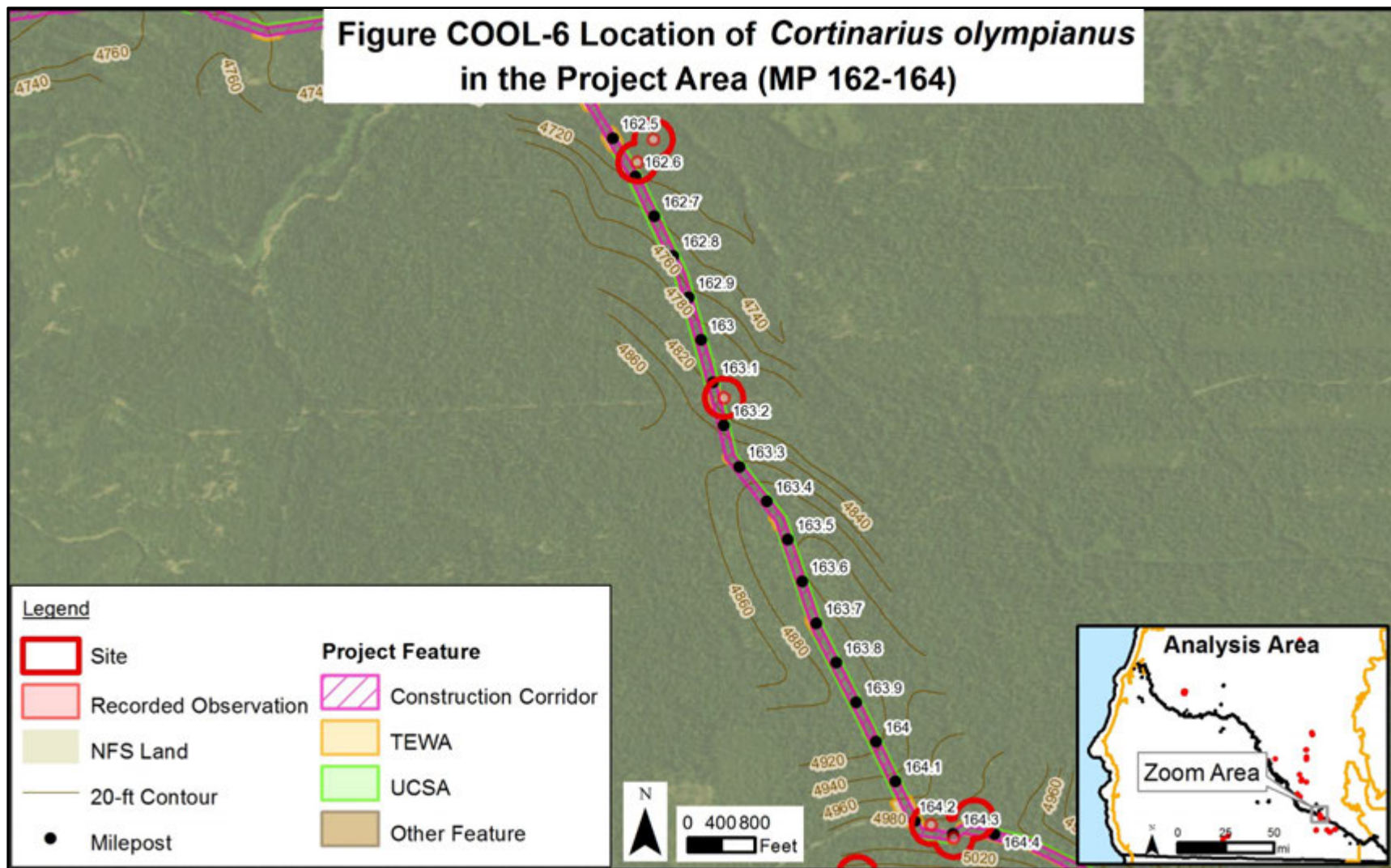
Based on this analysis, *C. olympianus* is not likely to persist at three of the four sites in the analysis area following project implementation. The site in the analysis area that is expected to persist is part of a small cluster of sites in the Little Butte Creek watershed in the Cascade Range. While the majority of the group will be removed by the PCGP project, two additional sites would remain outside the analysis area, within 2 miles of the analysis area site.

Across the project area, the PCGP Project would remove an estimated 806 acres of coniferous forests, including 222 acres of LSOG coniferous forests. These impacts would result in a reduction of habitat that may be suitable for *C. olympianus*. Within this impact area, about 427 acres (about 53 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 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. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the three sites as a result of the PCGP Project, three sites of *C. olympianus* would remain on NFS land in the local area, and 41 sites, including 24 in reserves, would remain on NFS lands in the NSO range. While an additional 11 sites would remain on BLM lands in the local area, they are located on Harvest Land Base and are not likely protected under BLM management. A total of 26 sites, including nine entirely in reserves would remain on BLM 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 24 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, the nine sites entirely 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:

- *Cortinarius olympianus* is a Category B (rare) S&M species across 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 is more common than previously documented, as described below:
 - *Cortinarius olympianus* has a wide, but scattered, distribution across nine physiographic provinces and three states the region and a moderate-high number of overall sites (44 on NFS lands, 73 on all lands). The species is most abundant in the Cascade Range and Klamath Mountains, but it does not appear to be well distributed in its range due to its scattered distribution. The currently known number of sites on NFS and BLM lands has increased by 28 sites since 2007, with many sites documented during the PCGP Project surveys.
 - An estimated 52 percent of the sites (37 sites) on NFS and BLM lands are in reserves, which is an increase of about four sites in reserves since 2006 per Molina (2008).
- Coniferous forests (general habitat for the species) are widespread across the region and encompass approximately 16.3 million acres on BLM and NFS lands with an estimated 61 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 three of 44 NFS-managed sites of *C. olympianus*, representing approximately 7 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the three sites, a low-moderate number of sites (41) would remain on NFS lands in the region with a wide, but scattered, distribution across Washington, Oregon, and California. Two sites (in LSRs) would remain on NFS lands in the local vicinity of the analysis area. Nine sites would remain entirely in BLM reserves in the region. 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 affect site persistence at three sites in LSRs, but the percentage of sites in NFS reserves would be about the same (approximately 60 percent). Of the remaining sites in NFS reserves, 13 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 *C. olympianus* are unlikely. A total of nine 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. olympianus* 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 190 acres of coniferous forests (less than 1 percent of the total regional acreage). An estimated 9.9 million acres (61 percent) of coniferous forests and 3.3 million acres (66 percent) of LSOG coniferous forests would remain in reserves in the NSO range.
- The remaining forests could support additional populations of *C. olympianus*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Cortinarius olympianus* 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.

2.11.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *C. olympianus* at three 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, 41 sites would remain on NFS lands across the region and two sites would remain on NFS land in the local area. Additionally, nine sites would remain in BLM reserves in the region. Out of the three sites affected, two sites are in the Cascade Range where the species is fairly common. Several NFS sites are within 15 miles of the analysis area in the Cascade Range. The one site is affected in the Klamath Mountains is approximately 20 miles west of the same group of NFS sites in the Cascade Range. Many more sites are located on BLM lands in the local area and general vicinity in the Cascade Range; however, these sites are at least partially on Harvest Land Base and would not likely be protected. While the forests at these locations remain un-harvested, it can be assumed the sites would remain present and contribute to the species distribution and recolonization. The remaining *C. olympianus* sites would allow for dispersal between the Cascade Range and the Klamath Mountains. The species' distribution and range within the NSO range following project implementation would be fairly similar to its currently known distribution and range. *Cortinarius olympianus* would persist in the region without considering the three sites as part of the population.
- The PCGP Project would remove approximately 806 acres of coniferous forests and 222 acres of LSOG coniferous forests (a negligible amount of the forests). An estimated 53 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 9.9 million acres (61 percent) of coniferous forests and 3.3 million acres (66 percent) of LSOG coniferous forests would remain in reserves in the NSO range. While *C. olympianus* is somewhat uncommon in the Klamath Mountains in the vicinity of the project area, two of the sites in the Klamath Mountains were found during recent PCGP surveys (2014 and 2016). The sites in the analysis area in the Cascade Range were also found during PCGP surveys in 2010. It is anticipated more sites are 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 in BLM reserves are expected to receive some level of protection under BLM management. Although a single natural disturbance event or combination of events could affect a significant portion of sites in the Cascade Range, other sites are scattered across the region and are less likely to be affected by a single event.

The PCGP Project would not be able to avoid impacts to all *C. olympianus* 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 *C. olympianus* 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 would waive implementation of Management Recommendations for *C. olympianus* 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.

2.12 CORTINARIUS VERRUCISPORUS

Cortinarius verrucisporus is a gilled mushroom species in the Cortinariaceae family and has no common name.

2.12.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *C. verrucisporus* as a Category B (rare) species. ORBIC evaluated *C. verrucisporus* 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 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). It is also considered to be at moderate to high risk of extinction due to a very restricted range, with very few populations and steep declines within Oregon (S2S3). It is not considered a BLM Sensitive or Strategic species in Oregon but it is considered a Forest Service Strategic species in Oregon.

2.12.2 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

Cortinarius verrucisporus is a mycorrhizal fungus that depends on host trees for nutrients (carbohydrates) and forms sporocarps beneath the soil surface (Castellano and O'Dell 1997). Fruiting generally occurs in spring and rarely in the fall (Desjardin et al. 2015). It is considered a sequestrate fungi and thus presumed to be dependent on mycophagy (consumption of fungi by animals) for spore dispersal (Castellano and O'Dell 1997). The species has moderate dispersal capability such that extirpated populations generally become reestablished through natural recolonization (unaided by humans) (ORBIC 2004).

Range

Cortinarius verrucisporus is known across western North America, located from Colorado and Idaho to the Pacific Northwest (ORBIC 2004). In the Pacific Northwest, the species has been found on east side of the Cascades in Washington, Oregon, and northern California as well as northern and central Sierra Nevada (ORBIC 2004). It is considered to have a fairly narrow range extent due to its limited habitat preference (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 of *C. verrucisporus* distributed across the species' range. In the Pacific Northwest, up to 20 occurrences were in California, less than five occurrences were in Oregon, and only one occurrence was in Washington (ORBIC 2004). Arora (1986) reported the species to be common in the Sierra Nevada but has been more recently reported by Desjardin et al. (2015) as being uncommon in the Sierra Nevada and Cascade Ranges. Long term trends for the species show relative stability to moderate decline in both its global range and in California; in Oregon the species is in moderate decline; and the long term trends is unknown in Washington (ORBIC 2004). The species was not found in any locations during Random Multi-Species surveys across the NSO range between 2001 and 2004 (USDA and USDI 2007). Molina (2008) documented three new sites of *C. verrucisporus* in the NSO range between 1998 and 2006, and 10 total sites were documented by 2006, including three in reserves or protected areas. The 2007 Final SEIS reported seven 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 *C. verrucisporus*, and resulted in four new observations of individuals or populations of *C. verrucisporus*. Based on the increased number of known sites since 1998 as a result of the increased number of surveys (a 43 percent increase between 1998 and 2006 per Molina 2008 records), additional surveys would be expected to locate additional populations within the

NSO range, particularly in the Cascade Range 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

Cortinarius verrucisporus prefers dry late-successional conifer forests in elevations above 4,000 feet msl. It has a solitary to scattered habit and forms mature sporocarps beneath the soil surface in association with the roots of California red fir and possibly other true fir species (Desjardin et al. 2015) as well as whitebark pine (*Pinus albicaulis*) (Moser 2004). Research in Yosemite National Park revealed that forested areas that were burned at least eight years before sampling had thicker litter layers than more recently burned sites, and these thicker layers were positively associated with truffles; including other sequestrate fungi such as *C. verrucisporus* (Meyer et al. 2008).

Threats

This taxon is believed to be at high risk in the Pacific Northwest because of its rarity and dependent mycorrhizal association with old-growth legacy, high-elevation conifers (Castellano and O'Dell 1997). Actions that disrupt stand conditions necessary for *C. verrucisporus* survival, particularly damage to host trees and soil disturbance, are major threats to this species. This includes logging that removes its presumed mycorrhizal host and other actions that cause disturbance to the soil, particularly road, trail, and campground construction (Castellano and O'Dell 1997). Other possible threats include hot fires, drought, climate change, and insect infestations.

Management Requirements

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 *C. verrucisporus* along with several other species (a subset of Group 10 of Castellano and O'Dell 1997). The primary guidance is to identify likely habitats on federal lands that may support populations, survey these sites to reveal populations, and manage them to retain forest structure and soil conditions. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *C. verrucisporus*:

- As a mycorrhizal species, *C. verrucisporus* 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.

2.12.3 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. verrucisporus* 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 COVE-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 83 observations from BLM and Forest Service geodatabases were converted into 52 sites in the NSO range (region). Table COVE-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table COVE-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 COVE-1 displays the regional distribution of the species across NFS lands, Figure COVE-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure COVE-3 displays the species' regional distribution as well as the extent of coniferous forests above 4,000 feet and LSOG coniferous forests above 4,000 feet on BLM and NFS lands.

Number of <i>Cortinarius verrucisporus</i> Sites (2017)	
Location*	Number of Sites
Regional Area	52
Local Area	17
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.

Distribution of <i>Cortinarius verrucisporus</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	32	8	5
BLM	21	10	-
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	5	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.

Distribution of <i>Cortinarius verrucisporus</i> 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)	11	-	-
Congressionally Reserved (CR)	-	-	-
Late Successional Reserve (LSR)	5	-	-
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) @/	-	-	-
Managed Late Successional Area (MLSA)	1	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	20	8	5

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	-	-	-
District Designated Reserve	10	6	-
Harvest Land Base	20	10	-
Late Successional Reserve	5	4	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	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

Cortinarius verrucisporus has a somewhat limited distribution across two physiographic provinces in Oregon (Eastern Cascades), and California (Cascades) (see Figure COVE-1). All sites are found along the eastern Cascade Range, with sites generally clustered in three groups in central Oregon, southern Oregon, and northern California. Each group of sites is separated by 60 to 70 miles. *Cortinarius verrucisporus* does not appear to be well distributed within its range in the NSO range.

Five of 52 known sites are at least partially located on private or other lands; 21 sites are at least partially on BLM lands; and 32 sites are at least partially on NFS lands across the region. Sites included on National Forests that encompass the project area include 16 sites on the Fremont-Winema National Forest. The remaining sites on NFS lands include eight sites on the Deschutes National Forest and eight sites on the Shasta-Trinity National Forest.

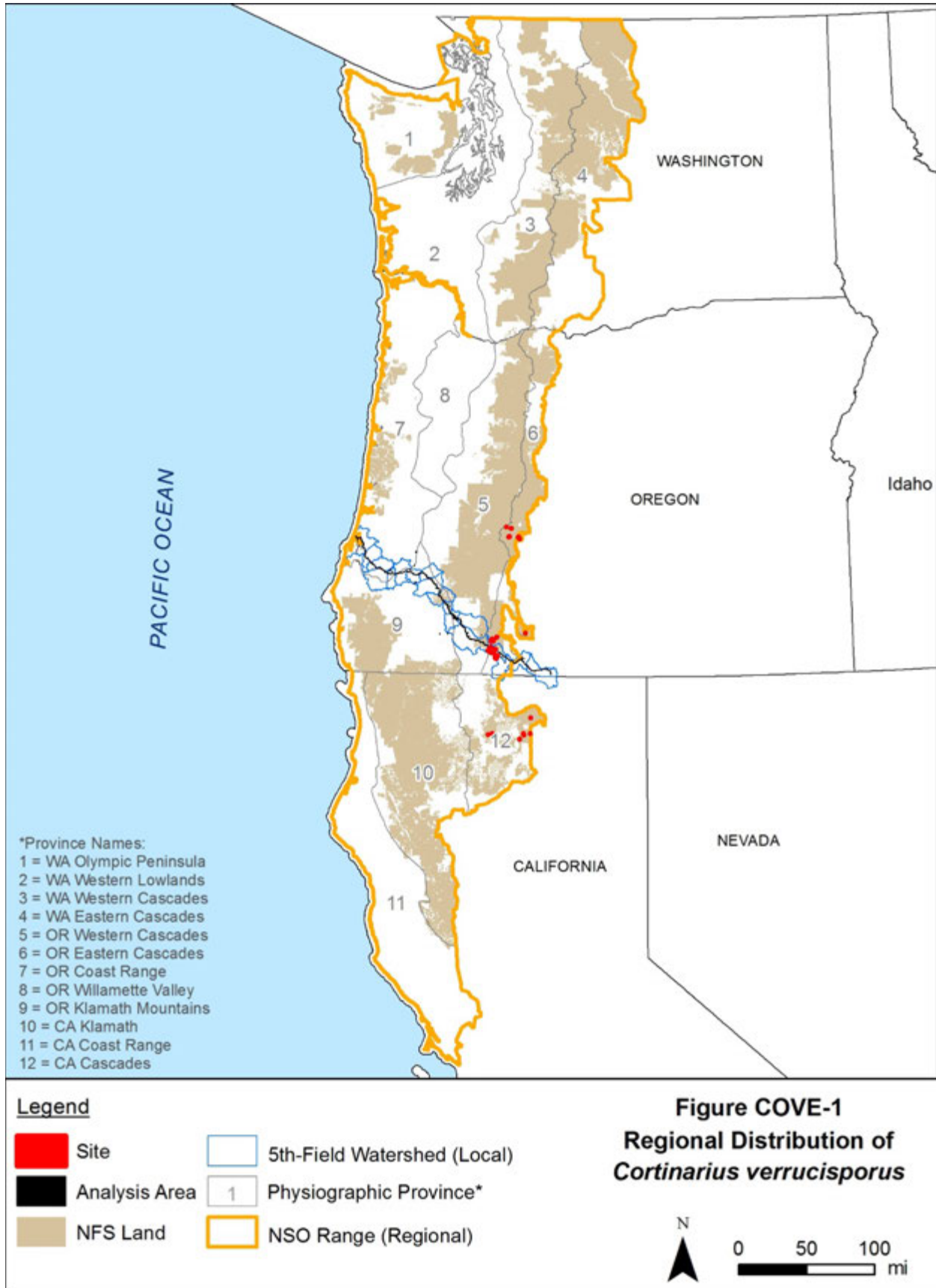
Across the NSO range, five sites are at least partially located in reserve lands managed by the Forest Service (LSRs) (see Figure COVE-2). This represents 16 percent of the total Forest Service-managed sites in the region. The remaining Forest Service-managed sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, one site is entirely in reserve lands managed by BLM, which represents 5 percent of the total number of BLM-managed sites in the region. While sites on BLM lands are not covered by the S&M Standards and Guidelines, the single site entirely in reserves will likely receive some degree of protection under BLM reserve management.

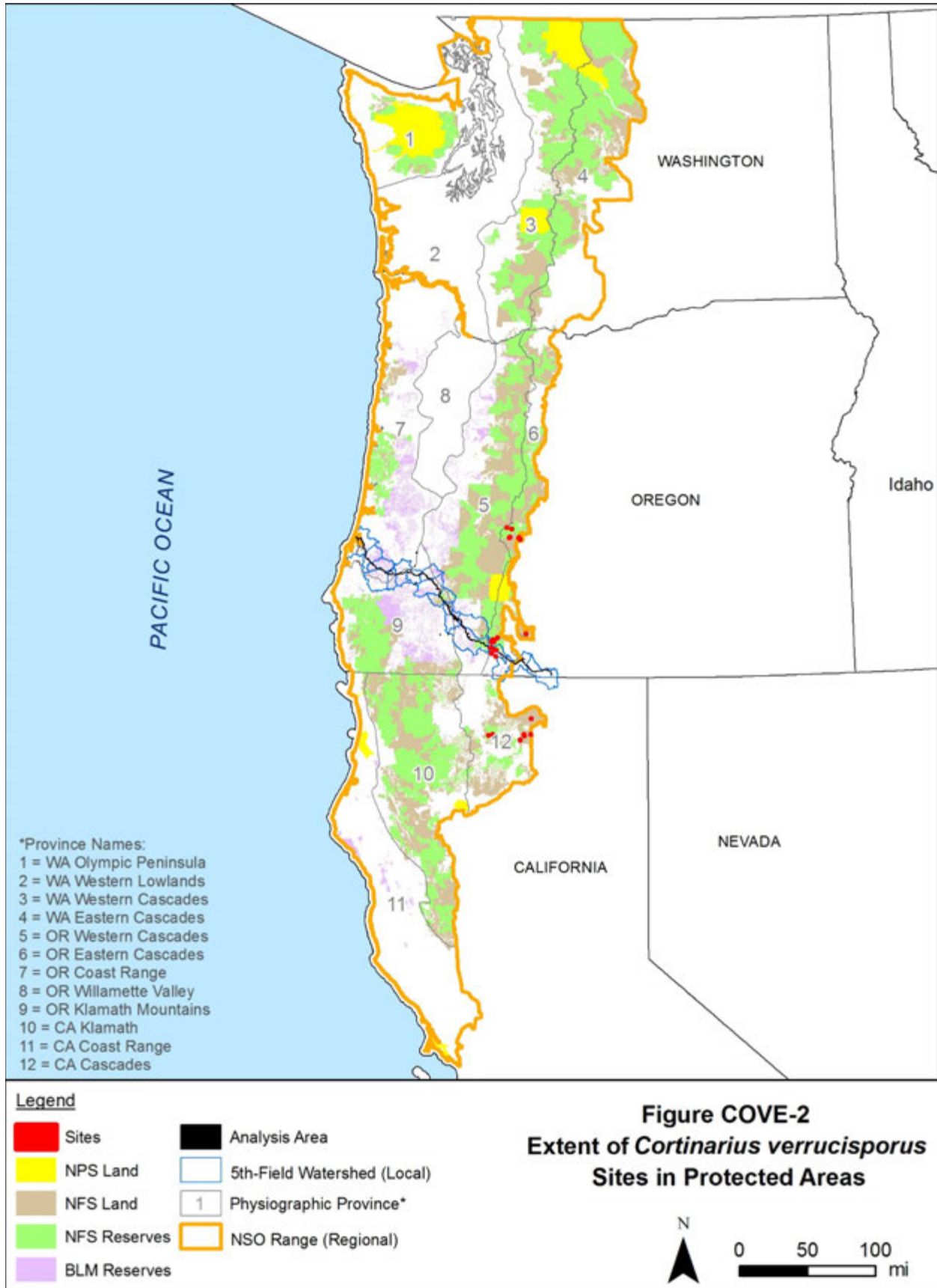
Cortinarius verrucisporus is more commonly found in LSOG forests based on available data (38 of 52 total sites are in LSOG), but it is also found in non-LSOG forests and may not be restricted to LSOG conditions based on available information on its life history and habitat requirements. Based on current site locations, the species is found in coniferous forests above 4,000 feet msl and has only been documented 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 are included in this potential habitat discussion. Coniferous forests above 4,000 feet msl, including the LSOG component of these forests, across the NSO range could provide habitat for *C. verrucisporus* and support additional

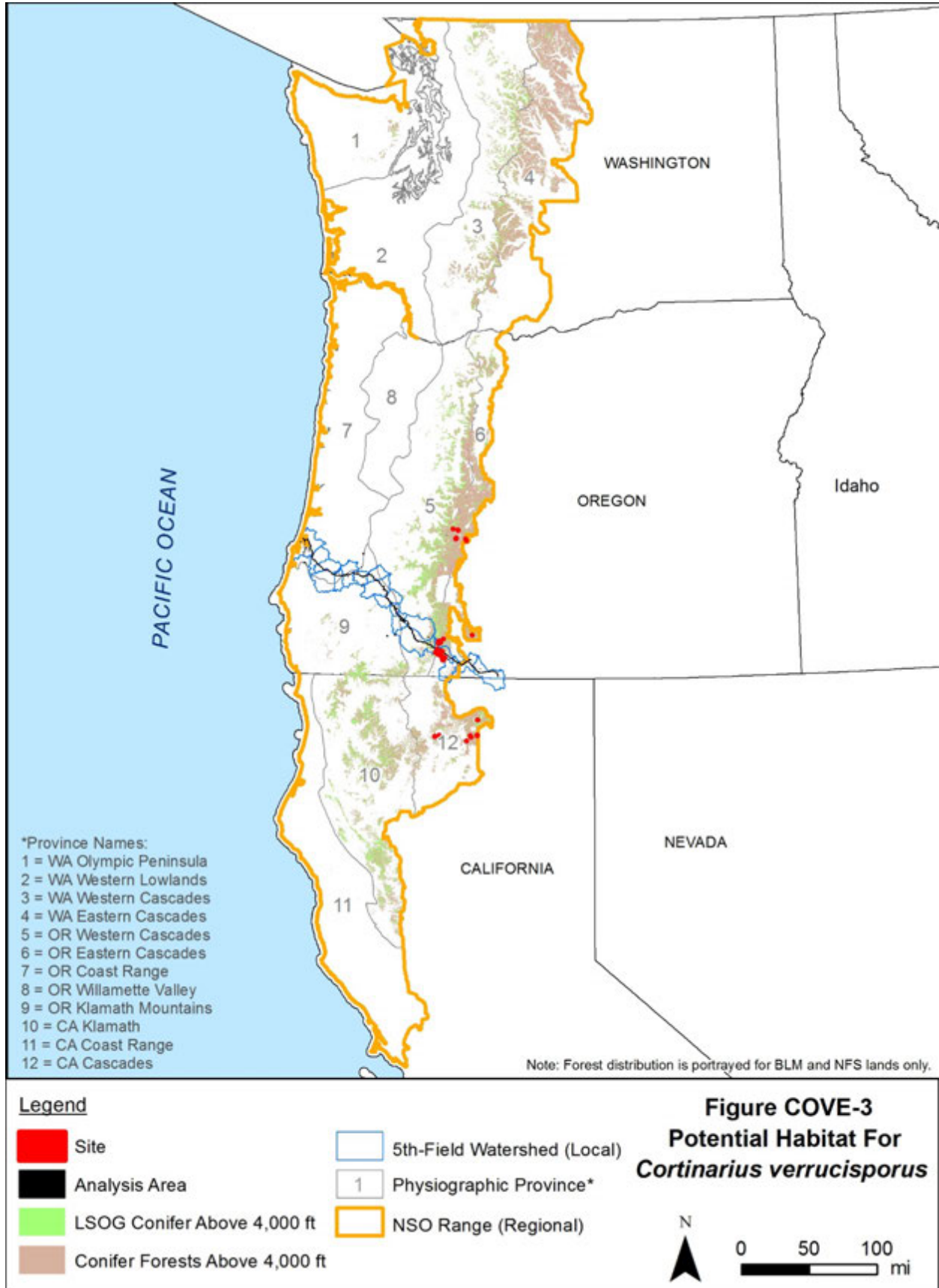
sites. These forests encompass an estimated 7.5 million acres on BLM and NFS lands in the region, including an estimated 4.7 million acres in reserve land allocations (63 percent of the forests; Table COVE-4). Of this acreage, an estimated 1.7 million acres are LSOG (see Figure COVE-3), including 1.1 million acres in reserve land allocations (67 percent of the forests). Although coniferous forests above 4,000 feet msl are widespread across the region, LSOG coniferous forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

Location	Coniferous Forests above 4,000 feet		LSOG Coniferous Forests above 4,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	7,471,720	4,733,729	1,688,359	1,127,276
Local Area	149,778	76,805	40,914	24,405
Project Area	422	277	122	76

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

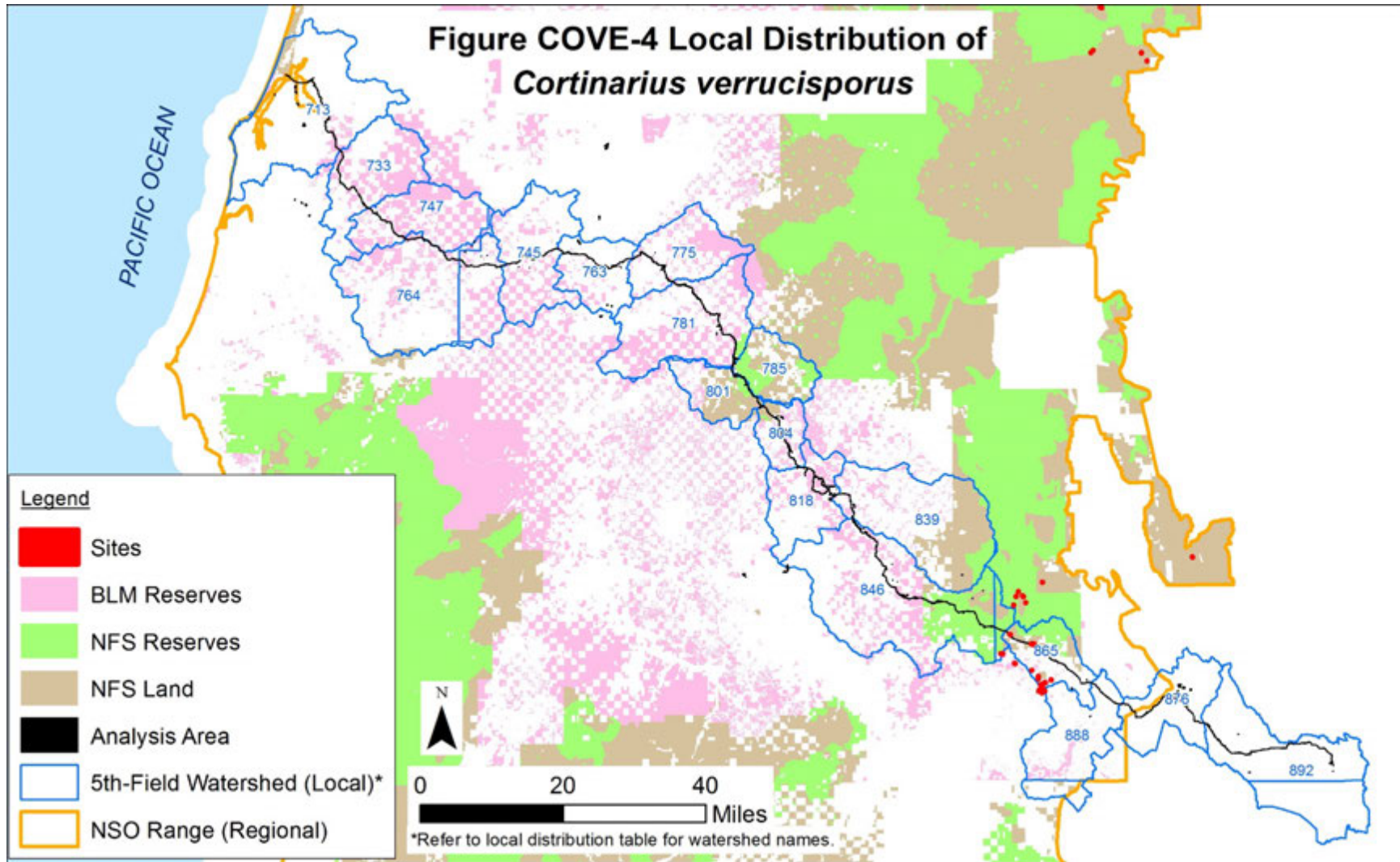
Within the local area, *C. verrucisporus* is found in two 5th-field watersheds that overlap the project area (see Table COVE-5 and Figure COVE-4). The 17 sites in the local area are clustered and near one another in the eastern Cascade Range. Across these watersheds, multiple avenues of connectivity 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 based on the proximity of other sites in the region. Many sites are located on NFS lands within 10 miles north of the project area. Many more sites occur approximately five miles south of the project area in the eastern Cascade Range, however, the majority of the sites are at least partially on Harvest Land Base and would not likely be protected under BLM management. The sites in the local area represent the southern extent of the central group of sites in southern Oregon, with the nearest sites located approximately 60 miles south of the local area in the Cascade Range in California.

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)	2	-	2
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)	15	-	7
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 include sites that are only partially in reserves.

Of the 17 sites in the local area, eight are at least partially on NFS lands, with all eight sites located on Other (Matrix). Three sites are partially on private lands and 10 sites are at least partially on BLM lands. While several sites on BLM lands in the local area are partially in reserves, all 10 sites on BLM lands are at least partially in Harvest Land Base.

Coniferous forests encompass approximately 149,778 acres on BLM and NFS lands in the local area, with 76,805 acres in reserve land allocations (51 percent of the forests). Of this acreage, an estimated 40,914 acres are LSOG, including 24,405 acres in reserves (60 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 COVE-3 and COVE-4).



Analysis/Project Area Distribution

The analysis and project areas contain five sites of *C. verrucisporus*, all of which are on NFS lands on the Fremont-Winema National Forest. The analysis area sites occur in one 5th-field watershed (Spencer Creek) in the eastern Cascade Range. Four sites are clustered in a group, while one site is fairly isolated, located approximately 4 miles west of the group of sites. Many sites are also located within the immediate vicinity of the analysis area in the eastern Cascade Range (see Local Distribution discussion above), including several sites within 10 miles. All five sites in the analysis area are located on lands designated as Other (Matrix). Surveys for the PCGP Project resulted in nine total observations of individuals of the species in or near the project area during 2010 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). Six of these recorded observations comprise the five sites in the analysis area; the other observation is in a site outside the analysis area. Within the project area, one site is located at approximately MP 168.8 and the other four sites are between MPs 172.1 and 173.3.

Project Impacts

Analysis

The PCGP Project would affect five sites out of the 32 sites on NFS lands in the region, representing approximately 16 percent of the sites (or five out of 52 total sites on all lands in the NSO range). Table COVE-6 presents an overview of the features of the PCGP Project that would affect the *C. verrucisporus* sites. The construction corridor and associated work and storage areas would affect approximately 4.4 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 impacts on *C. verrucisporus* in and near the project area. Due to the proportion of sites affected, the effects on five 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.

TABLE COVE-6		
Impacts to <i>Cortinarius verrucisporus</i> Sites on NFS Lands in the Project Area		
Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	5	3.4 ac
Temporary Extra Work Area (TEWA)	2	0.5 ac
Uncleared Storage Area (UCSA)	3	0.5 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 PCGP Project would result in ground disturbance and vegetation removal in five out of the seven sites in the analysis area (Table COVE-7). The only recorded observations of the species in three of the sites (MP 172.1, MP 172.5, and MP 173.3) would likely be removed by construction within the corridor or establishment of TEWAs (see Figures COVE-5 and COVE-6). The site at MP 168.8 is a large site and includes two observations, one of which is within a TEWA and would likely be removed. The remaining observation is outside the project area and would not be directly

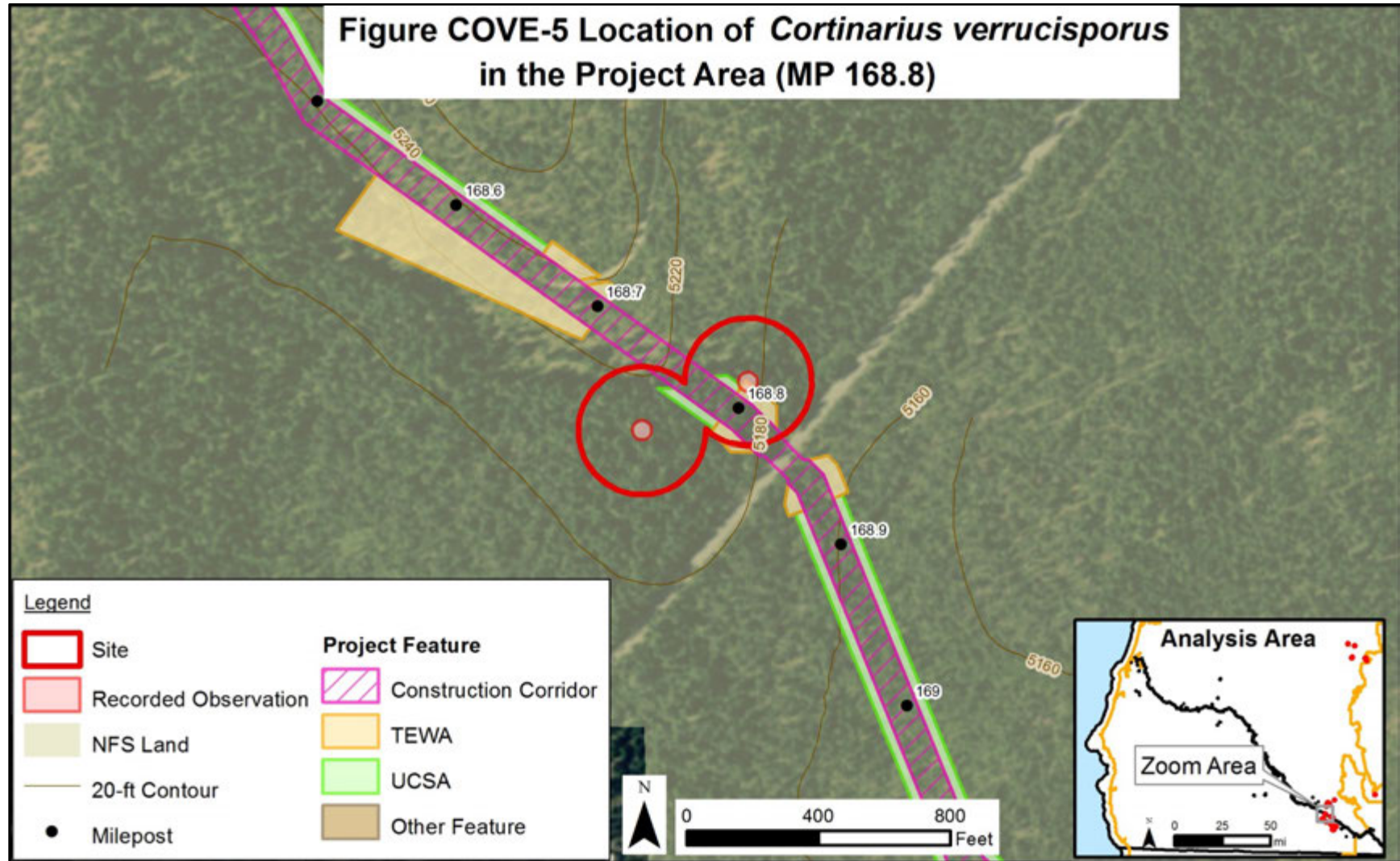
affected. The site at MP 172.6 includes one observation that is outside the project area and would not be directly affected. For all of the sites, individuals outside the corridor and TEWAs may also be subject to indirect effects associated with the PCGP Project based on the proximity of project activities to the sites, as discussed below.

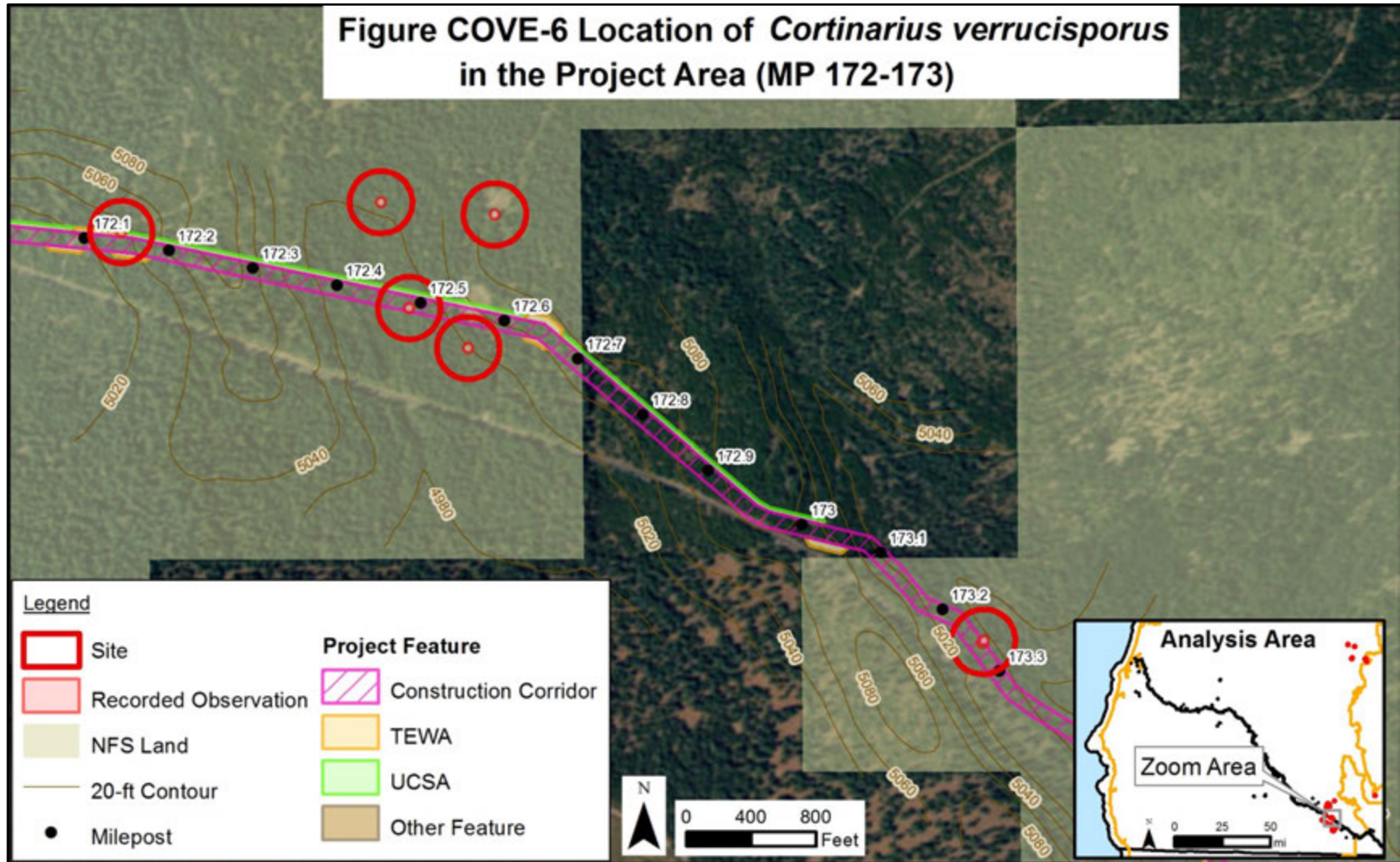
Site Location	Source of Impacts	Area of Disturbance	Individuals Likely to Persist?
MP 168.8	Corridor	0.8 ac	Yes
	TEWA	0.2 ac	
	UCSA	0.2 ac	
MP 172.1	Corridor	0.8 ac	No
	TEWA	0.2 ac	
	UCSA	0.1 ac	
MP 172.5	Corridor	0.8 ac	No
	UCSA	0.2 ac	
MP 172.6	Corridor	0.2 ac	Yes
MP 173.3	Corridor	0.8 ac	No

Notes: MP = milepost; ac = acres

Establishment of the 95-foot wide construction corridor and TEWAs would likely remove *C. verrucisporus* individuals in five sites and modify microclimate conditions around individuals that are not removed. The removal of forests and host trees and disturbance to soil could negatively affect *C. verrucisporus* in adjacent areas by removing its habitat, disturbing the roots of host trees, and affecting its mycorrhizal association with the trees, although the species appears to be somewhat resilient to edge effects in some areas (e.g., it has been found along roadsides). 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. *Cortinarius verrucisporus* is not likely to persist at three of the sites because of the extent of impacts within the sites and the proximity of the recorded observations to the corridor (see Table COVE-7). *Cortinarius verrucisporus* is likely to persist at the remaining two sites (MP 168.8 and MP 172.6), despite impacts to some individuals, because some observations within those sites are more than 100 feet from the corridor, where direct effects are not anticipated and indirect effects are unlikely. The site at MP 168.8 is comprised of two observations, one of which is located approximately 135 feet from the corridor in a moderately forested area and is likely to persist. The site at MP 172.6 is comprised of a single observation which is located approximately 140 feet downslope of the corridor in a heavily forested area and is likely to persist.

Based on this analysis, *C. verrucisporus* is not likely to persist at three of the five sites in the analysis area following project implementation. The two sites that are expected to persist in the analysis area are located in the eastern Cascade Range in southern Oregon and several sites are located on NFS lands in the vicinity. The species would continue to be locally abundant in the southern Cascade Range in Oregon. All three affected sites are on land designated as Other (Matrix).





Across the project area, the PCGP Project would remove an estimated 335 acres of coniferous forests above 4,000 feet msl, including 91 acres of LSOG coniferous forests above 4,000 feet msl. These impacts would result in a reduction of habitat that may be suitable for *C. verrucisporus*. Within this impact area, about 187 acres (about 56 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 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 85 acres of coniferous forests above 4,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the three sites as a result of the PCGP Project, five sites of *C. verrucisporus* would remain on NFS land in the local area. A total of 29 sites, including five in reserves, would remain on NFS lands in the NSO range. While an additional 10 sites would remain on BLM lands in the local area, they are located at least partially on Harvest Land Base and would not likely be protected under BLM management. A total of 21 sites, including one entirely in reserves would remain on BLM 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 five 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, the one site entirely 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:

- *Cortinarius verrucisporus* is a Category B (rare) S&M species across 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 more information about the species’ distribution is available, as described below:
 - *Cortinarius verrucisporus* has a somewhat limited distribution across two physiographic provinces and two states the region and a low-moderate number of overall sites (32 on NFS lands, 52 on all lands). The species does not appear to be well distributed in its range. The currently known number of sites on NFS and BLM lands has increased by 45 sites since 2007, with several sites documented during the PCGP Project surveys.

- An estimated 12 percent of the sites (6 sites) are in NFS or BLM reserves, which is an increase of about three sites in reserves since 2006 per Molina (2008).
- Coniferous forests above 4,000 feet msl (general habitat for the species) are widespread across the region and encompass approximately 7.5 million acres on BLM and NFS lands with an estimated 63 percent in reserves. Most of the forests are found in the Cascade Range where all sites are documented.
- The PCGP Project would affect three of 32 Forest Service-managed sites of *C. verrucisporus*, representing approximately 9 percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the five sites, a low-moderate number of sites (29) would remain on NFS lands in the region with a somewhat limited distribution in the Cascade Range in Oregon and California. 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 site persistence at sites in reserves, and the percentage of sites in NFS reserves would remain about the same (17 percent). The five sites in NFS reserves are in LSRs where management actions are restricted to those activities that benefit LSOG forests. One site would remain entirely on LSRs and Riparian Reserves on BLM lands.
- The PCGP Project would result in a permanent loss of an estimated 85 acres of coniferous forests above 4,000 feet msl (less than 1 percent of the total regional acreage). An estimated 4.7 million acres (63 percent) of coniferous forests above 4,000 feet msl and 1.1 million acres (67 percent) of LSOG coniferous forests above 4,000 feet msl would remain in reserves in the NSO range.
- The remaining forests could support additional populations of *C. verrucisporus*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Cortinarius verrucisporus* 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.

2.12.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *C. verrucisporus* 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, 29 sites would remain on NFS lands across the region and five sites would remain on NFS land in the local area. Additionally, one site would remain entirely in BLM reserves in the region. The three sites affected are in the eastern Cascade Range in southern Oregon where the species is fairly common. Several sites are located on NFS lands within 10 miles north of the project area. Many more sites are located on BLM lands in the general vicinity; however, most are at least partially on Harvest Land Base and would not likely be protected. For the time that the sites remain on BLM lands,

it can be assumed the sites would contribute to the species distribution and recolonization in the area. The remaining sites in southern Oregon would allow for dispersal between groups of sites across the Cascade Range in Oregon and California. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Cortinarius verrucisporus* would persist in the region without considering the five sites as part of the population.

- The PCGP Project would remove approximately 335 acres of coniferous forests above 4,000 feet msl and 91 acres of LSOG coniferous forests above 4,000 feet msl (a negligible amount of the forests). An estimated 56 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 4.7 million acres (63 percent) of coniferous forests above 4,000 feet msl and 1.1 million acres (67percent) of LSOG coniferous forests above 4,000 feet msl would remain in reserves in the NSO range. It is anticipated more sites are 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 single site in BLM reserves are expected to receive some level of protection under BLM management. Although a single natural disturbance event or combination of events could affect a significant portion of sites in the Cascade Range, other sites are scattered across Oregon and California and are less likely to be affected by a single event.

The PCGP Project would not be able to avoid impacts to all *C. verrucisporus* 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 *C. verrucisporus* 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 *C. verrucisporus* 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.

2.13 CUDONIA MONTICOLA

Cudonia monticola is a litter saprobe in the Cudoniaceae family and is commonly known as mountain cudonia.

2.13.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *C. monticola* as a Category B (rare) species. ORBIC evaluated *C. monticola* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and again in its publication of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2007) but it was not included in the 2010 or subsequent publications. In 2007, the species was considered to be at moderate risk of extinction due to a restricted range, relatively few populations, and recent and widespread declines within its global range and in Oregon (G3, S3, respectively). It was also

considered at high risk of extinction due to a very restricted range, very few populations and steep declines within Oregon (S2). The species is not currently on any ORBIC lists. It is not considered a Forest Service or BLM Sensitive or Strategic species in Oregon.

2.13.2 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

Cudonia monticola is a saprophytic fungus which feeds on dead and decaying organic material and plays a vital role in decomposition and nutrient recycling (Cushman and Huff 2007). Fruit bodies can be found in the spring (Arora 1986), late summer, and autumn (Castellano et al. 2003) but are irregular and seldom abundant (ORBIC 2004). Optimal moisture and cool to moderate temperatures are required for fruiting to occur (ORBIC 2004). Spores are produced on the surface of the head, not on the gills (ORBIC 2004) and very little is known about its dispersal mechanisms or reproductive biology.

Range

Cudonia monticola is endemic to western North America, and has been documented from British Columbia south to northern California. It has also been located from Arizona to Wyoming and Idaho (ORBIC 2004). In the Pacific Northwest, it has been documented on the west coast, Cascade Range, and Klamath Mountains (ORBIC 2004). 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 17 occurrences of *C. monticola* within Washington, Oregon, and California. An estimated 13 occurrences were in Oregon, one to five occurrences were in California, and three occurrences were in Washington (ORBIC 2004). The number of occurrences in British Columbia, Arizona, Wyoming, and Idaho is unknown. Long term trends for the species are unknown (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 25 new sites of *C. monticola* in the NSO range between 1998 and 2006, and 28 total sites were documented by 2006, including 14 in reserves or protected areas. The 2007 Final SEIS reported 12 sites on NFS and BLM lands and 12 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 *C. monticola*, and resulted in one new observation of individuals or populations of *C. monticola*. Based on the increased number of known sites since 1998 as a result of the increased number of surveys (an approximately nine-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

Cudonia monticola is found on woody debris and spruce needles (Castellano et al. 2003) in mature, moist coniferous forests with white fir, Douglas fir and pine (Knorr 2007). It is often found in areas with thick duff or moss that is shaded much of the day so the humidity remains high at the ground level (ORBIC 2004). It is also associated with decomposed wood which may be buried (ORBIC 2004).

Threats

Ground-disturbing activities that reduce the amount of rotting wood and interrupt the addition of fresh wood to rot could impact the species (ORBIC 2004). Other threats include logging, thinning, or other activities that would change the humidity, light patterns, and composition of its habitat (ORBIC 2004). It can also be negatively affected by canopy removal, which is needed to retain moisture within the litter layer.

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 *C. monticola*:

- As a litter saprobe, *C. monticola* feeds on dead and decaying organic material and plays a vital role in decomposition and nutrient recycling. Consider incorporation of patch retention areas (as described in Standards and Guidelines 1994, C-41) with occupied sites wherever possible.

2.13.3 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. monticola* 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 CUMO-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 95 observations from BLM and Forest Service geodatabases were converted into 82 sites in the NSO range (region). Table CUMO-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table CUMO-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 CUMO-1 displays the regional distribution of the species across NFS lands, Figure CUMO-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure CUMO-3 displays the species' regional distribution as well as the extent of coniferous forests below 6,000 feet msl and LSOG coniferous forests below 6,000 feet msl on BLM and NFS lands.

TABLE CUMO-1	
Number of <i>Cudonia monticola</i> Sites (2017)	
Location*	Number of Sites
Regional Area	82
Local Area	19
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 CUMO-2			
Distribution of <i>Cudonia monticola</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	35	1	1
BLM	45	17	-
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	10	4	-
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 CUMO-3			
Distribution of <i>Cudonia monticola</i> 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)	4	-	-
Late Successional Reserve (LSR)	7	-	-
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) a/	-	-	-
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	19	1	1
Riparian Reserve	-	-	-

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	-	-	-
District Designated Reserve	9	2	-
Harvest Land Base	19	5	-
Late Successional Reserve	28	15	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	22	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.

Regional Distribution

Cudonia monticola has a wide, but scattered, distribution across seven physiographic provinces in Washington (Western and Eastern Cascades), Oregon (Coast Range, Cascades East and West, and Klamath Mountains), and California (Klamath) (see Figure CUMO-1). Most sites are found along the Cascade Range in Oregon, with scattered sites or groups of sites in the Klamath Mountains, Coast Range, and other outlying areas. Although *C. monticola* is widely distributed across the NSO range, its distribution is scattered with few clusters of sites, despite the extent of forests that may provide suitable habitat, and the species does not appear to be well distributed within its range in the NSO range.

Ten of 82 known sites are at least partially located on private or other lands; 45 sites are at least partially on BLM lands; and 35 sites are at least partially on NFS lands across the region. Sites included on National Forests that encompass the project area include five sites on the Umpqua National Forest and three sites on the Rogue River-Siskiyou National Forest. The remaining 27 sites on NFS lands are on the Deschutes, Gifford Pinchot, Mt. Baker-Snoqualmie, Mt. Hood, Okanogan-Wenatchee, Siuslaw, Six Rivers, and Willamette National Forests.

Across the NSO range, nine sites are entirely located in reserve lands managed by the Forest Service, including seven sites at least partially in LSRs and four sites at least partially in Congressionally Reserved areas (see Figure CUMO-2). This represents 26 percent of the total 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. Additionally, 26 sites are entirely in reserve lands managed by BLM, which represents 58 percent of the total number of BLM-managed sites in the region. While the sites on BLM lands are not covered by the S&M Standards and Guidelines, the sites entirely in reserves will likely receive some degree of protection under BLM reserve management.

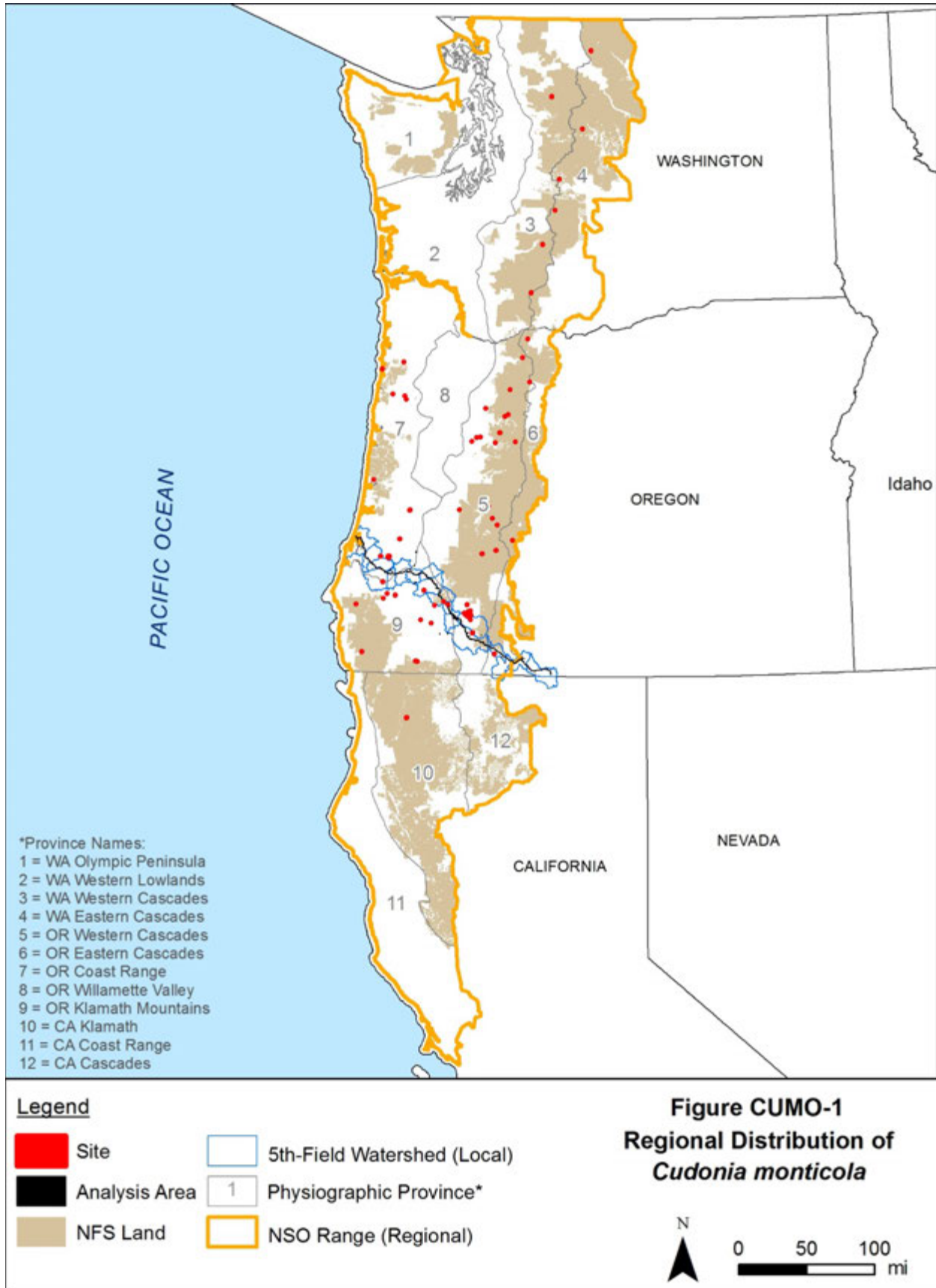
Cudonia monticola is primarily found in LSOG forests based on available data (66 of 82 total sites are in LSOG), but it is also found in non-LSOG forests and may not be restricted to LSOG conditions based on available information on its life history and habitat requirements. Based on current site locations, the species is found in coniferous forests below 6,000 feet msl and has been

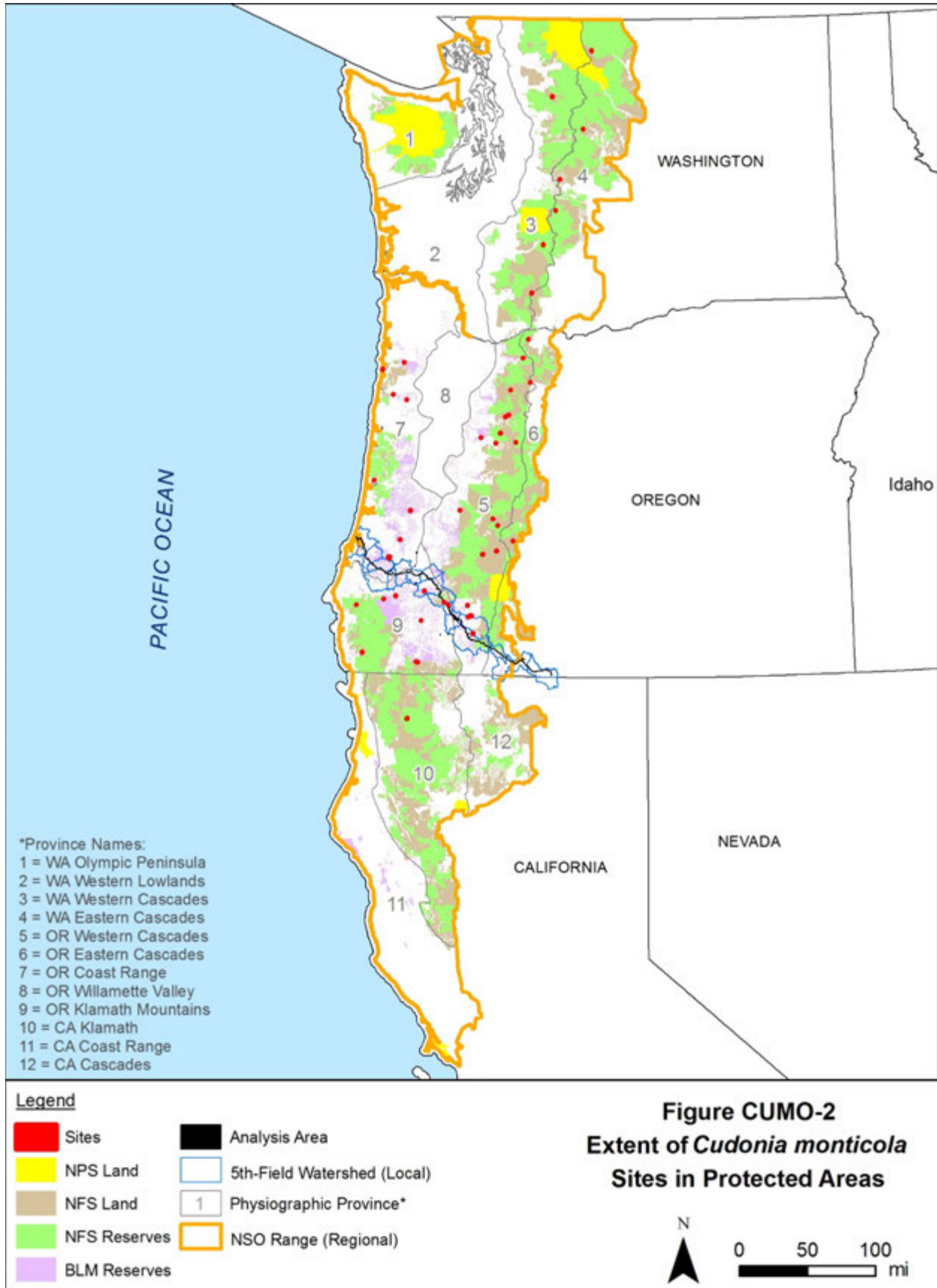
documented in most of the NSO range. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM lands in the region, and the level of protection offered by NFS and BLM reserve land, both land ownerships are included in this potential habitat discussion. Coniferous forests below 6,000 feet msl, including the LSOG component of these forests, across the NSO range could provide habitat for *C. monticola* and support additional sites. These forests encompass an estimated 15.1 million acres on BLM and NFS lands in the region, including an estimated 9.1 million acres in reserve land allocations (60 percent of the forests; Table CUMO-4). Of this acreage, an estimated 4.9 million acres are LSOG (see Figure CUMO-3), including 3.2 million acres in reserve land allocations (66 percent of the forests). Although coniferous forests below 6,000 feet msl are widespread across the region, LSOG coniferous forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

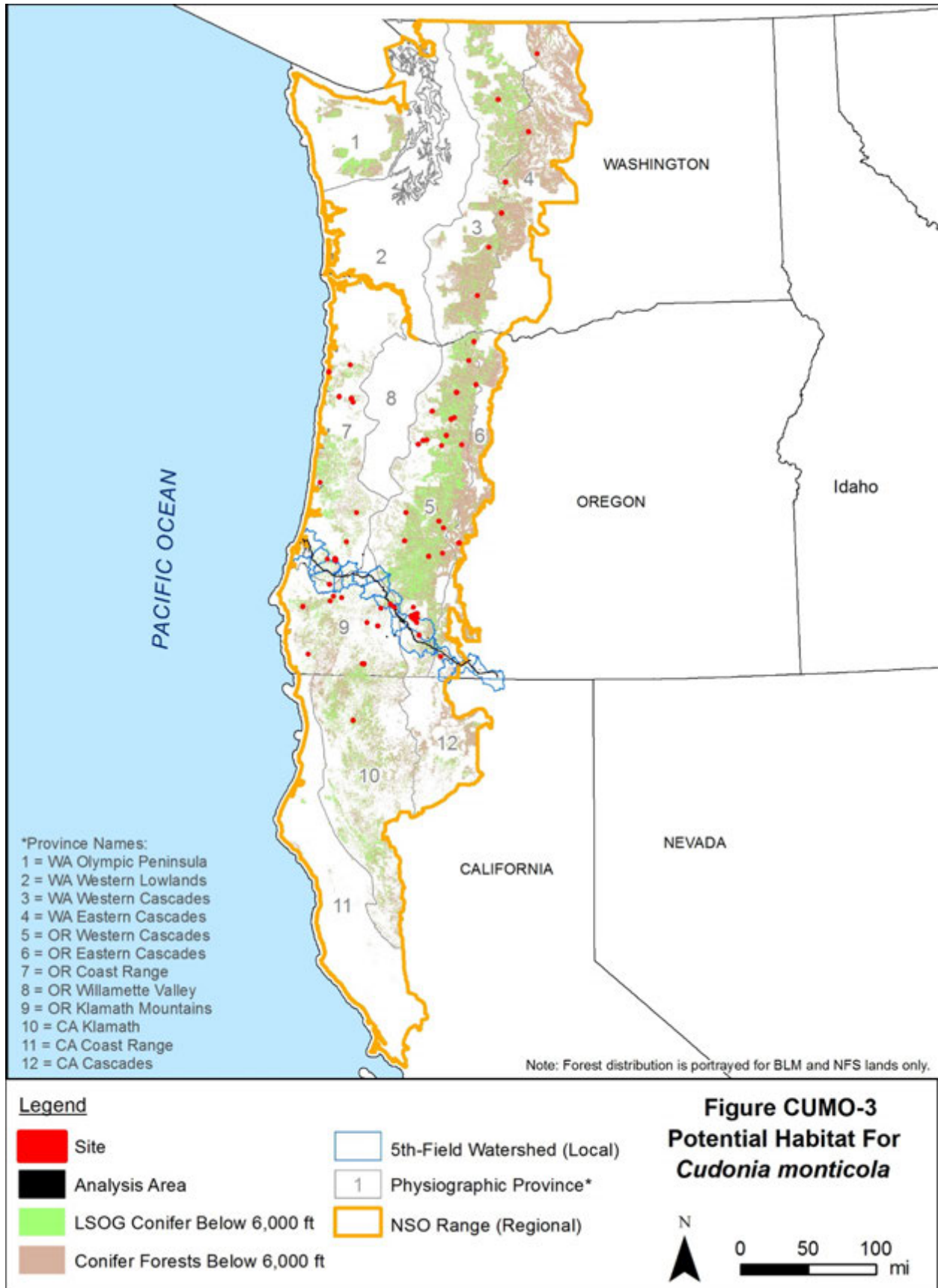
TABLE CUMO-4

Extent of Forests That Could Provide Habitat for <i>Cudonia monticola</i> on NFS and BLM Lands ^{a/}				
Location	Coniferous Forests below 6,000 feet		LSOG Coniferous Forests below 6,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	15,108,825	9,057,899	4,869,845	3,235,553
Local Area	442,108	276,754	159,211	114,927
Project Area	10,23	691	298	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.







Local Distribution

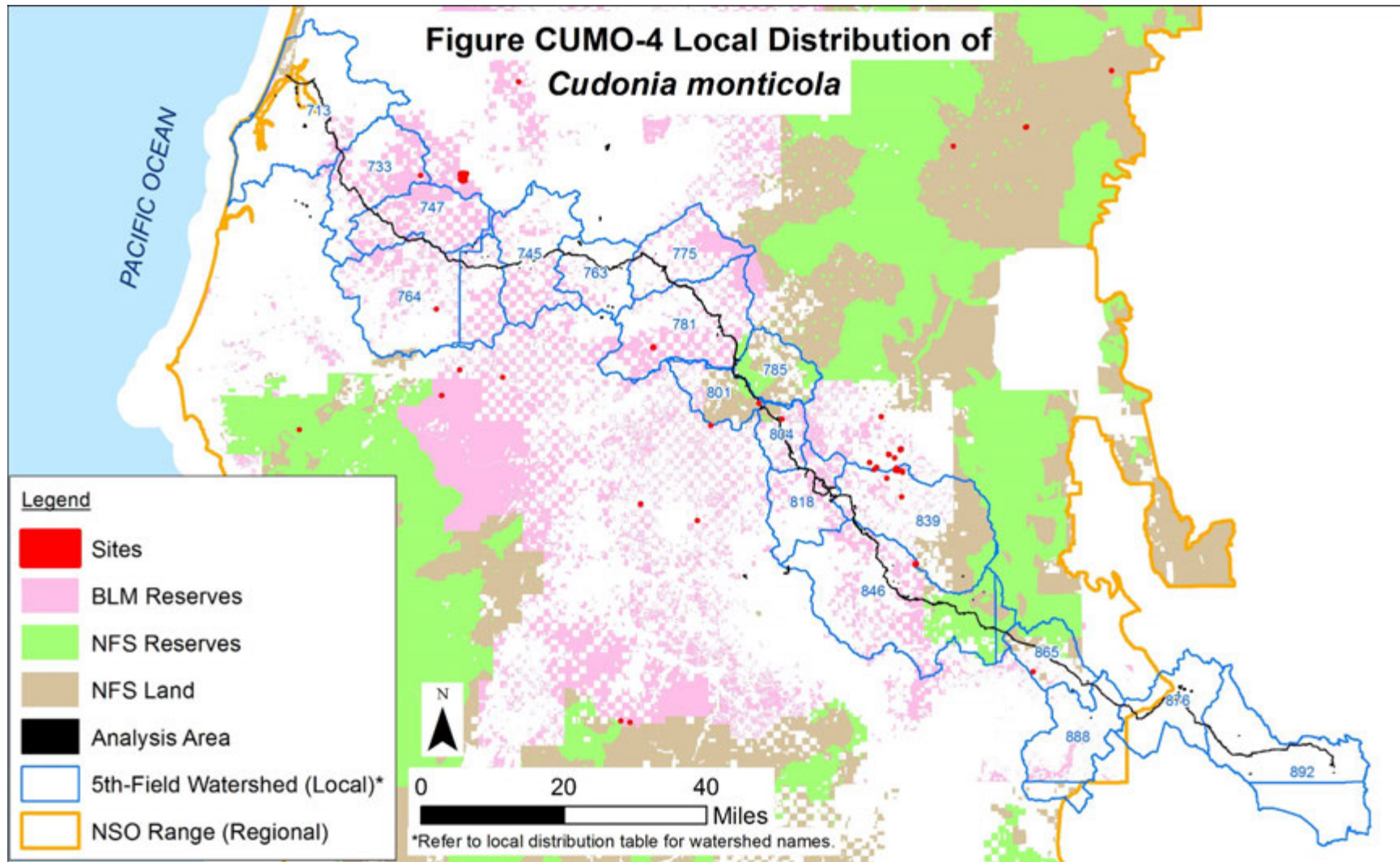
Within the local area, *C. monticola* is distributed across eight 5th-field watersheds that overlap the project area (see Figure CUMO-4 and Table CUMO-5.) The 19 sites in the local area are scattered across the majority of the project area, with several clustered sites located in the Big Butte Creek and Little Butte Creek watersheds in the western Cascade Range. The remaining watersheds contain fairly isolated or scattered sites. Across these watersheds, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous forests below 6,000 feet msl, 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 approximately 10 miles north of the project area in the Cascade Range, several more sites are located within 20 miles south of the project area in the Klamath Mountains, and one large multi-observation site is located 10 miles north of the project in the Coast Range. The majority of these nearby regional sites are either on NFS lands or located entirely in BLM reserves.

Of the 19 sites in the local area, one is on NFS lands on lands designated as Other (Matrix). Four sites are at least partially on private lands and 17 sites are at least partially on BLM lands. Of the sites on BLM lands, 12 sites are entirely in BLM reserves, representing 71 percent of the sites on BLM lands in the local area.

Coniferous forests below 6,000 feet msl encompass approximately 442,108 acres on BLM and NFS lands in the local area, with 276,754 acres in reserve land allocations (63percent of the forests). Of this acreage, an estimated 159,211 acres are LSOG, including 114,927 acres in reserves (72 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 CUMO-3 and CUMO-4).

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	-	9
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)	1	-	1
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	-	-	-
North Fork Coquille River (733)	1	-	-
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	1	-	1
Spencer Creek (865)	1	-	1
Trail Creek (804)	1	-	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.



Analysis/Project Area Distribution

The analysis and project areas contain one *C. monticola* site, located in the Upper Cow Creek watershed on the Umpqua National Forest. The analysis area site is located in the central portion of the project area in the Klamath Mountains and is located on lands designated as Other (Matrix). Many sites are located within 20 miles of the analysis site, including several sites east of the analysis area site in the Cascade Range and several more sites west and southwest of the analysis area site in the Klamath Range. While the sites in close vicinity to the analysis area site are all on BLM lands, about half are entirely within reserves and would likely receive some level of protection under BLM reserve management. Additional sites on NFS lands are located approximately 50 miles from the analysis area in the Cascade Range and Klamath Mountains.

Surveys for the PCGP Project resulted in one observation of individuals of the species in or near the project area during 2010 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). This recorded observation comprises the only site in the analysis area located at approximately MP 109.7.

Project Impacts

Analysis

The PCGP Project would affect one out of the 35 sites on NFS lands in the region, representing approximately 3 percent of the sites (or one out of 82 total sites on all lands in the NSO range). Table CUMO-6 presents an overview of the features of the PCGP Project that would affect the *C. monticola* site. The work and storage areas would affect approximately 0.17 acres within the site (about 6 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. monticola* in and near the project area. 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 CUMO-6		
Impacts to <i>Cudonia monticola</i> Sites on NFS Lands in the Project Area		
Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	-	-
Temporary Extra Work Area (TEWA)	1	0.08 ac
Uncleared Storage Area (UCSA)	1	0.09 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 TEWAs would disturb about 0.08 acre within the *C. monticola* site. The UCSA may disturb an additional 0.09 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 woody debris could negatively affect *C. monticola* 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 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.

Across the project area, the PCGP Project would remove an estimated 809 acres of coniferous forests below 6,000 feet msl, including 224 acres of LSOG coniferous forests below 6,000 feet msl. These impacts would result in a reduction of habitat that may be suitable for *C. monticola*. Within this impact area, about 428 acres (about 53 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 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 191 acres of coniferous forests below 6,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests below 6,000 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the single site as a result of the PCGP Project, no sites would remain on NFS land in the local area, and 34 sites, including nine in reserves, would remain on NFS lands in the NSO range. A total of 17 sites would remain on BLM lands in the local area, including 12 entirely in reserves, and 45 sites would remain on BLM lands in the NSO range, including 26 entirely in reserves. 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 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, the 26 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 *C. monticola* sites on NFS lands in the NSO range would be protected in reserves and 44 percent of the 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:

- *Cudonia monticola* is a Category B (rare) S&M species across 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:

- *Cudonia monticola* has a wide, but scattered, distribution across seven physiographic provinces and three states the region and a moderate-high number of overall sites (35 on NFS lands, 82 on all lands). The species is most abundant in the Cascade Range and Klamath Mountains, but it does not appear to be well distributed in its range. The currently known number of sites on NFS and BLM lands has increased by 68 sites since 2007, with one site documented during the PCGP Project surveys.
- An estimated 44 percent of the sites (35 sites) on NFS and BLM lands are in reserves, which is an increase of about 21 sites in reserves since 2006 per Molina (2008).
- Coniferous forests below 6,000 feet msl (general habitat for the species) are widespread across the region and encompass approximately 15.1 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 PCGP Project would affect one of 35 Forest Service-managed sites of *C. monticola*, representing approximately 3 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 (34) would remain on NFS lands in the region with a wide, but scattered, distribution across Washington, Oregon, and California. No sites would remain on NFS lands in the local area. A total of 26 sites would remain entirely in BLM reserves in the NSO range and 12 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 reserves, and the percentage of sites in NFS reserves would be about the same (approximately 26 percent). Of the sites in NFS reserves, seven 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 *C. monticola* are unlikely. A total of 26 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. monticola* 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 191 acres of coniferous forests below 6,000 feet msl (less than 1 percent of the total regional acreage). An estimated 9.1 million acres (60 percent) of coniferous forests and 3.2 million acres (66 percent) of LSOG coniferous forests below 6,000 feet msl would remain in reserves in the NSO range.
- The remaining forests could support additional populations of *C. monticola*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Cudonia monticola* 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.

2.13.4 Conclusions

If implemented as proposed, the PCGP Project may affect site persistence of *C. monticola* 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, 34 sites would remain on NFS lands across the region, and no sites would remain on NFS lands in the local area. Additionally, 45 sites would remain on BLM lands in the region, including 26 sites entirely in reserves, and 17 sites would remain on BLM lands in the local area, including 12 entirely in reserves. The PCGP Project would affect site persistence of *C. monticola* at one site on NFS lands. The site in the analysis area represents the only site on NFS lands in close proximity to the project area; the nearest sites on NFS lands are approximately 50 miles to the northeast in the Cascade Range and 60 miles to the west in the Klamath Mountains. Sites on BLM lands are much more abundant in the vicinity of the analysis area, and many sites are distributed across the Coast Range, Klamath Mountains, and Western Cascade Range in southern Oregon. Approximately half of the regional sites on BLM lands are located entirely in BLM reserves, and it is expected that BLM management would enable the majority of the sites in reserves to persist. Due to the significant number of sites located on BLM lands in the local area (17) with a large proportion of sites in BLM reserves (71 percent), it can be assumed that the species would be protected and remain common in the local area. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Cudonia monticola* would persist in the region without considering the single site as part of the population.
- The PCGP Project would remove approximately 809 acres of coniferous forests and 224 acres of LSOG coniferous forests below 6,000 feet msl (a negligible amount of the forests). An estimated 53 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 9.1 million acres (60 percent) of coniferous forests and 3.2 million acres (66percent) of LSOG coniferous forests below 6,000 feet msl would remain in reserves in the NSO range. It is anticipated more sites are 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 in BLM reserves are expected to receive some level of protection under BLM management. Although a single natural disturbance event or combination of events could affect a significant portion of sites in the western Cascade Range in southern Oregon, other sites are scattered across the region and are less likely to be affected by a single event.

The PCGP Project would not be able to avoid impacts to the *C. monticola* site 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. monticola* 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 the affected site would waive implementation of Management Recommendations for the *C. monticola* 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.

2.14 GALERINA ATKINSONIANA

Galerina atkinsoniana is a litter saprobe or parasite in the Cortinariaceae family and does not have a common name.

2.14.1 Regulatory Status and Ranking

The 2001 ROD identifies *G. atkinsoniana* as a Category B (rare) species. While the 2003 Annual Species Review removed *G. atkinsoniana* from the S&M list, it is considered one of twelve special consideration species and it is included in this evaluation with the 2001 ROD Category B ranking. ORBIC did not evaluate *G. atkinsoniana* in its 2004 *Survey and Manage Assessment* for BLM and the Forest Service (ORBIC 2004) and has not ranked the species in current or past publications of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2001, 2004, 2007, 2010, 2013, and 2016). It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.14.2 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

Galerina atkinsoniana is considered saprophytic (Castellano et al. 2003) and obtains its nutrients by the chemical decomposition of dead plant matter (Cushman and Huff 2007). It has also been thought to parasitize mosses (Castellano et al. 2003) and may be dependent on them for growth and reproduction (Hothausen et al. 1994). Fruit bodies are produced primarily during the summer and fall but it may fruit at other times depending on the site and geographic location (Hothausen et al. 1994). Very little is known about its dispersal mechanisms or reproductive biology.

Range

Galerina atkinsoniana is widely distributed throughout the Northern Hemisphere (Castellano et al. 2003) but is thought to have a spotty distribution (ORBIC 2004). It is known from Europe, Russia, Japan, and North America (ORBIC 2004) and reportedly common in Idaho and found occasionally in Wyoming and Colorado (Evenson 2015). In the range of the NSO, the species has a uniform but scattered distribution from Mt. Hood National Forest in Oregon to the California border. In Washington, it is restricted to Mt. Baker-Snoqualmie National Forest and Mt. Rainier National Park (ORBIC 2004).

Population Status

ORBIC (2004) reported 50 occurrences of *G. atkinsoniana* within California, Oregon, and Washington. An estimated 40 occurrences were in Oregon, four occurrences were in California, and four to 12 occurrences were in Washington (ORBIC 2004). The number of occurrences outside of the western United States is unknown. The long term trend for the species is relatively stable with *G. atkinsoniana* being common enough throughout its boreal range (ORBIC 2004). The species was found in 57 locations during Random Multi-Species surveys across the NSO range from 2001 to 2004 (USDA and USDI 2007). Molina (2008) documented 93 new sites of *G. atkinsoniana* in the NSO range between 1998 and 2006, and 102 total sites were documented by 2006, including 78 in reserves or protected areas. The 2007 Final SEIS reported 83 sites on NFS and BLM lands and 83 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 *G. atkinsoniana*, and resulted in one new observation of individuals or populations of *G. atkinsoniana*. Based on the increased number of known sites since 1998 as a result of the increased number of surveys (an approximately 10-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

Galerina atkinsoniana is found in boreal forests with full canopies and sufficient moss and needle litter (ORBIC 2004). It is found single to gregarious and within spruce and Douglas fir forests (Castellano et al. 2003). It is often found in moist habitats (e.g. riparian areas), including moist late-successional forests with little to no disturbance (Roger 1998), but in Oregon it has also been collected from protected sites in recently thinned and clear-cut stands (Norvell and Exeter 2004).

Threats

ORBIC (2004) states that the primary threats to *G. atkinsoniana* are actions that remove canopy cover resulting in exposure to full sun as well as the loss of substrate. Air pollution and global climate change could also cause a decline in this species since it is closely associated with mosses, which are sensitive to bad air quality and warming temperatures. (Hothausen et 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. No management recommendations have been developed for *G. atkinsoniana* because it was removed from the S&M list after 2001.

2.14.3 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 *G. atkinsoniana* 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 GAAT-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 145 observations from BLM and Forest Service geodatabases were converted into 96 sites in the NSO range (region). Table GAAT-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table GAAT-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 GAAT-1 displays the regional distribution of the species across NFS lands, Figure GAAT-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure GAAT-3 displays the species' regional distribution as well as the extent of coniferous forests below 4,500 feet and LSOG coniferous forests below 4,500 feet on BLM and NFS lands.

Number of <i>Galerina atkinsoniana</i> Sites (2017)	
Location*	Number of Sites
Regional Area	96
Local Area	8
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.

Distribution of <i>Galerina atkinsoniana</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	68	2	1
BLM	28	6	-
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	6	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.

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	2	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	6	-	-
Congressionally Reserved (CR)	16	-	-
Late Successional Reserve (LSR)	39	1	-
Marbled Murrelet Area (LSR3)	1	-	-
Northern Spotted Owl Activity Center (LSR4) ^{a/}	1	-	-
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	10	1	1
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	-	-	-
District Designated Reserve	10	4	-
Harvest Land Base	10	3	-
Late Successional Reserve	16	2	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	14	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

Galerina atkinsoniana has a wide, but scattered, distribution across eight physiographic provinces in Washington (Western and Eastern Cascades and Olympic Peninsula) and Oregon (Coast Range, Cascades East and West, Willamette Valley, and Klamath Mountains) (see Figure GAAT-1). Most sites are found along the Cascade Range, with scattered sites or groups of sites in the Klamath Mountains, Coast Range, and other outlying areas. Some clusters of sites are located in the Cascade Range, Klamath Mountains, and Coast Range; however, many sites appear scattered across the NSO range. *Galerina atkinsoniana* appears to be well distributed in the western Cascade Range in Oregon and Washington based on the abundance and size of sites, proximity of sites to one another, and distribution of the species across forests that may provide suitable habitat in the mountain range.

Six of 96 known sites are at least partially located on private or other lands; 28 sites are at least partially on BLM lands; and 68 sites are at least partially on NFS lands across the region. Sites included on National Forests that encompass the project area include two sites on the Rogue River-Siskiyou National Forest and four sites on the Umpqua National Forest. The remaining 62 sites on NFS lands are on the Gifford Pinchot, Mt. Baker-Snoqualmie, Mt. Hood, Okanogan-Wenatchee, Olympic, Siuslaw, and Willamette National Forests.

Across the NSO range, 55 sites are at least partially located in reserve lands managed by the Forest Service, including 39 at least partially in LSRs, 16 at least partially in Congressionally Reserved areas, one in a Marbled Murrelet Area, and one in a Known Owl Activity Center (see Figure GAAT-2). This represents 81 percent of the total Forest Service-managed sites in the region. The remaining Forest Service-managed sites on other land allocations receive some level of protection

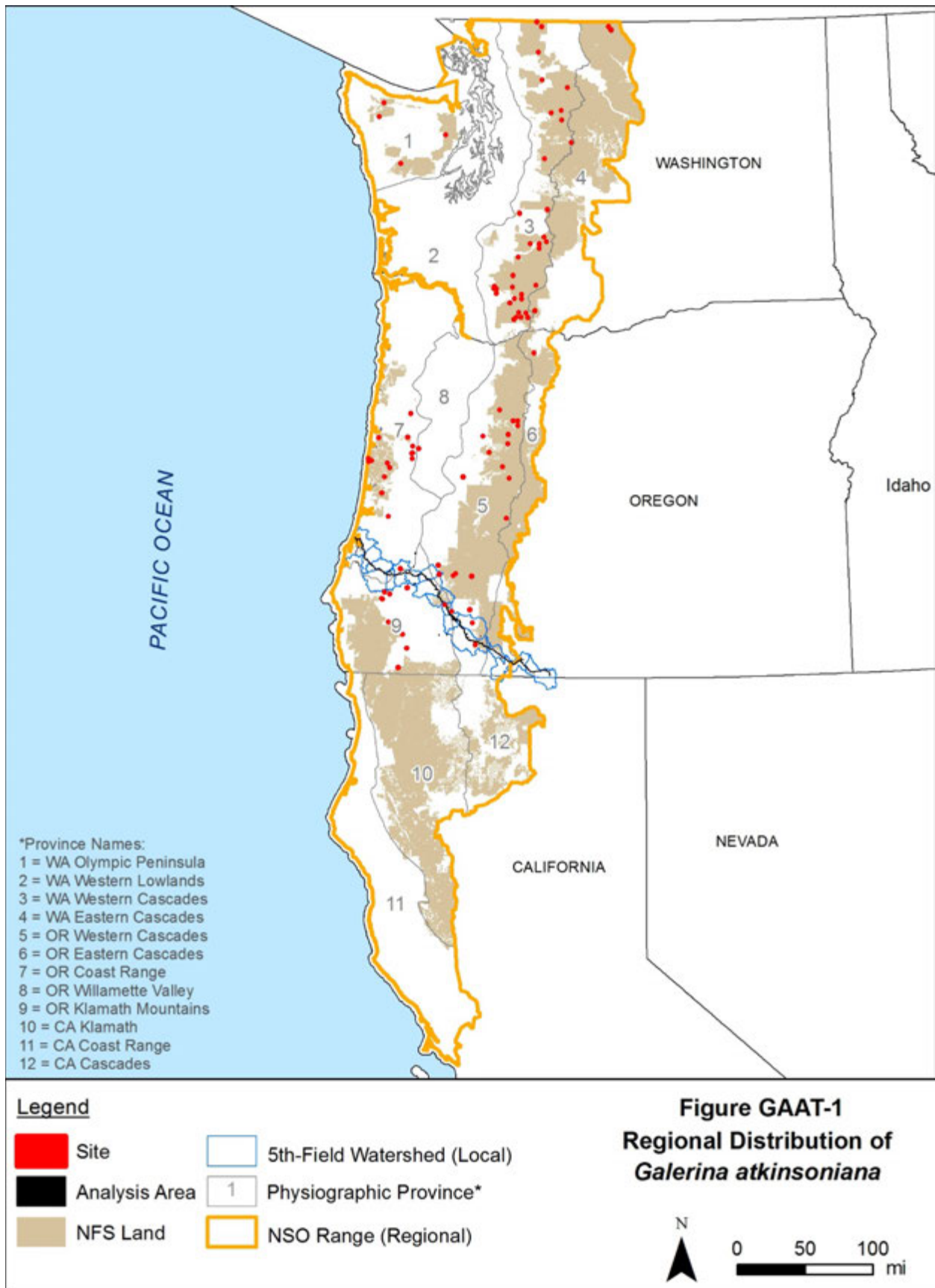
through the S&M Standards and Guidelines and other land management plan components. Additionally, 18 sites are entirely in reserve lands managed by BLM, which represents 64 percent of the total number of BLM-managed sites in the region. While the sites on BLM lands are not covered by the S&M Standards and Guidelines, the sites entirely in reserves will likely receive some degree of protection under BLM reserve management.

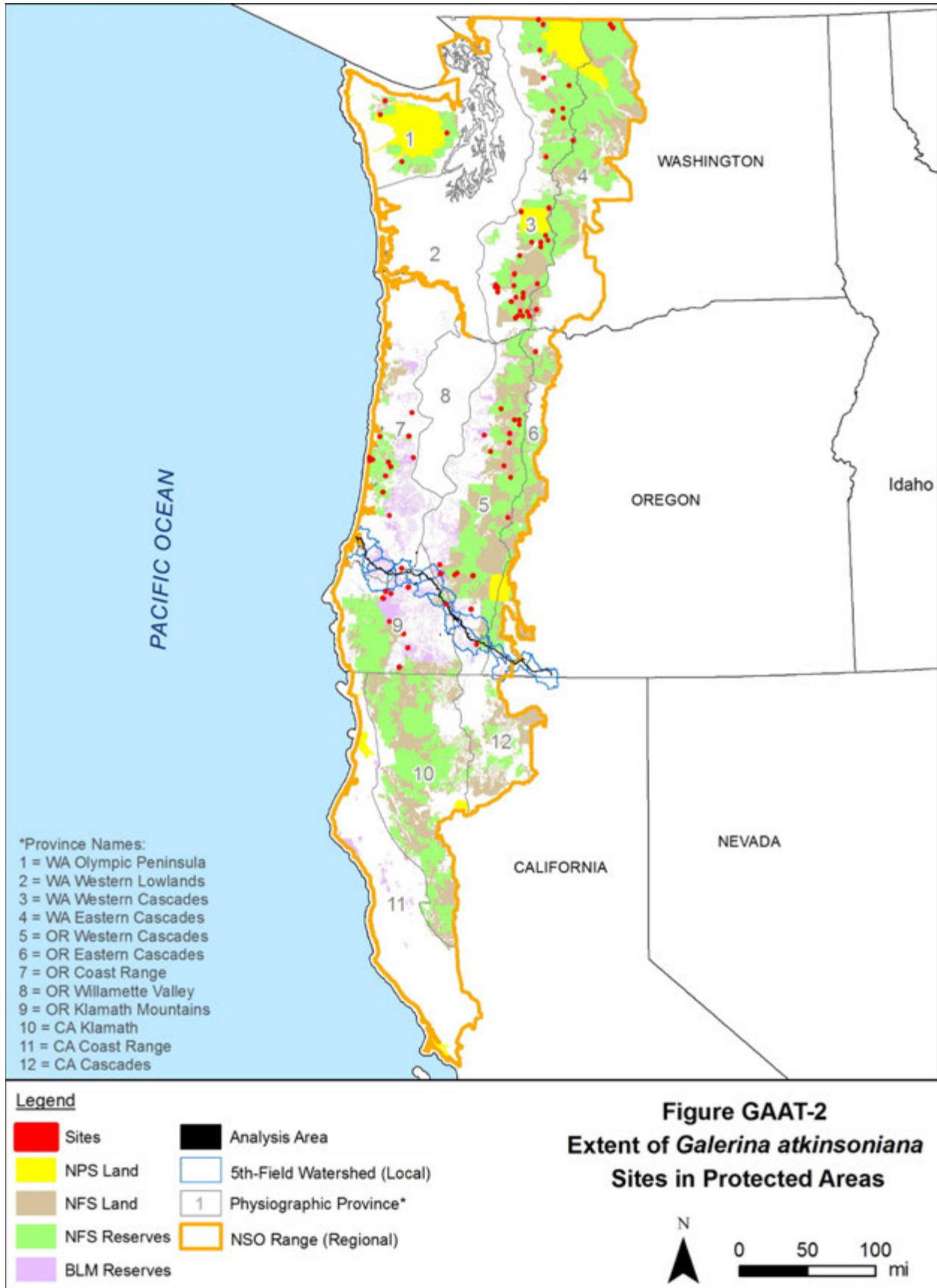
Galerina atkinsoniana is primarily found in LSOG forests based on available data (79 of 96 total sites are in LSOG), but it is also found in non-LSOG forests and may not be restricted to LSOG conditions based on available information on its life history and habitat requirements. Based on current site locations, the species is found in coniferous forests below 4,500 feet msl and has been documented in Washington and 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 forests below 4,500 feet msl, including the LSOG component of these forests, across the NSO range could provide habitat for *G. atkinsoniana* and support additional sites. These forests encompass an estimated 10.7 million acres on BLM and NFS lands in the region, including an estimated 6.3 million acres in reserve land allocations (59 percent of the forests; Table GAAT-4). Of this acreage, an estimated 4.9 million acres are LSOG (see Figure GAAT-3), including 2.6 million acres in reserve land allocations (66 percent of the forests). Although coniferous forests below 4,500 feet are widespread across the region, LSOG coniferous forests below 4,500 feet are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

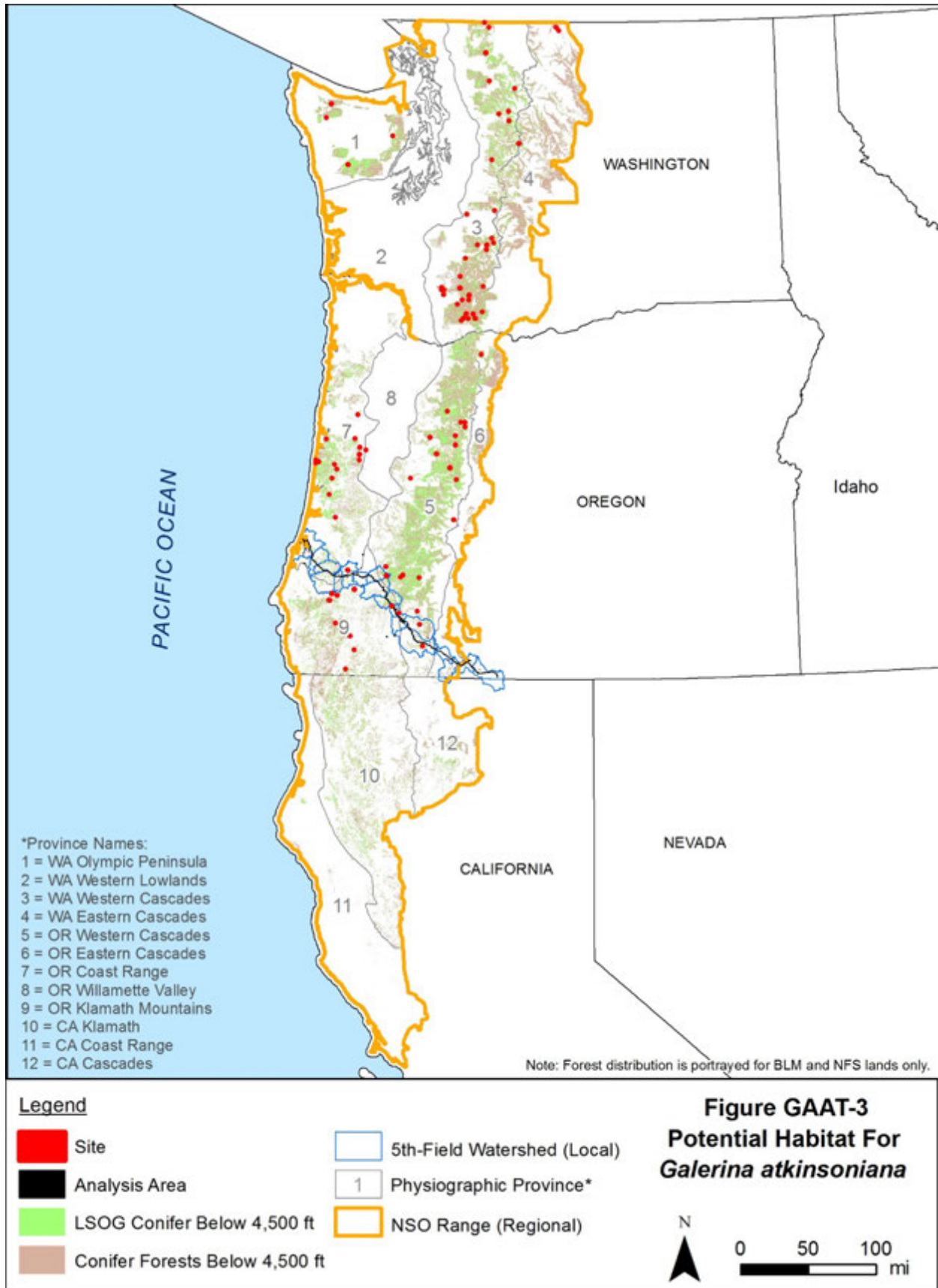
TABLE GAAT-4

Extent of Forests That Could Provide Habitat for <i>Galerina atkinsoniana</i> on NFS and BLM Lands ^{a/}				
Location	Coniferous Forests below 4,500 feet		LSOG Coniferous Forests below 4,500 feet	
	Total	Reserves	Total	Reserves
Regional Area	10,705,684	6,266,445	3,942,115	2,601,548
Local Area	344,154	221,869	128,796	95,925
Project Area	714	484	199	139

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

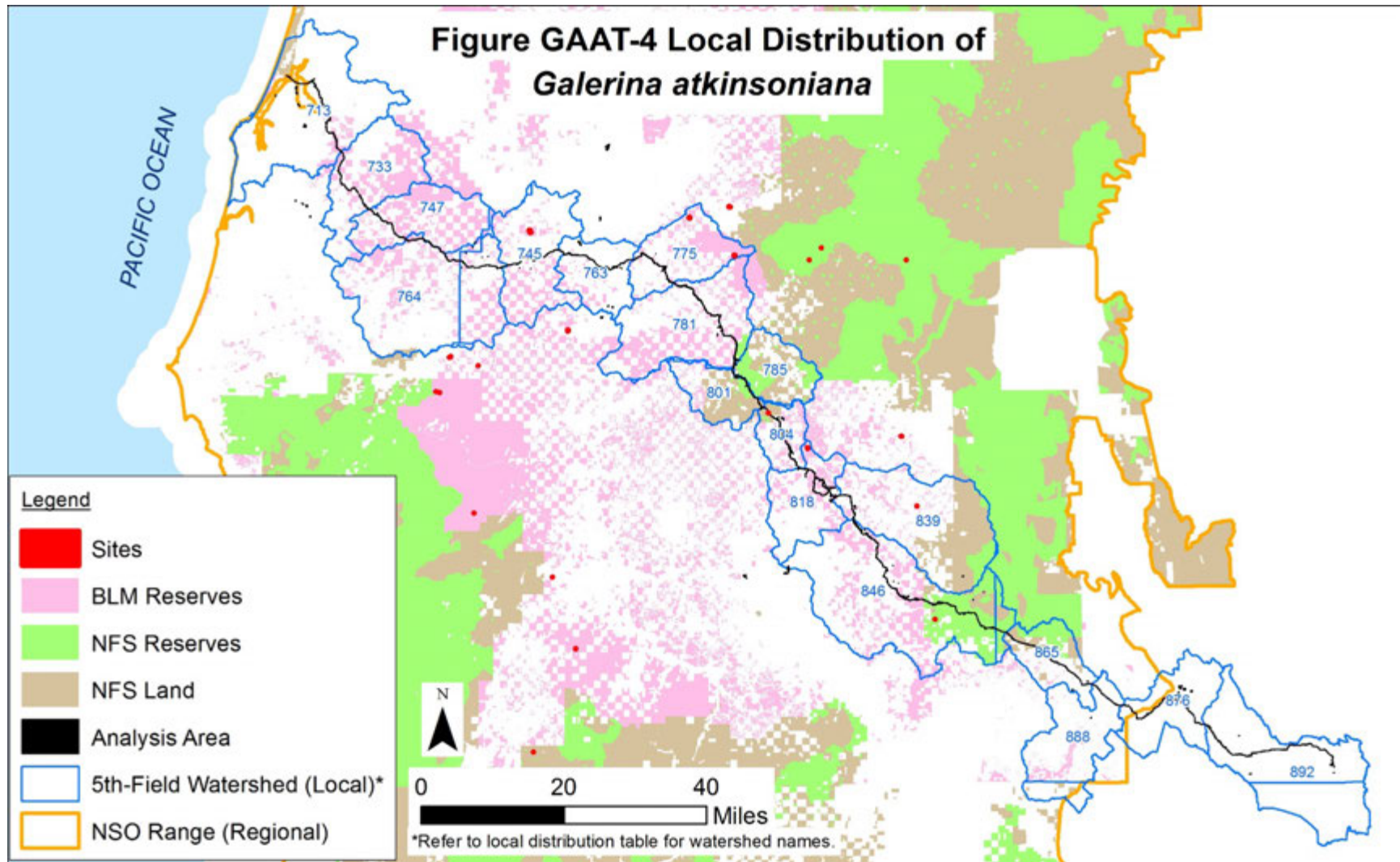
Within the local area, *G. atkinsoniana* is distributed across six 5th-field watersheds that overlap the project area (see Table GAAT-5 and Figure GAAT-4). The eight sites in the local area are scattered across the central third of the project area. Across these watersheds, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous forests below 4,500 feet msl, 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 on NFS lands within 15 miles northeast of the project area. Several more sites are located on BLM lands within 15 miles south of the project area in the Klamath Mountains. The majority of these sites are located entirely in BLM reserves and would likely receive some level of protection under BLM management.

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	1	-	-
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)	2	-	2
North Fork Coquille River (733)	-	-	-
Olalla Creek-Lookingglass Creek (745)	2	-	2
Rogue River-Shady Cove (818)	1	-	1
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.

Of the eight sites in the local area, two are on NFS lands, one of which is on LSRs and the other is on Other (Matrix). One site is partially on private lands and six sites are at least partially on BLM lands, two of which are located entirely in BLM reserves.

Coniferous forests below 4,500 feet encompass approximately 344,154 acres on BLM and NFS lands in the local area, with 221,869 acres in reserve land allocations (64 percent of the forests). Of this acreage, an estimated 128,796 acres are LSOG, including 95,925 acres in reserves (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 GAAT-3 and GAAT-4).



Analysis/Project Area Distribution

The analysis and project areas contain one *G. atkinsoniana* site, which is located in the Trail Creek watershed on the Umpqua National Forest. The analysis area site is located in the central portion of the project area on lands designated as Other (Matrix). Several sites are also located in the site’s immediate vicinity in the Cascade Range, including several sites on NFS lands within 20 miles. Several more sites are located entirely in BLM reserves within 15 miles east of the analysis area site in the Cascade Range and within 30 miles west of the analysis area site in the Klamath Mountains (see Local Distribution discussion above).

Surveys for the PCGP Project resulted in one observation of individuals of the species in or near the project area during 2010 (Siskiyou BioSurvey LLC 2012a). This recorded observation comprises the one site in the analysis area located at approximately MPs 112.2.

Project Impacts

Analysis

The PCGP Project would affect one site out of the 68 sites on NFS lands in the region, representing approximately 1 percent of the sites (or one out of 96 total sites on all lands in the NSO range). Table GAAT-6 presents an overview of the features of the PCGP Project that would affect the *G. atkinsoniana* sites. The construction corridor and associated work and storage areas 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 *G. atkinsoniana* in and near 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)	1	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.

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 0.3 acre of vegetation and soil within the site and could result in the removal of *G. atkinsoniana* 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 individuals adjacent to the corridor. The removal of forests, woody debris, and mosses could negatively affect *G. atkinsoniana* 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 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 0.1 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 570 acres of coniferous forests below 4,500 feet msl, including 152 acres of LSOG coniferous forests below 4,500 feet msl. These impacts would result in a reduction of habitat that may be suitable for *G. atkinsoniana*. Within this impact area, about 297 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 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 126 acres of coniferous forests. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests below 4,500 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the single site as a result of the PCGP Project, one site of *G. atkinsoniana* would remain in LSRs on NFS land in the local area, and 67 sites, including 55 in reserves, would remain on NFS lands in the NSO range. Six sites, including two entirely in reserves would remain on BLM lands in the local area, and 28 sites, including 18 entirely in reserves would remain on BLM 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 55 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, the 18 sites entirely 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:

- *Galerina atkinsoniana* is a Category B (rare) S&M species across 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:
 - *Galerina atkinsoniana* has a wide, but scattered, distribution across eight physiographic provinces and two states the region and a moderate-high number of overall sites (68 on

NFS lands, 96 on all lands). The species is well distributed in the Western Cascade Range in Oregon and Washington. The currently known number of sites on NFS and BLM lands has increased by 13 sites since 2007, with one site documented during the PCGP Project surveys.

- An estimated 76 percent of the sites (73 sites) on NFS and BLM lands are in reserves, which is a decrease of sites in reserves since 2006 per Molina (2008).
- Coniferous forests below 4,500 feet msl (general habitat for the species) are widespread 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 and Klamath Mountains, where most sites are documented.
- The PCGP Project would affect one of 68 Forest Service-managed sites of *G. atkinsoniana*, 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 (67) would remain on NFS lands in the region with a wide, but scattered, distribution across Washington and Oregon. One site (in LSRs) would remain on NFS lands in the local vicinity of the analysis area. Additionally, 28 sites, including 18 entirely in reserves would remain on BLM lands in the region, and six sites, including two entirely in reserves would remain on BLM lands 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 reserves, and the percentage of sites in NFS reserves would be about the same (approximately 80 percent). Of the sites in NFS reserves, 41 are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, and 16 are at least partially in Congressionally Reserved areas where management activities that may adversely affect *G. atkinsoniana* are unlikely. A total of 18 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 *G. atkinsoniana* 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 126 acres of coniferous forests below 4,500 feet msl (less than 1 percent of the total regional acreage). An estimated 6.3 million acres (59 percent) of coniferous forests below 4,500 feet msl and 2.6 million acres (66 percent) of LSOG coniferous forests below 4,500 feet msl would remain in reserves in the NSO range.
- The remaining forests could support additional populations of *G. atkinsoniana*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Galerina atkinsoniana* is treated as 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.

2.14.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *G. atkinsoniana* 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, 67 sites would remain on NFS lands across the region and one site would remain on NFS land in the local area. Additionally, 18 sites would remain entirely in BLM reserves in the region and two sites would remain entirely in BLM reserves in the local area. The site affected in the analysis area is one out of many scattered sites in the Klamath Mountains, Cascade Range, and Coast Range in southern Oregon. Several sites are located on NFS lands and BLM reserves within 20 miles of the site. The remaining *G. atkinsoniana* sites would allow for connectivity and dispersal between the mountain ranges. The species' distribution and range within the NSO range following project implementation would be similar to its currently known distribution and range. *Galerina atkinsoniana* would persist in the region without considering the single site as part of the population.
- The PCGP Project would remove approximately 570 acres of coniferous forests below 4,500 feet msl and 153 acres of LSOG coniferous forests below 4,500 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 6.3 million acres (59 percent) of coniferous forests below 4,500 feet msl and 2.6 million acres (66 percent) of LSOG coniferous forests below 4,500 feet msl would remain in reserves in the NSO range. It is anticipated more sites are 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 in BLM reserves are expected to receive some level of protection under BLM management. A single natural disturbance event or combination of events would not affect a significant portion of sites since the sites are fairly scattered across the region and are not likely to be affected by a single event.

The PCGP Project would not be able to avoid impacts to the *G. atkinsoniana* site in the analysis area, although some individuals within the sites may persist following project implementation. Based on the above conclusions, avoidance of the *G. atkinsoniana* 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 *G. atkinsoniana* 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.

2.15 GASTROBOLETUS SUBALPINUS

Gastroboletus subalpinus is a bolete mushroom species in the Boletaceae family and does not have a common name.

2.15.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *G. subalpinus* as a Category B (rare) species. ORBIC evaluated *G. subalpinus* 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.

2.15.2 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 *G. subalpinus*. It forms sequestrate sporocarps in soil that develop and mature beneath the surface (Castellano and O'Dell 1997). It is presumed that it forms ectomycorrhiza, which form symbiotic associations with host plant roots. *Gastroboletus subalpinus* spores are assumed to disperse through mycophagy (i.e., through animal consumption). The species has been documented fruiting in September and October throughout its known range (Castellano et al. 1999).

Range

Gastroboletus subalpinus is endemic to California and Oregon (Holthausen et al. 1994, Castellano and O'Dell 1997, Castellano et al. 1999). Based on data available in 1994, the species' range was restricted to the Cascade Range in Oregon and the northern Sierra Nevada in California (Holthausen et al. 1994). 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 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, may have reduced available habitat and further restricted the species' distribution.

Population Status

ORBIC (2004) reported *G. subalpinus* from an estimated 22 element occurrences in the NSO range in 2004. An estimated 11 of these occurrences were in Oregon, and 11 occurrences were in California (ORBIC 2004). In 2004, *G. subalpinus* had a limited range, and populations trends were unknown (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 27 new sites of *G. subalpinus* in the NSO range between 1998 and 2006, and 48 total sites were documented by 2006, including 24 in reserves or protected areas. The 2007 Final SEIS reported 38 sites on NFS and BLM lands and 39 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 between 2010 and 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 *G. subalpinus*, and resulted in two new observations of *G. subalpinus*. Based on the increased number of known 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, particularly in the Cascade Range where the species is most abundant. The current estimated number of sites and distribution of the species based on 2017 data are provided below under Species Distribution.

Habitat

Gastroboletus subalpinus grows in association with the roots of assorted species in the Pine family, particularly mountain hemlock, California red fir, lodgepole pine, or whitebark pine (Castellano and O'Dell 1997). Based on data available in 1994, *G. subalpinus* was only found in coniferous forests above 4,500 feet msl (Holthausen et al. 1994). *Gastroboletus subalpinus* has been documented in disturbed areas, such as campgrounds and roadsides, and appears to be resilient to low intensity fire (Trappe, pers. comm. 2013). *Gastroboletus subalpinus* may prefer specific microclimate conditions of LSOG forests and in one study showed significant positive correlations with stand age (> 225 years) (Trappe et al. 2009); however, it may not be restricted to these conditions.

Threats

Threats to *G. subalpinus* include actions that disturb soil and remove overstory host trees, such as logging (Castellano and O'Dell 1997). Trampling and soil compaction from recreational uses may threaten the species because many occurrences are found in high recreational use areas (Holthausen et al. 1994); however, the species appears to be resilient to such disturbances (Trappe, pers. comm. 2013). Fire is not considered a major threat because the species is found at higher elevations in cool, wet areas that are less prone to fire (Castellano and O'Dell 1997).

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 *G. subalpinus* with several other species (Group 2 of Castellano and O’Dell 1997). The primary guidance is to maintain current habitat and microclimatic conditions and avoid disturbance at all known locations on federal lands. 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. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *G. subalpinus*:

- As a mycorrhizal species, *G. subalpinus* 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.

2.15.3 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 *G. subalpinus* 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 GASU-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 97 observations from BLM and Forest Service geodatabases were converted into 91 sites in the NSO range (region). Table GASU-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table GASU-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 GASU-1 displays the regional distribution of the species across NFS lands, Figure GASU-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure GASU-3 displays the species’ regional distribution as well as the extent of coniferous forests and LSOG coniferous forests between 2,000 and 7,000 feet msl on BLM and NFS lands within the currently known range of the species.

TABLE GASU-1	
Number of <i>Gastroboletus subalpinus</i> Sites (2017)	
Location*	Number of Sites
Regional Area	91
Local Area	2
Analysis Area (Project Area)	2 (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.	

Distribution of <i>Gastroboletus subalpinus</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	81	2	2
BLM	1	-	-
NPS	7	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	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.

Distribution of <i>Gastroboletus subalpinus</i> 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)	18	-	-
Congressionally Reserved (CR)	22	-	-
Late Successional Reserve (LSR)	13	-	-
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) ^{a/}	2	-	-
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	37	2	2
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	1	-	-
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

Gastroboletus subalpinus has a somewhat wide distribution across five physiographic provinces in Washington (Eastern Cascades), Oregon (Cascades East and West), and California (Klamath and Cascades) (see Figure GASU-1). Most sites are found along the Cascade Range in Oregon and California, with isolated sites located in the Klamath Mountains in California and Cascade Range in Washington. The sites in the Cascade Range are distributed across Oregon and California in many clusters of sites. *Gastroboletus subalpinus* appears to be well distributed in the eastern Cascade Range in Oregon based on the abundance and size of sites, proximity of sites to one another, and distribution of the species across forests that may provide suitable habitat in the mountain range.

Two of the 91 known sites in the region are on private land; seven sites are on NPS lands (Crater Lake National Park); one site is on BLM lands; and 81 sites are on NFS lands across the region. Sites included on National Forests that encompass the project area include 17 sites on the Fremont-

Winema National Forest, seven sites on the Umpqua National Forest, and two sites on the Rogue River-Siskiyou National Forest. The remaining 58 sites on NFS lands are on the Deschutes, Gifford Pinchot, Modoc, Mt. Hood, Shasta-Trinity, Six Rivers, and Willamette National Forests.

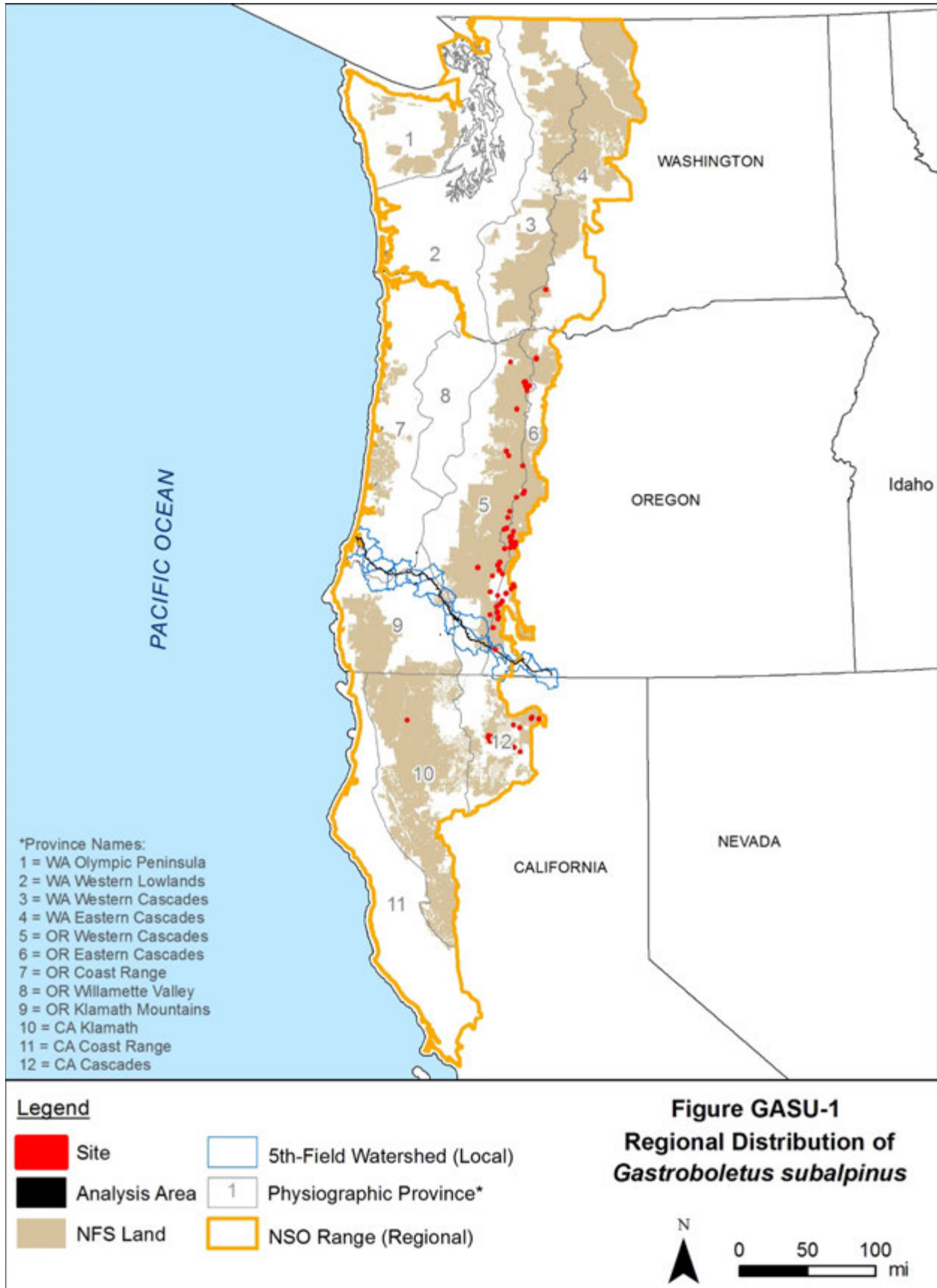
Across the NSO range, 36 sites are at least partially located in reserve lands managed by the Forest Service, including 13 at least partially in LSRs, 22 at least partially in Congressionally Reserved areas, and two at least partially in Known Owl Activity Centers (see Figure GASU-2). This represents 44 percent of the total 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. The single site on BLM lands is in Congressional Reserves. While the single site in BLM reserves and the seven sites on NPS land are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection under BLM management and National Park management.

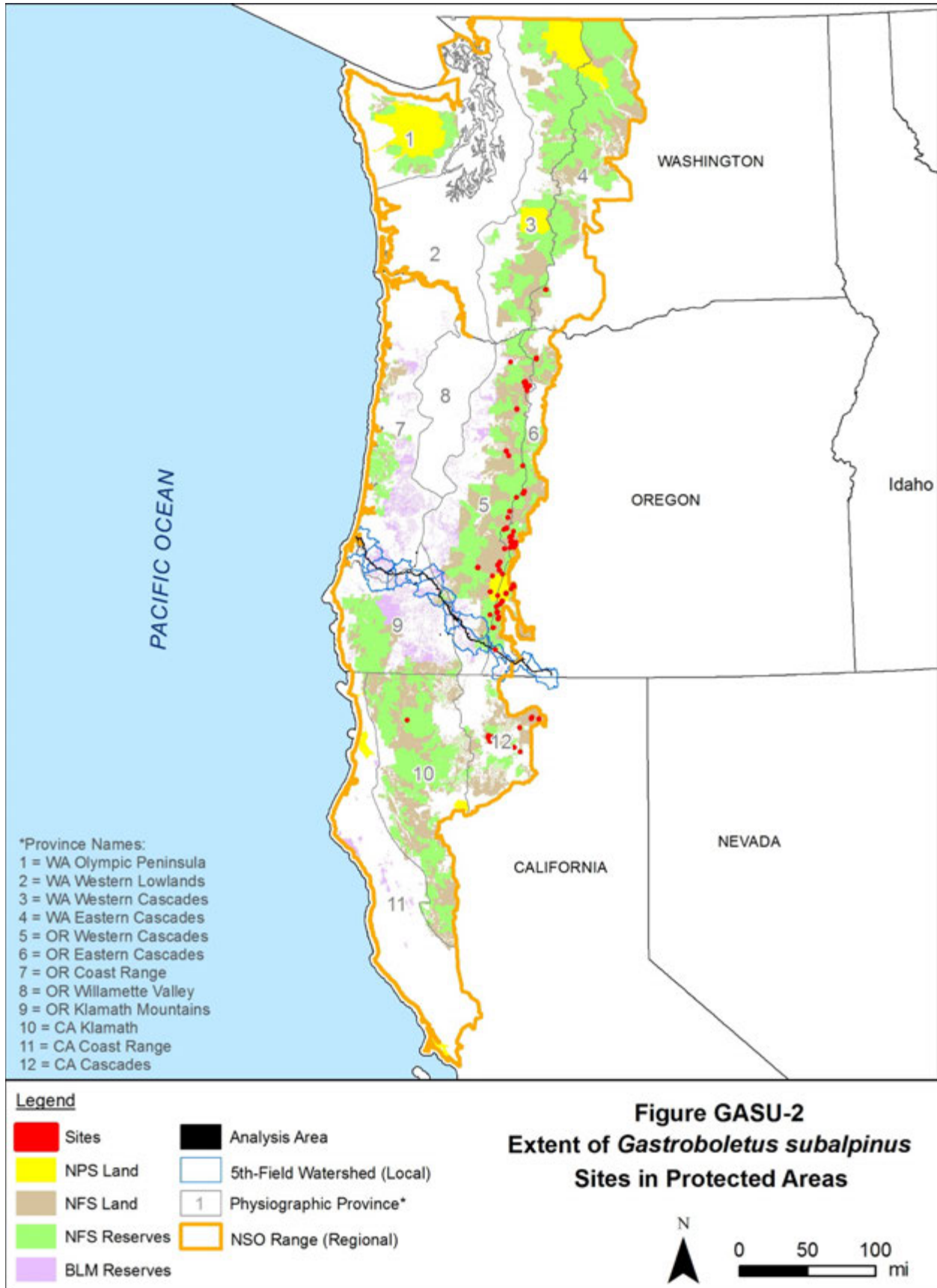
Gastroboletus subalpinus is more often found in LSOG forests based on available data (40 of 91 total sites are in LSOG), but it is also relatively common in non-LSOG forests and is found in areas that have been disturbed by recreational activities. Based on current site locations, the species has been found in coniferous forests between about 2,000 and 7,000 feet msl and has only been documented in parts 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 across the NSO range could provide habitat for *G. subalpinus* and support additional sites. These forests encompass an estimated 14 million acres on BLM and NFS lands, including an estimated 8.3 million acres in reserve land allocations (59 percent of the forests; Table GASU-4). Of this acreage, an estimated 4 million acres are LSOG (see Figure GASU-3), including 2.6 million acres in reserve land allocations (64 percent of the forests). Although coniferous forests between 2,000 and 7,000 feet msl are widespread across the mountain ranges, LSOG coniferous forests are less common.

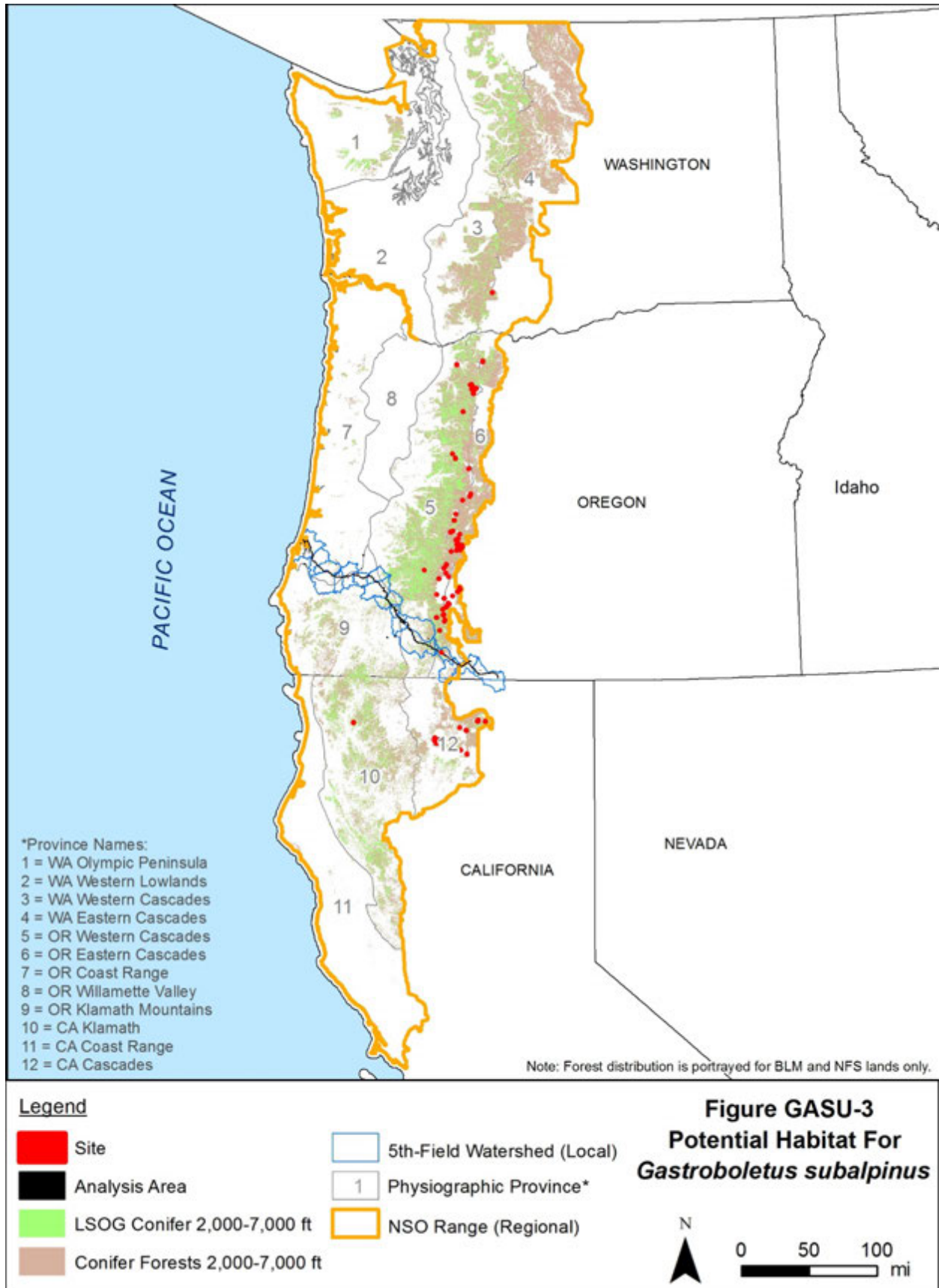
TABLE GASU-4

Extent of Forests That Could Provide Habitat for <i>Gastroboletus subalpinus</i> on NFS and BLM Lands ^{a/}				
Location	Coniferous Forests between 2,000-7,000 feet		LSOG Forests between 2,000-7,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	13,968,404	8,257,684	4,020,181	2,563,746
Local Area	328,613	178,814	104,916	65,073
Project Area	789	518	225	152

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, *G. subalpinus* is found in one 5th-field watershed (Spencer Creek) that overlaps the project area (see Table GASU-5 and Figure GASU-4). The two sites in the local area are on NFS land designated as Other (Matrix) in the Fremont-Winema National Forest. The two sites are within 500 feet of each other in the eastern Cascade Range and are a part of many sites in the region that are scattered across the Cascade Range in Oregon. Although the nearest site is more than 16 miles north of the local area sites in the Cascade Range, dispersal opportunities may exist between sites via animal vectors based on the extent of forests that may provide suitable habitat within the Cascade Range.

Coniferous forests between 2,000 and 7,000 feet msl encompass approximately 328,613 acres on BLM and NFS lands in the local area, with 178,814 acres in reserve land allocations (54 percent of the forests). Of this acreage, an estimated 104,916 acres are LSOG, including 65,073 acres in reserve land allocations (62 percent of the forests). Other sites may be located in the Cascade Range and Klamath Mountains in areas that have not been previously surveyed.

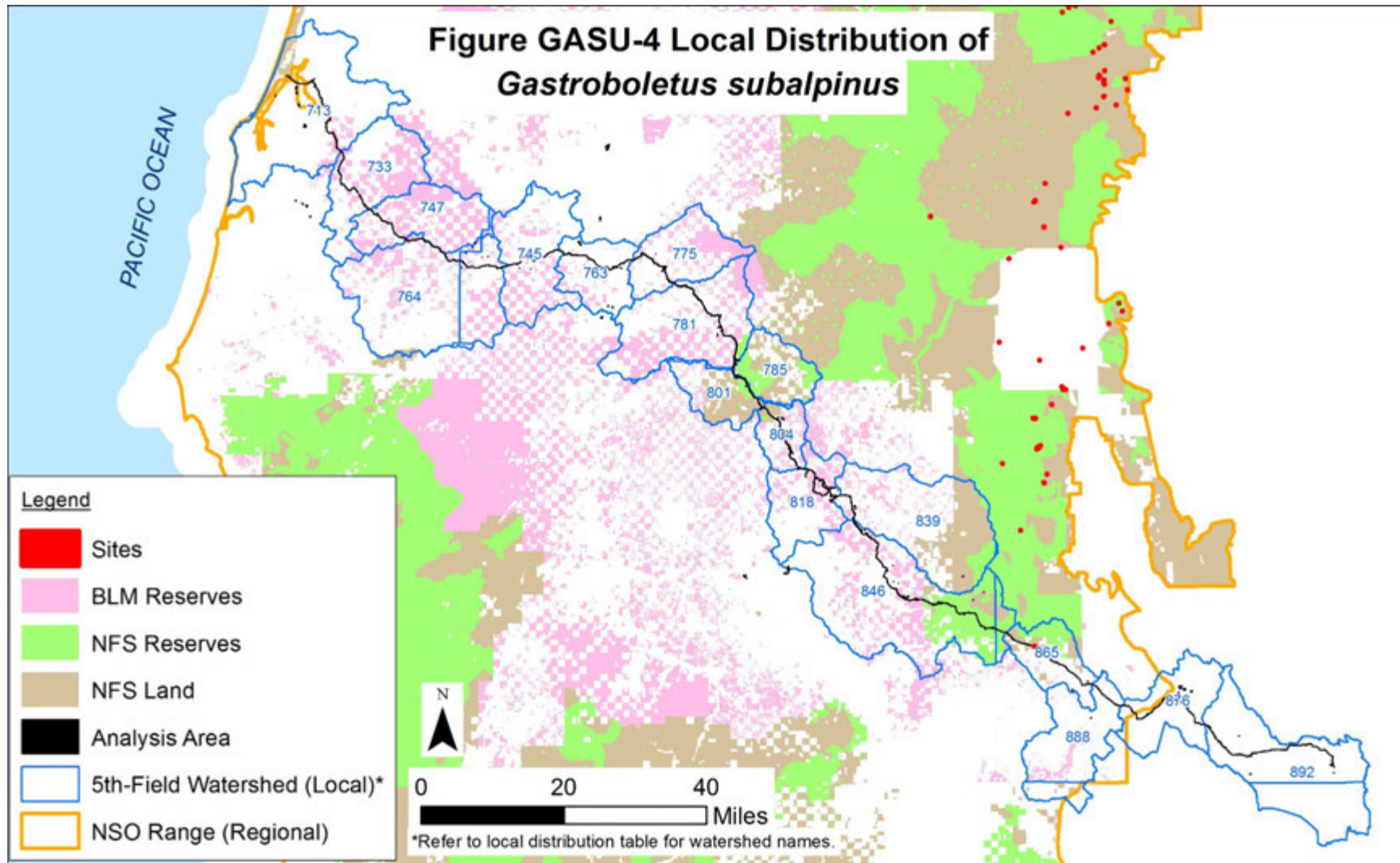
Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	-	-	-
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper Klamath River (876)	-	-	-
Little Butte Creek (846)	-	-	-
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)	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

Analysis/Project Area Distribution

The analysis and project areas contain two sites of *G. subalpinus*. These are the same sites as described in the Local Distribution discussion above.

Surveys for the PCGP Project resulted in two observations of *G. subalpinus* in the survey area during fall of 2011 and 2013 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These observations comprise two sites located at approximately MPs 172.5 and 172.6.



Project Impacts

Analysis

The PCGP Project would affect two sites out of the 81 sites on NFS lands in the region, representing approximately 2 percent of the sites (or one out of 91 total sites on all lands in the NSO range). Table GASU-6 presents an overview of the features of the PCGP Project that would affect the *G. subalpinus* sites. The construction corridor and associated work and storage areas would affect approximately 1.0 acre within one of the sites (about 38 percent of the site). The other site is located outside of the project area and would not be directly affected. 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 *G. subalpinus* in and near 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	0.01 ac
Uncleared Storage Area (UCSA)	1	0.2 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 0.8 acre of vegetation and soil within one site and could result in the removal of *G. subalpinus* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about 0.01 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 host trees and disturbance to soil could negatively affect *G. subalpinus* 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. Material storage within UCSAs would disturb about 0.2 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.

The other *G. subalpinus* site in the analysis area (adjacent to the southern boundary of project area at MP 172.5) is not likely to be affected by activities within the corridor or TEWAs. The observation within the site is located approximately 170 feet from the corridor in a forested area

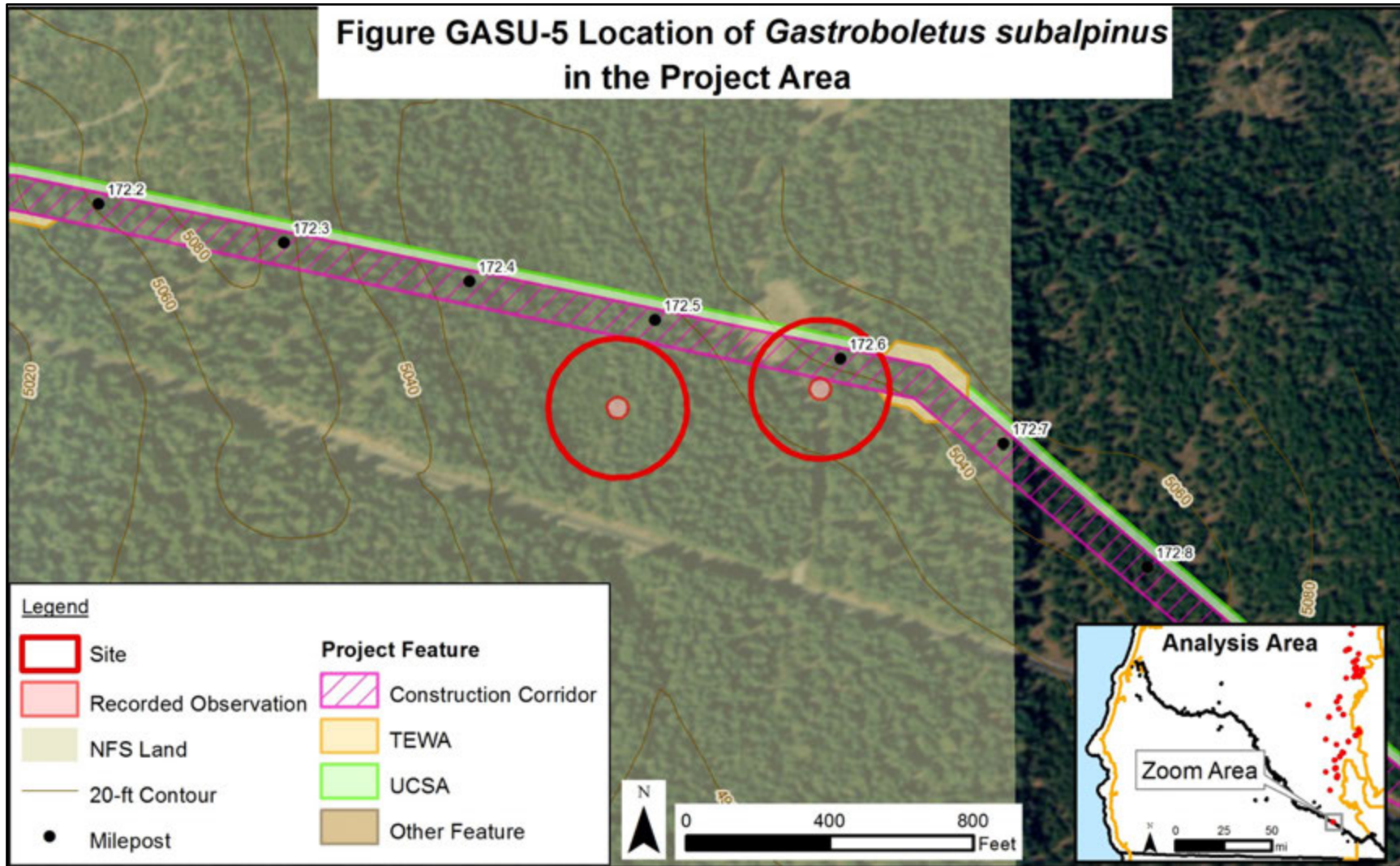
(see Figure GASU-5). Vegetation removal and disturbance in the project area are not expected to affect microclimate conditions in the site based on its distance from project activities and the existing habitat conditions.

Based on this analysis, *G. subalpinus* is not likely to persist at one of the two sites in the analysis area following project implementation. A single site would persist in the analysis area and local area in the Cascade Range and the species would continue to be common in the eastern Cascade Range in Oregon.

Across the project area, the PCGP Project would remove an estimated 625 acres of coniferous forests between 2,000–7,000 feet msl, including 166 acres of LSOG coniferous forests. These impacts would result in a reduction of habitat that may be suitable for *G. subalpinus*. Within this impact area, about 331 acres (53 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 permanent loss of about 145 acres of coniferous forests between 2,000 and 7,000 feet msl. This loss of forests represents less than 1 percent of the total estimated area of coniferous forests between 2,000 and 7,000 feet msl across the NSO range.

Discussion

Assuming site persistence cannot be maintained at one out of the two sites in the analysis area as a result of the PCGP Project, one site of *G. subalpinus* would remain on NFS lands in the local area, and 80 sites, including 36 in reserves, would remain on NFS lands in the NSO range. Additionally, one site would remain entirely in BLM reserves (Congressional Reserves) and seven sites would remain on NPS lands. 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 36 sites in reserves are assumed to have additional protections by the NWFP Standards and Guidelines in place for those land allocations. While sites on BLM and NPS lands are not subject to S&M Standards and Guideline protections, the single site in BLM reserves and seven sites on NPS lands would likely receive some level of protection under BLM management and National Park management. Based on these site counts, approximately 46 percent of the remaining *G. subalpinus* 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:

- *Gastroboletus subalpinus* 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:
 - *Gastroboletus subalpinus* has a somewhat wide distribution in five physiographic provinces and three states in the NSO range and has a moderate-high number of overall sites (81 on NFS lands, 91 on all lands). The species appears to be well distributed in the eastern Cascade Range in Oregon. The currently known number of sites on federal lands has increased by 51 sites on NFS and BLM lands since 2007, with two sites documented during the PCGP Project surveys.
 - An estimated 45 percent of the sites (37 sites) are in reserves, which is an increase of about 13 sites in reserves since 2006 per Molina (2008).
- Coniferous forests between 2,000 and 7,000 feet msl (general habitat for the species) are widespread across the Cascade Range and Klamath Mountains, 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 one of 81 Forest Service-managed sites of *G. subalpinus*, 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 (80) would continue to be documented on NFS lands in the Cascade Range and Klamath Mountains. One site would remain in the analysis area, and many other sites would remain in close vicinity in the Cascade 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 not affect any sites in reserves. Of the remaining sites on NFS lands, 15 are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, 22 are at least partially in Congressionally Reserved areas where management activities that may adversely affect *G. subalpinus* are unlikely. Additionally, one site on BLM lands would remain in Congressional Reserves and would likely be protected.
- The PCGP Project would result in a permanent loss of an estimated 145 acres of coniferous forests between 2,000 and 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 and 7,000 feet msl would remain in reserves across the NSO range.

- The remaining forests could support additional populations of *G. subalpinus*, although the potential for the habitat to be occupied varies based on the distribution of sites and the species' specific habitat requirements. *Gastroboletus subalpinus* 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.

2.15.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *G. subalpinus* 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, 80 sites would remain on NFS lands across the region, and one site would remain NFS lands in the local area. Although the PCGP Project would affect site persistence of *G. subalpinus* at one site, this site is part of the many sites in the 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. *Gastroboletus subalpinus* would persist in the region without considering the site as part of the population.
- The PCGP Project would remove approximately 625 acres of coniferous forests and 166 acres of LSOG coniferous forests between 2,000 and 7,000 feet msl (a negligible amount of the forests). An estimated 53 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 across 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 single site in BLM reserves and seven sites on NPS lands are expected to receive some level of protection under their respective management agencies. A single natural disturbance event or combination of events is unlikely to affect a significant portion of sites because the species is widely distributed across the Cascade Range and Klamath Mountains in Oregon and California.

The PCGP Project would not be able to avoid impacts to all *G. subalpinus* sites in the analysis area, although some individuals within the site affected may persist following project implementation. Based on the above conclusions, avoidance of the single *G. subalpinus* 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 sites would waive implementation of Management Recommendations for the *G.*

subalpinus 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.

2.16 GOMPHUS CLAVATUS

Gomphus clavatus is a chanterelle mushroom species in the Gomphaceae family and is commonly known as pig's ears or the pig's ear gomphus.

2.16.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *G. clavatus* as a Category F (uncommon) species. ORBIC evaluated *G. clavatus* 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 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.

2.16.2 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

Gomphus clavatus is a mycorrhizal fungus that depends on host trees for nutrients (carbohydrates) (ORBIC 2004). It grows closely gregarious to caespitose in clusters or arcs (Castellano et al. 2003, The Fungi of California 2010). According to the ORBIC (2004), dispersal occurs through mycelial interactions with other individuals and their mycorrhizal partners rather than spore dispersal. Longevity of individuals and specific biological requirements are unknown. *Gomphus clavatus* has been documented fruiting in autumn or from late fall to mid-winter, depending on its location within its range (Castellano et al. 2003, The Fungi of California 2010). Fruiting may not occur every year (ORBIC 2004).

Range

Gomphus clavatus is widely distributed across northern temperate forests in North America and Europe (Castellano et al. 2003). Based on data available in 2004, *G. clavatus* was considered widely distributed and was most common in Oregon in the Cascade Range, and along the Pacific coast from Oswald West State Park south to the California border (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 North America and 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 *G. clavatus* from about 197 element occurrences in North America in 2004, with an estimated 121 of these occurrences in the Pacific Northwest and 78–95 in the range of the NSO. Most of the occurrences in the Pacific Northwest were in Oregon (estimated 57), with fewer in California (34) and Washington (36) (ORBIC 2004). In 2004, the species was considered uncommon with a spotty distribution, but had a relatively stable population (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 68 new sites of *G. clavatus* in the NSO range between 1998 and 2006, and 118 total sites were documented by 2006, including 60 in reserves or protected areas. The 2007 Final SEIS reported 85 sites on NFS and BLM lands and 110 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]). *Gomphus clavatus* was considered a Category B species for the majority of the surveys conducted for PCGP. The equivalent-effort surveys targeted all Category B species, including *G. clavatus*, and resulted in 18 new observations of individuals or populations of *G. clavatus*. Based on the relatively high number of sites and the increased number of sites since 1998 with increased 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

Gomphus clavatus is found in LSOG forests and appears to be restricted to fairly complex habitats (ORBIC 2004). It is typically found partially hidden in deep humus in coniferous forests (Castellano et al. 2003, Cushman and Huff 2007). *Gomphus clavatus* may prefer specific microclimate conditions of LSOG forests, but it may not be restricted to these conditions.

Threats

Threats to *G. clavatus* are those that affect its host tree. Natural catastrophes or human activities that imperil the health of conifers compromise both the tree and the fungus (ORBIC 2004). Catastrophic events, such as hot fires that might extirpate the community, and other activities that threaten the forest habitat, such as drought, insect infestations, road construction, development, and clear-cutting, also threaten the species. Unprotected populations are specifically at risk to road construction or other development and heavy logging, such as clear-cutting or heavy thinning. This mushroom is considered edible, but responsible harvesting is not viewed as a major threat to known populations.

Management Recommendations

For Category F S&M species, known sites are not required to be managed per the 2001 ROD; these species are expected to be assigned to another category or be removed from the list (USDA and USDI 2001).

2.16.3 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 *G. clavatus* 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 GOCL-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 228 observations from BLM and Forest Service geodatabases were converted into 189 sites in the NSO range (region). Table GOCL-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table GOCL-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 GOCL-1 displays the regional distribution of the species across NFS lands, Figure GOCL-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure GOCL-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 GOCL-1	
Number of <i>Gomphus clavatus</i> Sites (2017)	
Location*	Number of Sites
Regional Area	189
Local Area	24
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 GOCL-2

Distribution of *Gomphus clavatus* across Federal, Private, and Other Lands

Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	102	3	3
BLM	64	20	-
NPS	11	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	19	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 GOCL-3

Distribution of *Gomphus clavatus* 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)	10	-	-
Congessionally Reserved (CR)	9	-	-
Late Successional Reserve (LSR)	37	1	1
Marbled Murrelet Area (LSR3)	1	-	-
Northern Spotted Owl Activity Center (LSR4) ^{a/}	7	-	-
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	41	2	2
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	7	-	-
District Designated Reserve	14	5	-
Harvest Land Base	18	7	-
Late Successional Reserve	34	16	-
Not Designated (ND)	9	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	24	10	-

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

Gomphus clavatus is widely distributed across 10 physiographic provinces in Washington (Olympic Peninsula, Western Lowlands, and Western and Eastern Cascades), Oregon (Coast Range, Cascades East and West, and Klamath Mountain), and California (Coast and Klamath) (see Figure GOCL-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. Scattered sites are located in the Klamath Mountains, Coast Range, and other outlying areas with some clusters of sites in western Oregon and northwestern California. *Gomphus clavatus* appears to be well distributed in the western Cascade Range in Oregon and Washington 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.

Nineteen of the 189 known regional sites are at least partially located on private, state, or other lands; 64 sites are at least partially on BLM lands; eleven sites are at least partially on NPS lands

(Mount Rainier and Olympic National Parks); and 102 sites are at least partially on NFS lands across the region. Sites included on the National Forests that encompass the project area include four sites on the Rogue River-Siskiyou National Forest, two sites on the Fremont-Winema National Forest, and 20 sites on the Umpqua National Forest. The remaining sites on NFS lands are on the Deschutes, Gifford Pinchot, Klamath, Mt. Baker-Snoqualmie, Mt. Hood, Okanogan-Wenatchee, Olympic, Shasta-Trinity, Siuslaw, Six Rivers, and Willamette National Forests.

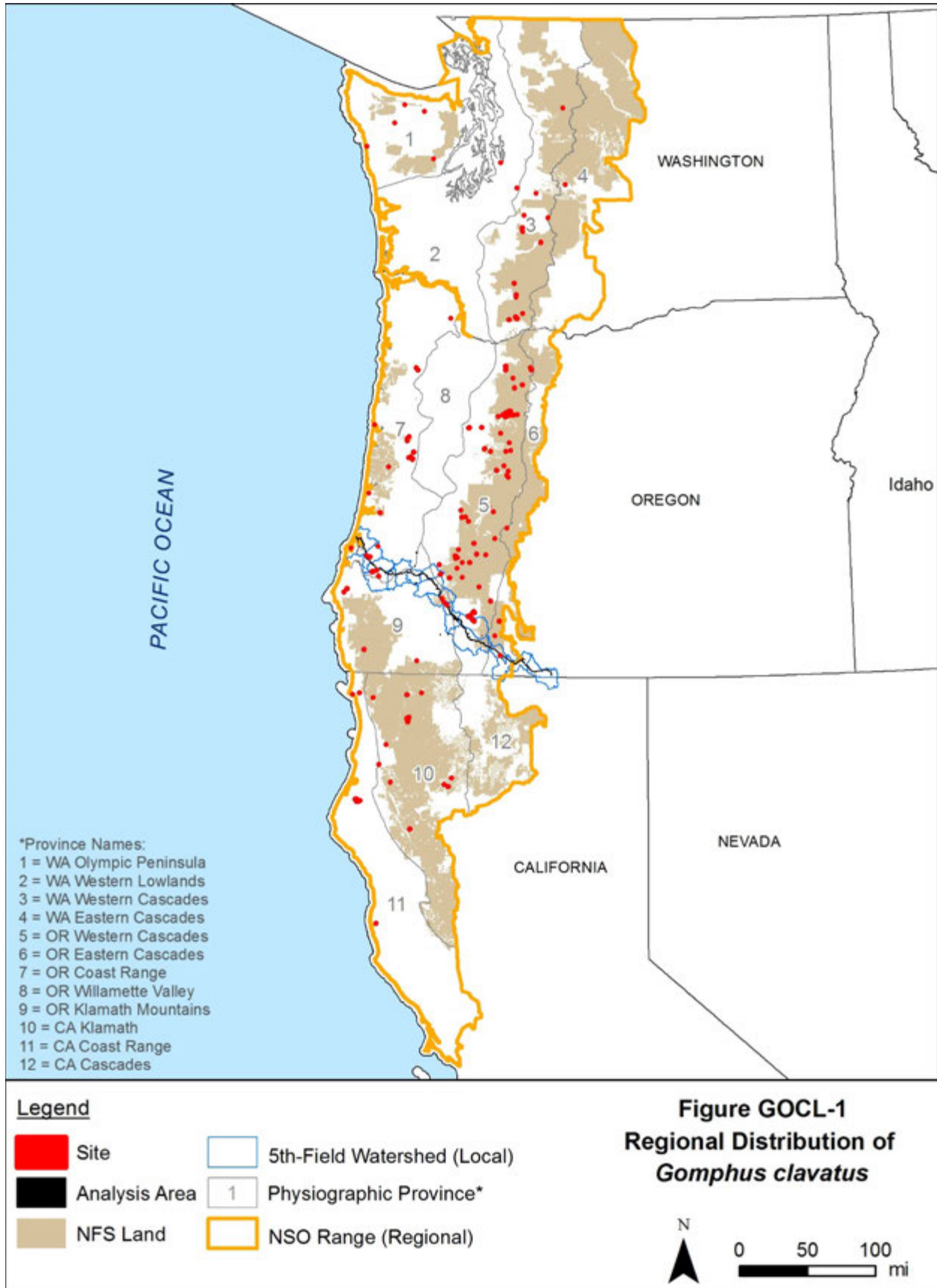
Across the NSO range, 53 sites are at least partially located in NFS reserve lands, including LSRs, Marbled Murrelet Areas, Known Owl Activity Centers, and Congressionally Reserved areas (see Figure GOCL-2). This represents 52 percent of the total sites on NFS lands in the region. The remaining NFS sites 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 reserve lands, which represents 58 percent of the total number of sites on BLM lands in the region. While the 37 sites in BLM reserves and the eleven NPS sites are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through the BLM management and National Park management.

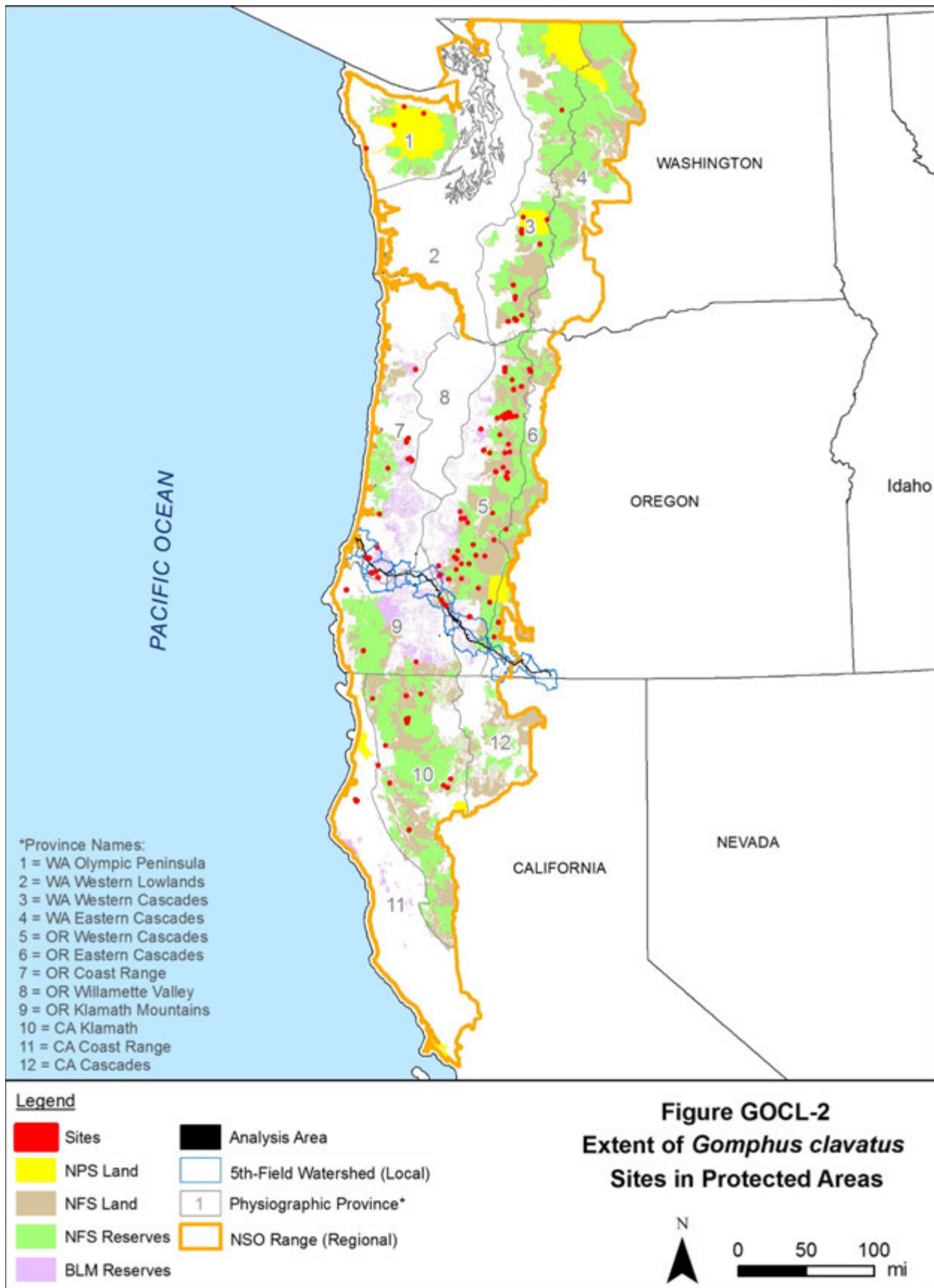
Gomphus clavatus is more common in LSOG forests based on available data (155 of 189 total sites are in LSOG), but it is also somewhat common in non-LSOG forests and may not be restricted to LSOG conditions. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous forests 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 and mixed hardwood-coniferous forests below 6,000 feet, including the LSOG component of these forests, within the NSO range could provide habitat for *G. clavatus* and support additional sites. These forests encompass an estimated 18.1 million acres on BLM and NFS lands in the region, including an estimated 10.7 million acres in reserve land allocations (59 percent of the forests; Table GOCL-4). Of this acreage, an estimated 5.9 million acres are LSOG (see Figure GOCL-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 region, LSOG forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

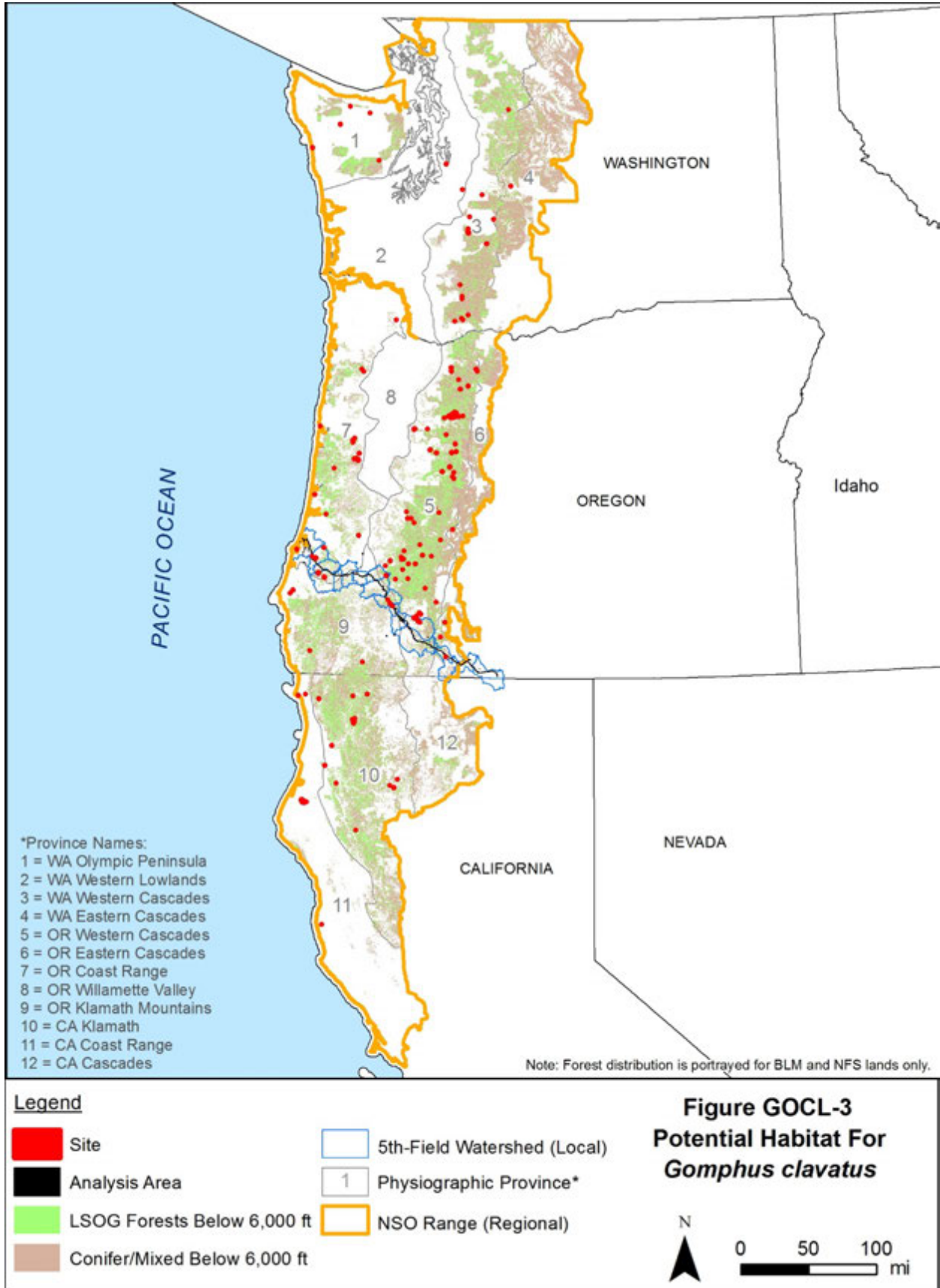
TABLE GOCL-4

Extent of Forests That Could Provide Habitat for <i>Gomphus clavatus</i> 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.







Local Distribution

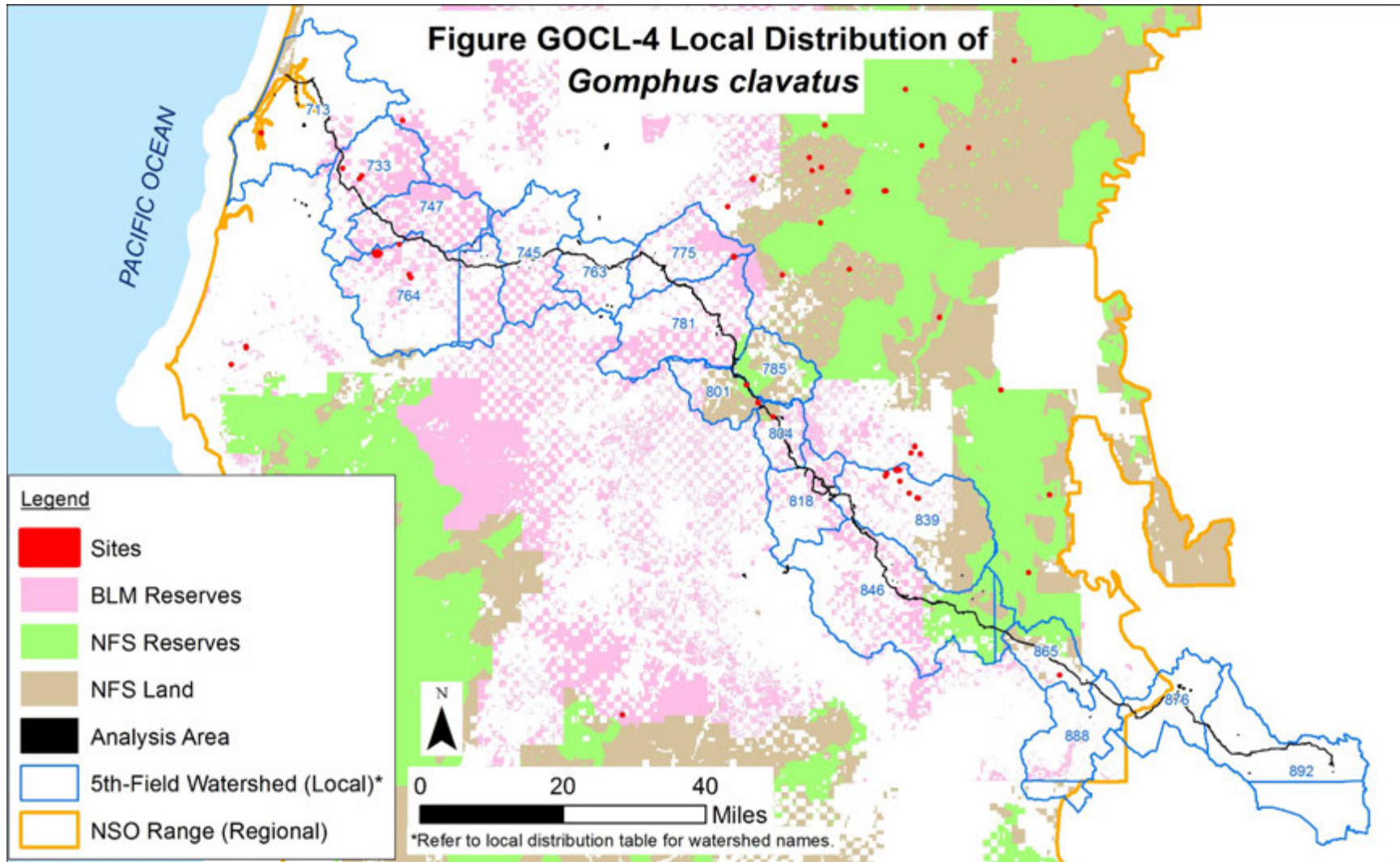
Within the local area, *G. clavatus* is distributed across nine 5th-field watersheds that overlap the project area (see Table GOCL-5 and Figure GOCL-4). Sites in the Big Butte Creek watershed are clustered and near one another and sites in other watersheds more scattered. Across these watersheds, multiple 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. Many regional sites are located on NFS lands within 20 miles to the north in the Cascade Range.

Of the 24 sites in the local area, three sites are at least partially on NFS lands. These sites are located on lands designated as Other (Matrix) and LSR. Four sites are at least partially on private lands and 20 sites are at least partially on BLM lands. Of the 20 sites on BLM lands, 13 sites are entirely in reserves, representing 58 percent of the local sites.

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 of sites in the local area, distribution of those sites, and the extent of forests that may provide suitable habitat (see Figures GOCL-3 and GOCL-4).

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	11	-	11
Coos Bay Frontal (713)	1	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	1 a/	1	-
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)	4	-	4
Middle South Umpqua River (763)	-	-	-
Myrtle Creek (775)	1	-	1
North Fork Coquille River (733)	3	-	3
Olalla Creek-Lookingglass Creek (745)	-	-	-
Rogue River-Shady Cove (818)	-	-	-
South Umpqua River (781)	-	-	-
Spencer Creek (865)	1	-	1
Trail Creek (804)	1	-	-
Upper Cow Creek (801)	2 a/	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 includes those that are 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 on both Elk Creek-South Umpqua and Upper Cow Creek watersheds.



Analysis/Project Area Distribution

The analysis and project areas contain three sites of *G. clavatus*. All three sites are on NFS lands (Umpqua National Forest), with one site partially on private land as well. The analysis area sites are found in three 5th-field watersheds (Elk Creek-South Umpqua, Trail Creek, and Upper Cow Creek). The sites are relatively close to one another in the central portion of the analysis area in the Klamath Mountains. Many sites are located entirely in BLM reserves in the immediate vicinity of the analysis area (see Local Distribution discussion above).

Surveys for the PCGP Project resulted in 18 total observations of the species in 10 locations in or near the project area during 2010 and 2011 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These recorded observations comprise the three sites in the analysis area. Within the project area, one site is located at approximately MP 106.4, five observations comprise one site located between MPs 109.7 and 109.8, and one site located at MP 113.2.

Project Impacts

Analysis

The PCGP Project would affect three sites out of the 102 sites on NFS lands in the region, representing approximately 3 percent of the sites (or three out of 189 total sites on all lands in the NSO range). Table GOCL-6 presents an overview of the features of the PCGP Project that would affect the *G. clavatus* sites. The construction corridor and associated work and storage areas would affect approximately 2.4 acres within the sites (about 19 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 *G. clavatus* in and near the project area.

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	2	1.7 ac
Temporary Extra Work Area (TEWA)	3	0.4 ac
Uncleared Storage Area (UCSA)	2	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 1.7 acres of vegetation and soil within two sites and could result in the removal of *G. clavatus* 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 *G. clavatus* 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. Material storage within UCSAs would disturb about 0.3 acre of understory habitat in two 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 1,132 acres of coniferous and mixed hardwood-coniferous forests below 6,000 feet msl, including 244 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *G. clavatus*. 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 three sites as a result of the PCGP Project, no sites of *G. clavatus* would remain on NFS lands in the local area, and 20 sites would remain on BLM lands in the local area, including 13 entirely in reserves. A total of 99 sites would remain on NFS lands in the NSO range, including 52 in reserves, and 64 sites would remain on BLM lands in the NSO range, including 37 entirely in reserves. 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 52 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 the S&M Standards and Guidelines, the 37 sites entirely in reserves would receive some level of protection under BLM management. Based on these site counts, approximately 54 percent of the remaining *G. clavatus* 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:

- *Gomphus clavatus* is a Category F (uncommon) S&M species throughout the NSO range. Per the 2001 ROD, information on Category F species is insufficient to determine what

level of management is needed for reasonable assurance of species persistence, and known sites are not required to be managed. New information since the species was listed in the 2001 ROD indicates that the species appears to be more common than previously documented, as described below:

- *Gomphus clavatus* has a wide distribution across 10 physiographic provinces and three states in the region and a moderate-high number of overall sites (102 on NFS lands, 189 on all lands). The species appears to be well distributed in the western Cascade Range in Oregon and Washington and is fairly common and widespread outside this mountain range. The currently known number of sites on BLM and NFS lands is an increase of 81 sites since 2007, with several sites documented during the PCGP Project surveys.
- An estimated 54 percent of the sites (90 sites) are in reserves, which is an increase of 30 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 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 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 *G. clavatus*.
- The PCGP Project would affect three of 102 NFS-managed sites of *G. clavatus*, representing approximately three percent of the sites on NFS lands in the NSO range. Assuming site persistence cannot be maintained at the three sites, a moderate-high number of sites (99) would continue to be documented on NFS lands in the region with a wide distribution across Washington, Oregon, and California. No sites would remain on NFS lands in the local area. Additionally, 37 sites would remain entirely in BLM reserves in the region, and 13 sites entirely in reserves would remain on BLM lands 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 reserves would remain about the same (53 percent). Of the remaining sites, 44 sites are at least partially in LSRs where management actions are restricted to those activities that benefit LSOG forests, and nine are at least partially in Congressionally Reserved areas where management activities that may adversely affect *G. clavatus* are unlikely. Additionally, 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 Congressionally Reserved Reserves and District Designated Reserves where management activities that may adversely affect *G. clavatus* 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 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 *G. clavatus*, 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 F species for which its status is undetermined; therefore, pre-disturbance surveys are not applicable. 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.

2.16.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *G. clavatus* at three sites on NFS lands; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence for the following reasons:

- With project implementation, 99 sites would remain on NFS lands across the region, and 37 sites would remain entirely in BLM reserves in the region. While no sites would remain on NFS lands in the local area, 13 sites would remain entirely in BLM reserves in the local area. The PCGP Project would affect site persistence of *G. clavatus* at three sites on NFS lands. The nearest sites on NFS lands include several scattered sites within 20 miles northeast of the analysis area in the Western Cascade Range. Sites on BLM lands are much more abundant than sites on NFS lands in the vicinity of the analysis area, and many sites entirely in reserves are located in western Cascades in southern Oregon. It is expected that BLM management would enable the majority of the sites in reserves to persist. Due to a moderate number of sites remaining on BLM lands in the local area (20) with a large proportion of sites entirely in BLM reserves (65 percent), it is presumed that many sites would be protected and the species would remain locally common. The species' distribution within the NSO range following project implementation would be similar to its currently known distribution. *Gomphus clavatus* would persist in the region without considering the three NFS sites as part of the population.
- The PCGP Project would remove approximately 1,132 acres of coniferous and mixed hardwood-coniferous forests and 243 acres of LSOG coniferous and mixed forests below 6,000 feet msl (a negligible amount of the forests). An estimated 67 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 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.

As a Category F species, the Forest Service does not require management of *G. clavatus*. This analysis is provided to assess potential impacts and to fulfill National Environmental Policy Act disclosure. The PCGP Project would not be able to avoid impacts to all *G. clavatus* 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 *G. clavatus* sites is not necessary because the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence.

2.17 GOMPHUS KAUFFMANII

Gomphus kauffmanii is a chanterelle mushroom species in the Gomphaceae family and is commonly known as Kauffman's gomphus. It is also known as *Turbinellus kauffmanii*.

2.17.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *G. kauffmanii* as a Category E (rare) species. ORBIC evaluated *G. kauffmanii* 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). It was not included in its most recent updates of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2013, ORBIC 2016). In 2010, the species was considered to be at moderate risk of extinction due to a restricted range, relatively few populations, recent and widespread declines, or other factors, within its global range and in Oregon (G3?, S3, respectively), although its global ranking was uncertain. The species is not currently on any ORBIC lists. It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.17.2 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

Gomphus kauffmanii is a mycorrhizal fungus that depends on host trees for nutrients (carbohydrates) (ORBIC 2004). It grows into the soil matrix and forms symbiotic associations with the fine root systems of plants (Cushman and Huff 2007). It grows solitary, closely gregarious or loosely caespitose and is typically partially hidden in deep, rich humus under pine and true fir trees (Castellano et al. 2003). According to ORBIC (2004), individuals are dispersed through mycelial interactions with other individuals and their mycorrhizal partners, rather than through spore dispersal. Longevity of individuals and specific biological requirements are unknown. The

mushroom has been documented fruiting between autumn and early winter in western North America and in the summer in eastern North America, but it does not always fruit annually (ORBIC 2004).

Range

Gomphus kauffmanii is endemic to North America, where it is found on the west and east coasts (ORBIC 2004). In the west, the mushroom has been reported from British Columbia south through California, Nevada, and Arizona. In the east, it has been reported in Connecticut, North Carolina, and Tennessee. In Oregon, *G. kauffmanii* was known from populations near Coos Bay and in the Coast and Cascade Ranges (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 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 *G. kauffmanii* from an estimated 54 element occurrences in the Pacific Northwest in 2004. An estimated 22 of these occurrences were in Oregon, and fewer were in California (10) and Washington (14) (ORBIC 2004). ORBIC estimated that 53 of the species' occurrences were in protected areas in the NSO range in 2004. In 2004, *G. kauffmanii* was considered to be uncommon to rare with a spotty distribution, but it had a relatively stable population in the Pacific Northwest (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 37 new sites of *G. kauffmanii* in the NSO range between 1998 and 2006, and 74 total sites were documented by 2006, including 45 in reserves or protected areas. The 2007 Final SEIS reported 59 sites on NFS and BLM lands and 70 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]). While *G. kauffmanii* is a Category E species, it was considered to be a Category B species during the majority of the PCGP surveys. The equivalent-effort surveys targeted all Category B species, and resulted in 17 new observations of individuals or populations of *G. kauffmanii*. Additional surveys for other species in LSRs in nearby areas resulted in seven additional incidental observations of the species. These observations have increased the number of sites documented in BLM and Forest Service records by about 20 percent. Based on the increased number of known 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 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

Gomphus kauffmanii is found in LSOG forests as well as younger forests and is primarily associated with true fir, Douglas-fir, pine, and hemlock trees (ORBIC 2004, Castellano et al. 2003, Holthausen et al. 1994, Trappe, pers. comm. 2013). It is typically found partially hidden in deep humus in coniferous forests (Castellano et al. 2003), but can grow to be about 10 inches tall (Trappe, pers. comm. 2013). Based on data available in 2007, observations were located between about 200 and 7,000 feet msl (Cushman and Huff 2007). *Gomphus kauffmanii* may prefer specific microclimate conditions of LSOG forests, but it is also found in younger forests and may not be restricted to these conditions.

Threats

Threats to *G. kauffmanii* are actions that affect its host tree. Natural catastrophes or human activities that imperil the health of conifers compromise both the tree and the fungus (ORBIC 2004). Catastrophic events, such as hot fires that might extirpate the community, and other activities that threaten the forest habitat, such as drought, insect infestations, road construction, development, and logging, also threaten the species. Unprotected populations are specifically at risk to road construction or other development and heavy logging, such as clean- or clear-cutting, or heavy thinning. This mushroom is considered edible, but responsible harvesting is not viewed as a major threat to the species.

Management Recommendations

For Category E 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 *G. kauffmanii*:

- As a mycorrhizal species, *G. kauffmanii* 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.

2.17.3 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 *G. kauffmanii* 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 GOKA-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 219 observations from BLM and Forest Service geodatabases were converted into 159 sites in the NSO range (region). Table GOKA-2 shows the total number of sites on BLM and NFS land and other land ownerships across the regional, local, and analysis areas. Table GOKA-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 GOKA-1 displays the regional distribution of the species across NFS lands, Figure GOKA-2, displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure GOKA-3 displays the species' regional distribution as well as the extent of all forest types and LSOG forests on BLM and NFS lands.

Number of <i>Gomphus kauffmannii</i> Sites (2017)	
Location*	Number of Sites
Regional Area	159
Local Area	35
Analysis Area (Project Area)	7 (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.

Distribution of <i>Gomphus kauffmannii</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	99	14	7
BLM	39	20	-
NPS	10	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	16	4	-

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.

Distribution of <i>Gomphus kauffmannii</i> 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)	27	1	-
Congressionally Reserved (CR)	7	-	-
Late Successional Reserve (LSR)	44	12	6
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) @/	2	-	-
Managed Late Successional Area (MLSA)	5	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	25	2	1
Riparian Reserve	-	-	-

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	-	-	-
District Designated Reserve	12	5	-
Harvest Land Base	23	12	-
Late Successional Reserve	17	9	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	-	-	-
Riparian Reserve	11	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

Gomphus kauffmannii is widely distributed across 11 physiographic provinces in Washington (Olympic Peninsula, Western Lowlands, and Western and Eastern Cascades), Oregon (Coast Range, Cascades East and West, and Klamath Mountain), and California (Coast, Cascades, and Klamath) (see Figure GOKA-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. Scattered sites are located in the Klamath Mountains, Coast Range, and other outlying areas with some clusters of sites in western Oregon and northwestern California. *Gomphus kauffmannii* appears to be well distributed in the western Cascade Range in Oregon and Washington 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.

Ninety-nine of the 159 known sites in the region are at least partially located on NFS lands; 16 sites are at least partially located on private, state, or other lands; 10 sites are on NPS lands (Mount Rainier, Redwood, and Olympic National Parks); and 39 sites are at least partially on BLM lands across the region. Sites included on National Forests that encompass the project area include 15 sites on the Rogue River National Forest, 21 sites on the Fremont-Winema National Forest, and nine sites on the Umpqua National Forest. The remaining sites on NFS lands are on the Gifford Pinchot, Klamath, Modoc, Mt. Baker-Snoqualmie, Mt. Hood, Okanogan-Wenatchee, Olympic, Shasta-Trinity, Siuslaw, Six Rivers, and Willamette National Forests.

Across the NSO range, 53 sites are at least partially located in reserve lands managed by the Forest Service, including 44 in LSRs, two in Known Owl Activity Centers, and seven in Congressionally Reserved areas (see Figure GOKA-2). This represents 54 percent of the total sites on NFS lands 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, 16 sites are located entirely in BLM reserve lands. This includes sites on LSRs, District Designated Reserves, and Riparian Reserves, and represents 41 percent of the total sites on BLM lands in region. While the sites entirely in BLM reserves and the 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.

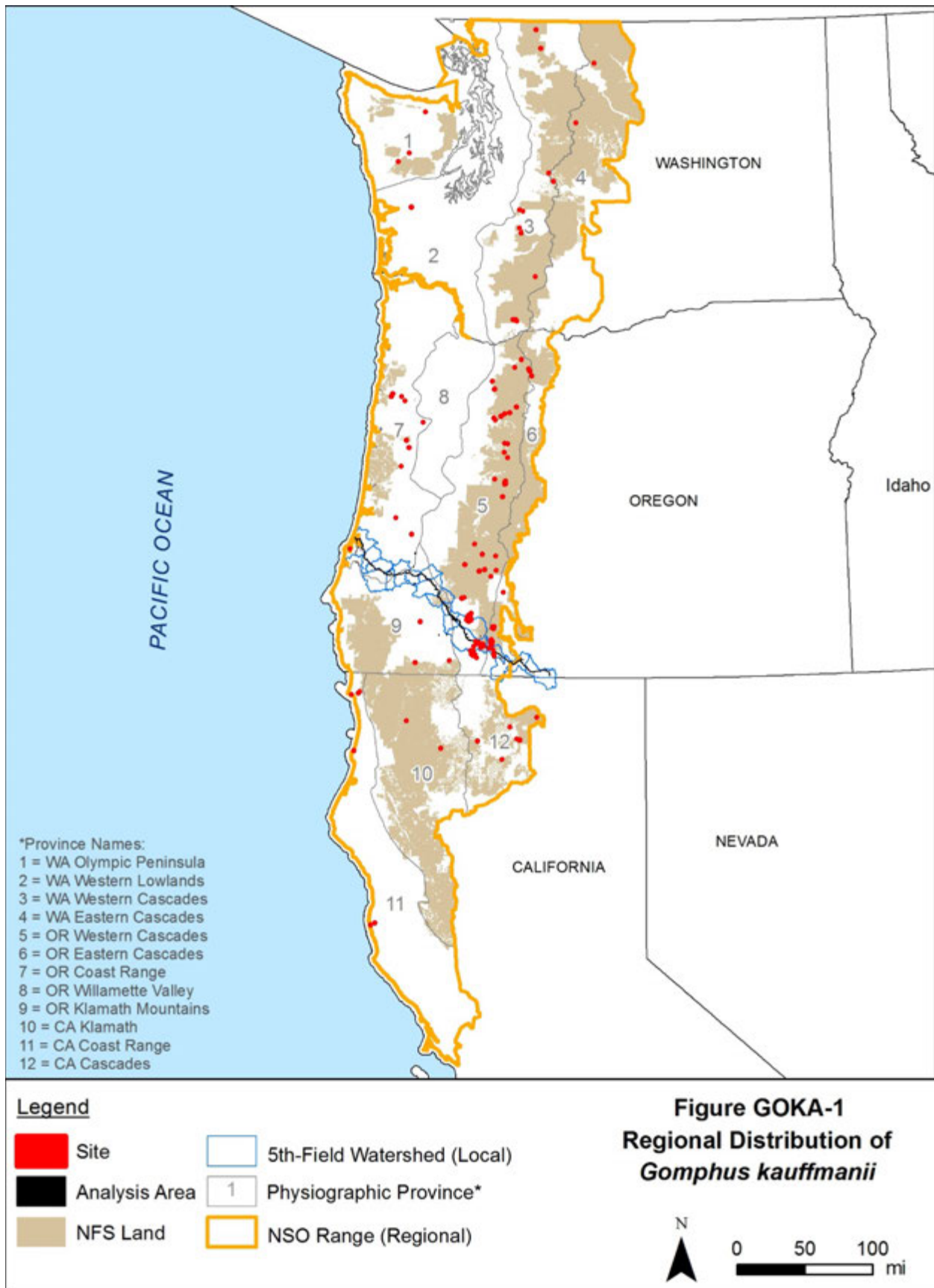
Gomphus kauffmanii is more common in LSOG forests based on available data (129 of 159 total sites are in LSOG), but it is also somewhat common in non-LSOG forests and has been documented in young forests. It may not be as restricted to LSOG conditions. Based on current site locations, the species is found in all forest types 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, mixed hardwood-coniferous, and hardwood forests, including the LSOG component of these forests, across the NSO range could provide habitat for *G. kauffmanii* and support additional sites. These forests encompass an estimated 20.4 million acres on BLM and NFS lands in the region, including an estimated 12.1 million acres in reserve land allocations (60 percent of the forests; Table GOKA-4). Of this acreage, an estimated 6.2 million acres are LSOG (see Figure GOKA-2), including 4.1 million acres in reserve land allocations (66 percent of the forests). Although coniferous, mixed hardwood-coniferous, and hardwood forests are widespread across the region, LSOG forests are less common and are primarily found in the Cascade and Coast Ranges and Klamath Mountains.

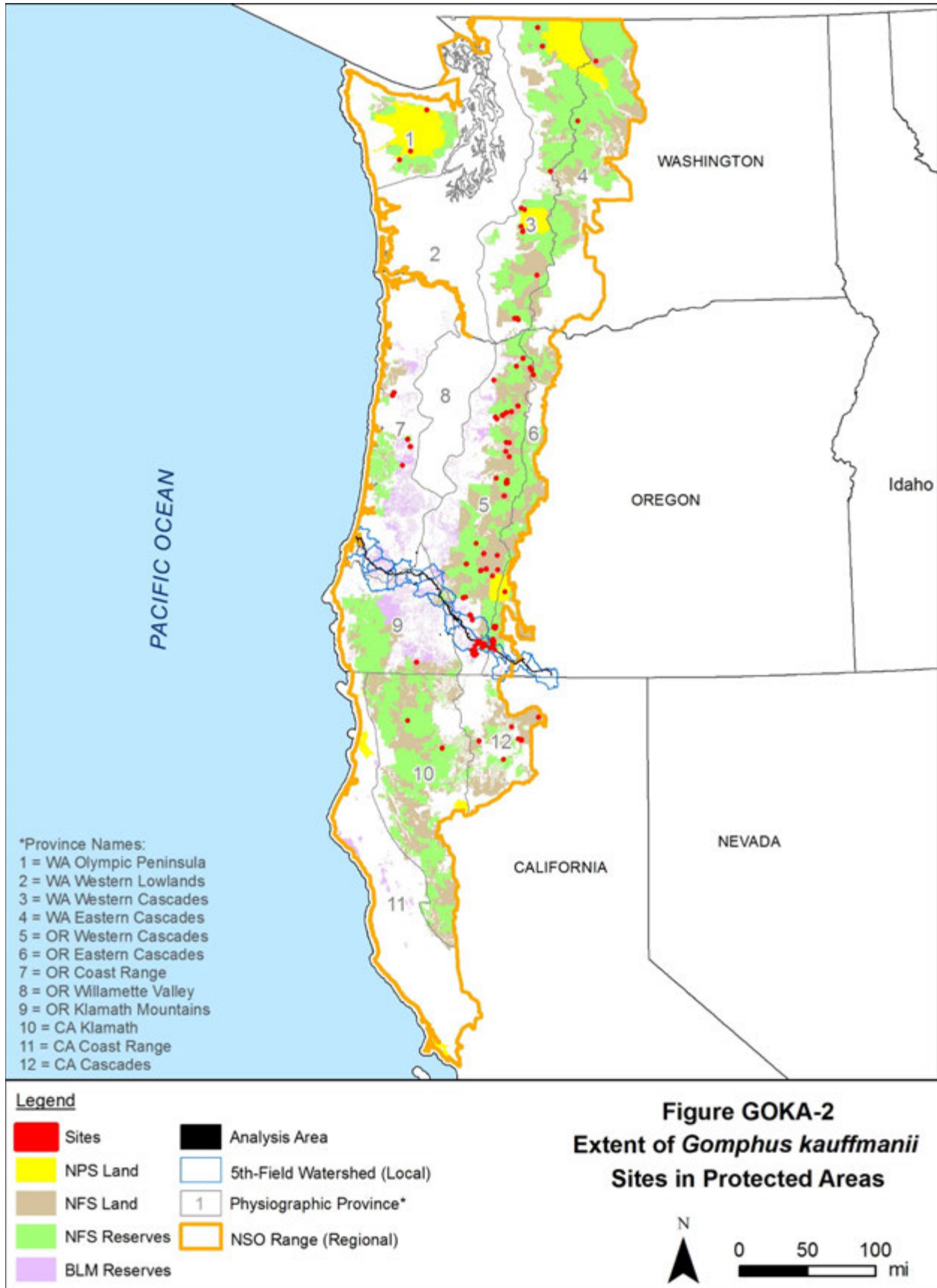
TABLE GOKA-4

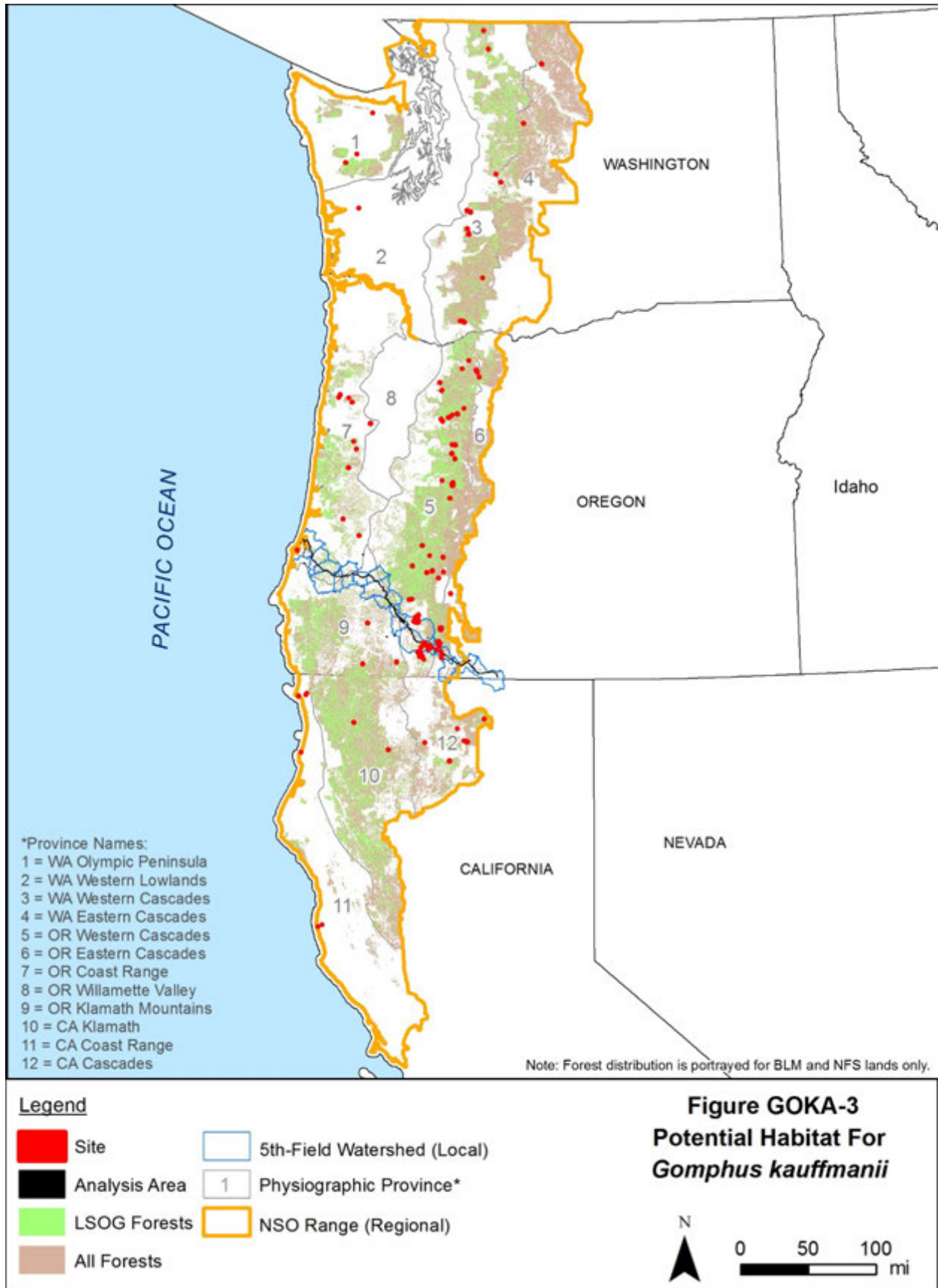
Extent of Forests That Could Provide Habitat for *Gomphus kauffmanii* on NFS and BLM Lands ^{a/}

Location	All Forests		LSOG Forests	
	Total	Reserves	Total	Reserves
Regional Area	20,349,175	12,108,434	6,243,140	4,099,347
Local Area	620,721	412,126	185,960	137,227
Project Area	1,527	1,062	322	229

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

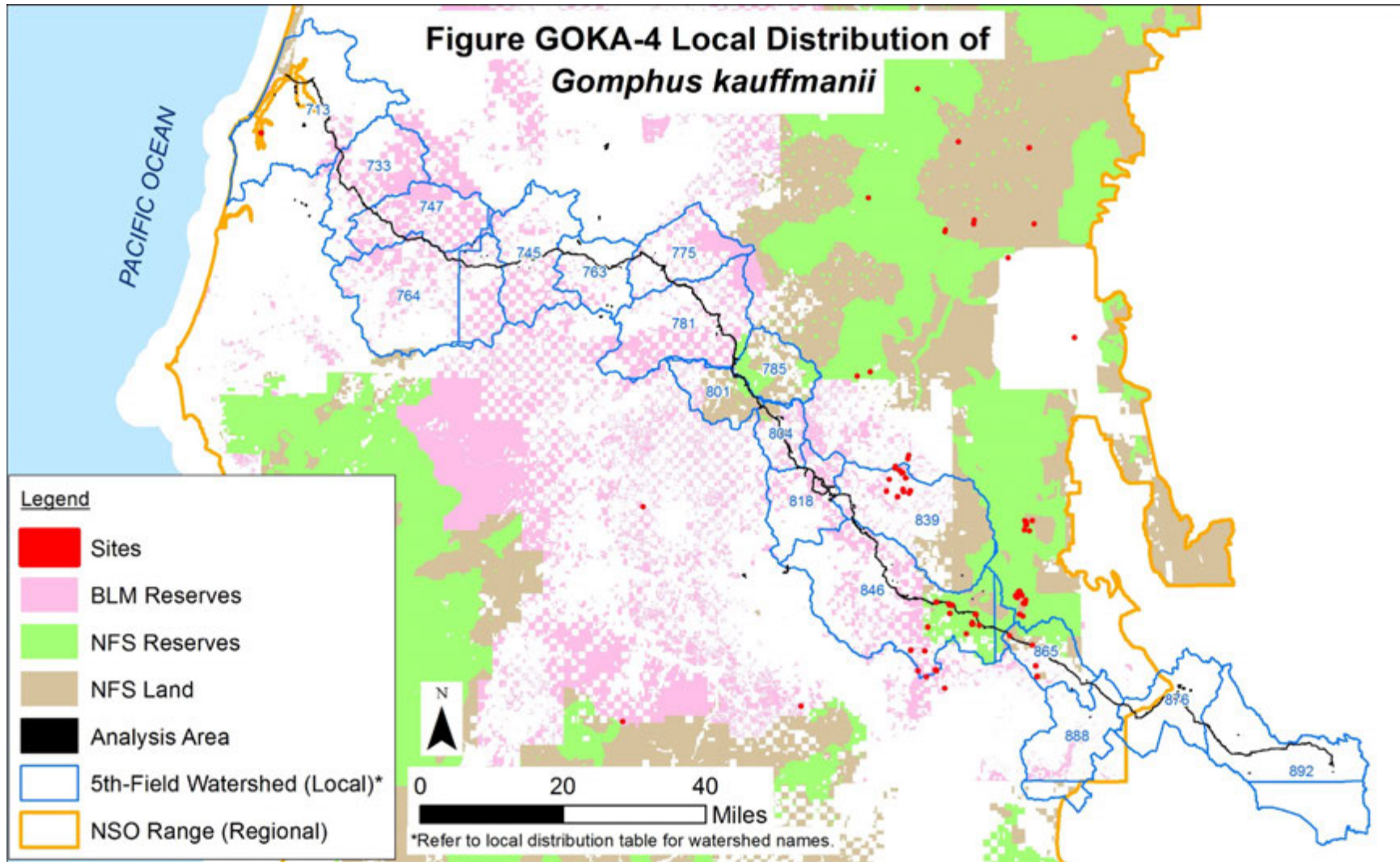
Within the local area, *G. kauffmanii* is found in four 5th-field watersheds that overlap the project area (see Table GOKA-5 and Figure GOKA-4). Most of the sites are clustered and near one another in the Cascade Range in the Big Butte Creek, Little Butte Creek, and Spencer Creek watersheds. The site in the Coos Bay Frontal watershed is distant from the other local sites and from others in the region (the nearest site is 40 miles northeast). Within the Cascade Range, multiple avenues of connectivity appear to be available between sites based on the extent of forests and abundance of sites in the mountain range, and opportunities for dispersal exist within the local area and to nearby regional areas. Many regional sites are located on NFS lands within 20 miles to the northeast in the Cascade Range.

Of the 35 sites in the local area, 14 sites are at least partially on NFS lands, including 12 sites partially in LSRs, one site in an Administratively Withdrawn area, and two sites on land designated as Other (Matrix). The 12 sites in LSRs represent 86 percent of the sites on NFS lands in the local area. Additionally, 20 sites are located on BLM lands, including eight entirely in reserves. The eight sites entirely in reserves represent 30 percent of the sites on BLM lands in the local area.

Coniferous, mixed hardwood-coniferous, and hardwood forests encompass approximately 620,721 acres on BLM and NFS lands in the local area, including 412,126 acres in reserve land allocations (66 percent of the forests). Of this acreage, an estimated 185,960 acres are LSOG, including 137,227 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 GOKA-3 and GOKA-4).

Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	13	-	8
Coos Bay Frontal (713)	1	-	-
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)	17	12	5
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)	4	-	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.



Analysis/Project Area Distribution

The analysis area contains seven sites of *G. kauffmanii*, and the project area contains six sites. The analysis area sites are on NFS lands (Rogue River-Siskiyou and Fremont-Winema National Forests) in two 5th-field watersheds (Little Butte Creek and Spencer Creek). Six of the sites are in LSRs and one is on land designated as Other (Matrix). The sites are relatively close to one another in the eastern portion of the analysis area. Some local sites are also present in the immediate vicinity of the analysis area (see Local Distribution discussion above).

Surveys for the PCGP Project resulted in 27 total observations of the species in 26 locations in or near the project area during 2010 through 2014 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). An estimated 26 of these recorded observations comprise the six sites in the analysis area; the other observations are in sites outside the analysis area. Within the project area, the six sites are between MPs 155.8 and 172.4.

Project Impacts

Analysis

The PCGP Project would affect seven out of the 99 sites on NFS lands in the region, representing approximately 7 percent of the sites, or seven out of 159 total sites on all lands in the NSO range. Table GOKA-6 provides an overview of the features of the PCGP Project that would affect the *G. kauffmanii* sites on NFS lands. The construction corridor and associated work and storage areas would affect approximately 12.8 acres within six sites (about 27 percent of all sites in the analysis area); the seventh site is outside the project corridor and may be indirectly affected by nearby PCGP Project activities. 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 *G. kauffmanii* in and near the project area.

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	6	7.6 ac
Temporary Extra Work Area (TEWA)	3	1.3 ac
Uncleared Storage Area (UCSA)	5	3.6 ac
Roads (TMP)	1	0.3 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.		

The following discussion provides an overview of the types of impacts that would be expected in 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 7.6 acres of vegetation and soil within six sites and could result in the removal of *G. kauffmanii* populations or individuals. Disturbance in the TEWAs would result in similar impacts on about 1.3 acres 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 *G. kauffmanii* 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. Material storage within UCSAs would disturb about 3.6 acres 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. Road improvements and establishment would disturb approximately 0.3 acre within one site and could remove habitat and extant populations or individuals of *G. kauffmanii*.

Across the project area, the PCGP Project would remove an estimated 1,128 acres of coniferous, mixed hardwood-coniferous, and hardwood forests, including 241 acres of LSOG forests. These impacts would result in a reduction of habitat that may be suitable for *G. kauffmanii*. 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 246 acres of forests. This loss of forests represents less than 1 percent of the total estimated area of all forests across the NSO range.

Discussion

Assuming site persistence cannot be maintained at the seven sites as a result of the PCGP Project, seven sites of *G. kauffmanii* would remain on NFS lands in the local area, including six in reserves, and eight sites would remain entirely in BLM reserves in the local area. A total of 92 sites, including 47 in reserves, would remain on NFS lands in the NSO range and 16 sites entirely in BLM reserves would remain 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 47 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 16 sites entirely in reserves would likely receive some level of protection under BLM management. Based on these site counts, approximately 46 percent of the remaining *G. kauffmanii* 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:

- *Gomphus kauffmanii* is a Category E (rare) S&M species throughout the NSO range. Per the 2001 ROD, all known sites of Category E 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 indicates that the species appears to be more common than previously documented, as noted below:
 - *Gomphus kauffmanii* has a wide distribution across 11 physiographic provinces and three states in the region and a moderate-high number of overall sites (99 on NFS lands, 159 on all lands). The species appears to be well distributed in the western Cascade Range in Oregon and Washington and is fairly common and widespread outside this mountain range. The currently known number of sites on NFS and BLM lands is an increase of 79 sites since 2007, with most sites documented during the PCGP Project surveys.
 - An estimated 50 percent of the sites (69 sites) are in reserves, which is an increase of about 24 sites in reserves since 2006 per Molina (2008).
- Coniferous, mixed hardwood-coniferous, and hardwood forests (general habitat) are widely distributed across the region and encompass approximately 20.4 million acres on BLM and NFS lands with an estimated 60 percent in reserves. Most of the forests are found in the Cascade Range, where most sites are documented. The Klamath Mountains, Coast Range, and other areas also contain conifer, mixed, and hardwood forests, but sites are more scattered in these areas. A subcomponent of these forests likely provides habitat for *G. kauffmanii*.
- The PCGP Project would affect seven of 99 Forest Service-managed sites of *G. kauffmanii*, 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 (92) would continue to be documented on NFS lands in the region with a wide distribution across Washington, Oregon, and California. Some sites (seven sites) would remain on NFS lands in the local vicinity of the analysis area. Additionally, 16 sites would remain entirely in BLM reserves in the NSO range and eight 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 six sites in LSRs, but the percentage of sites in reserves would be about the same (51 percent). Of the remaining sites on NFS lands, 40 are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and seven are in Congressionally Reserved areas where management activities that may adversely affect *G. kauffmanii* are unlikely. An additional 16 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 District Designated Reserves where management activities that may adversely affect *G. kauffmanii* are unlikely.

- The PCGP Project would result in a permanent loss of an estimated 246 acres of coniferous, mixed hardwood-coniferous, and hardwood forests (less than 1 percent of the total regional acreage). An estimated 12.1 million acres (60 percent) of all forests and 4.1 million acres (66 percent) of LSOG forests would remain in reserves in the NSO range.
- The remaining forests could support additional populations of *G. kauffmanii*, 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 E species for which its status is undetermined; therefore, pre-disturbance surveys are not applicable. 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.

2.17.4 Conclusions

If implemented as proposed, the PCGP Project would likely affect site persistence of *G. kauffmanii* at seven 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, 92 sites would remain on NFS lands across the region, and seven sites would remain on NFS lands in the local area. An additional 16 sites would remain entirely in BLM reserves in the region, and eight sites would remain entirely in BLM reserves in the local area. Although the PCGP Project would affect site persistence of *G. kauffmanii* at seven sites, these sites are part of the many sites in the 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. *Gomphus kauffmanii* would persist in the region without considering the seven sites as part of the population.
- The PCGP Project would remove approximately 1,128 acres of coniferous, mixed hardwood-coniferous, and hardwood forests and 241 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 12.1 million acres (60 percent) of all forests and 4.1 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 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 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 *G. kauffmanii* 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 *G. kauffmanii* 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 *G. kauffmanii* 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.

2.18 GYMNOMYCES ABIETIS

Gymnomyces abietis is a sequestrate mushroom species in the Russulaceae family and does not have a common name.

2.18.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *G. abietis* as a Category B (rare) species. ORBIC evaluated *G. abietis* 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 moderate risk of extinction due to a restricted range, relatively few populations, recent and widespread 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 (G3G4, S3S4, 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.

2.18.2 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 *G. abietis*. It is a mycorrhizal fungus that depends on host trees for nutrients (carbohydrates) and forms sporocarps beneath the soil surface (ORBIC 2004, Castellano et al. 1999). Although no specific information on its reproductive biology is known, it is presumed to be mostly dependent on mycophagy for dispersal of spores, similar to other sequestrate fungi (Castellano and O'Dell 1997). Mycophagy is the consumption of fungi by animals, which eat the sporocarp and transport and excrete the spores. One study confirms the consumption of *G. abietis* by flying squirrels; however, it was eaten far less than other truffle species (Waters et al. 2000). This may indicate the possibility of other vectors for *G. abietis* spore dispersal. The mushroom has been documented fruiting from July through October (Castellano et al. 1999).

Range

Gymnomyces abietis is endemic to the Pacific Northwest, where it was known only from Washington, Oregon, and California in 2004 (ORBIC 2004). In 2007, it was known from the Cascade Range in Oregon and Washington, the Coast Range in Oregon and California, and the

Klamath Mountains in California (Cushman and Huff 2007). 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 *G. abietis* from an estimated 22 element occurrences within the Pacific Northwest in 2004. Most of these occurrences were in Oregon (11) and California (10), with only one reported in Washington (ORBIC 2004). In 2004, *G. abietis* was reported as being frequently collected in Oregon and California, but population trends across its range were unknown (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) reported two new sites of *G. abietis* in the NSO range between 1998 and 2006, and 24 total sites were documented by 2006, including 19 in reserves or protected areas. These two new sites are likely the same two new sites reported between 2004 and 2006 in the 2007 FSEIS (USDA and USDI 2007), indicating that no new sites were recorded between 1998 and 2004. The 2007 Final SEIS reported 23 sites on NFS and BLM lands and 23 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 *G. abietis*, and resulted in one new observation of the species in 2011 on the Rogue River National Forest. *Gymnomyces abietis* has not been found in high numbers during past survey efforts, although limited fungi 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 presented below under the Species Distribution discussion.

Habitat

Gymnomyces abietis grows in association with the roots of conifer trees, including true fir, mountain hemlock, and possibly other species in the Pine family, primarily above 3,000 feet msl (Castellano and O'Dell 1997, Castellano et al. 1999). Specific habitat requirements are not known. The species was reported only from mature to old-growth coniferous stands in the *Results of Additional Species Analysis* in support of the NWFP ROD (Holthausen et al. 1994). It has also been found in recently burned areas (Trappe, pers. comm. 2013). *Gymnomyces abietis* may prefer specific microclimate conditions of LSOG coniferous forests, but it may not be restricted to these conditions.

Threats

Threats to *G. abietis* are those that affect its host tree and disturb the soil, such as road and trail construction, logging and fire management activities, and recreational activities (Castellano and

O'Dell 1997). For populations in or near recreation areas, trampling and other ground disturbance can affect the species (Holthausen et al. 1994). Fire is also a potential threat. Other specific threats to the species are not currently known.

Management Recommendations

For 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 *G. abietis* with several other species (Group 3 of Castellano and O'Dell 1997). The primary guidance is to maintain habitat conditions at all known sites, which will maintain viable populations of the species until additional information on the effects of various management activities can be obtained and evaluated. Populations on federal land should be managed to maintain population viability. 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. The 2007 Conservation Assessment for Fungi (Cushman and Huff 2007) provides the following management considerations for *G. abietis*:

- As a mycorrhizal species, *G. abietis* 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.

2.18.3 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 *G. abietis* 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 GYAB-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 23 observations from BLM and Forest Service geodatabases were converted into 21 sites in the NSO range (region). Table GYAB-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table GYAB-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 GYAB-1 displays the regional distribution of the species across NFS lands, Figure GYAB-2 displays the extent of known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure GYAB-3 displays the species'

regional distribution as well as the extent of coniferous and LSOG coniferous forests above 3,000 feet msl on BLM and NFS lands within the currently known range of the species.

Number of <i>Gymnomycetes abietis</i> Sites (2017)	
Location*	Number of Sites
Regional Area	21
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.

Distribution of <i>Gymnomycetes abietis</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	18	1	1
BLM	-	-	-
NPS	3	-	-
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.

Distribution of <i>Gymnomycetes abietis</i> across 1994 ROD and 2016 RMPs Land Allocations			
1994 ROD Land Allocation (NFS)	Regional Sites	Local Sites	Analysis Area Sites
Adaptive Management Area (AMA)	2	-	-
Adaptive Management Reserves (AMR)	-	-	-
Administratively Withdrawn (AW)	4	-	-
Congressionally Reserved (CR)	5	-	-
Late Successional Reserve (LSR)	5	1	1
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) <u>a/</u>	-	-	-
Managed Late Successional Area (MLSA)	-	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	2	-	-
Riparian Reserve	-	-	-
2016 RMPs Land Allocation (BLM)	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

Gymnomycetes abietis is somewhat widely distributed across six physiographic provinces in Washington (Eastern Cascades), Oregon (Coast Range, Cascades East and West), and California (Klamath and Cascades), despite a low overall number of sites (see Figure GYAB-1). Most sites

are found along the Cascade Range, with scattered sites in the Coast Range and Klamath Mountains. Sites in the Oregon Cascade Range are relatively close to one another, but other sites appear to be isolated. The species appears to have a limited distribution outside the Oregon Cascade Range based on the lower number of sites and isolated nature of most sites. *Gymnomycetes abietis* does not appear to be well distributed within its range in the NSO range.

Three sites are on NPS lands within the Crater Lake National Park, and the remainder (18) are on NFS lands in the region (no sites are on BLM lands). Sites included on the National Forests that encompass the project area include one site on the Rogue River-Siskiyou National Forest (the only site in the local and analysis areas). Sites included on other National Forests include two sites on the Deschutes National Forest, one site on the Klamath National Forest, one site on the Mt. Hood National Forest, one site on the Okanogan-Wenatchee National Forest, three sites on the Siuslaw National Forest, one site on the Six Rivers National Forest, two sites on Shasta-Trinity National Forest, and six sites on the Willamette National Forest.

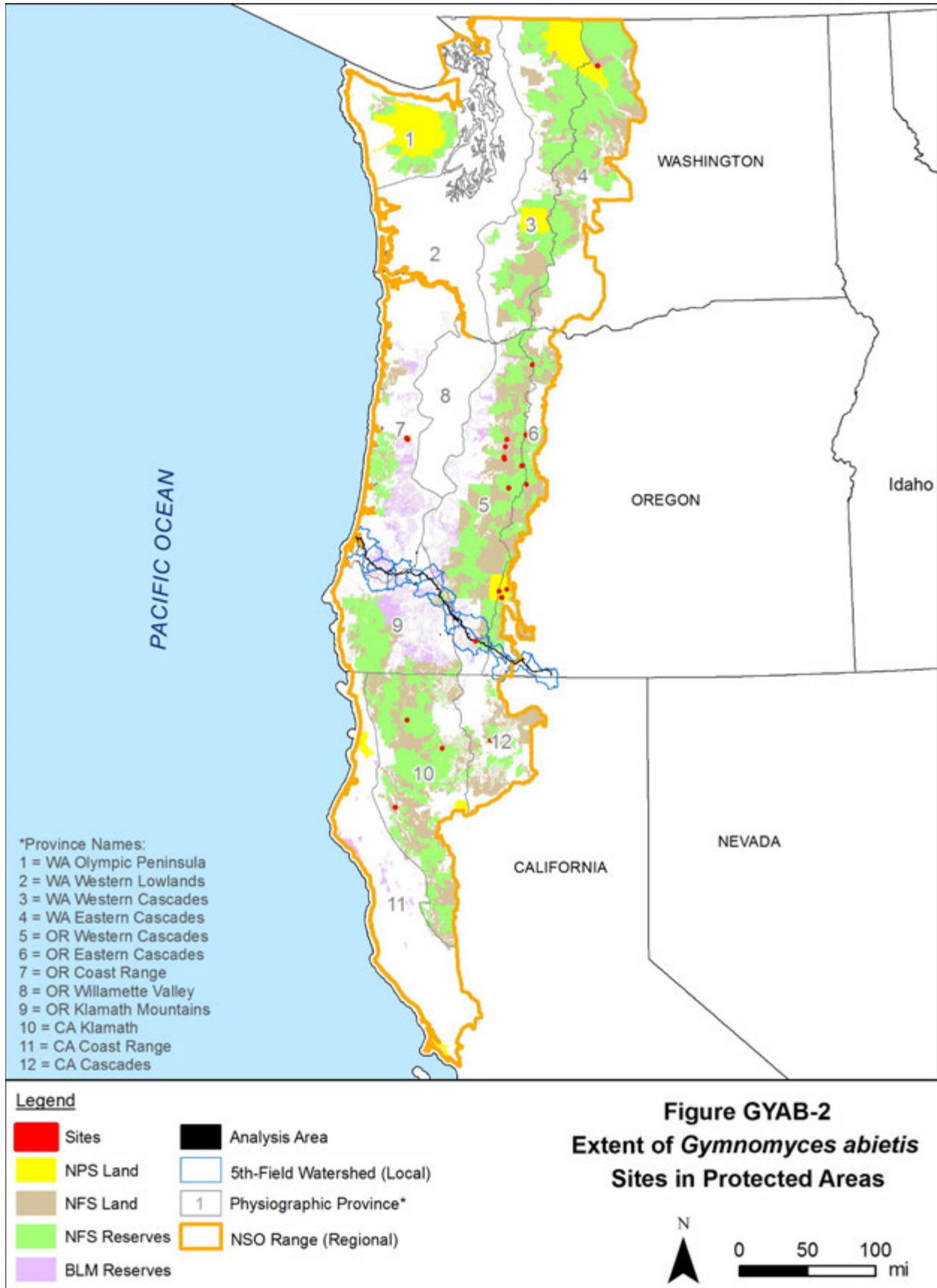
Across the NSO range, 10 sites are located in reserve lands managed by the Forest Service, including five sites entirely in LSRs and five sites entirely in Congressionally Reserved areas (see Figure GYAB-2). This represents 55 percent of the total NFS sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. The three NPS sites, while not covered by the S&M Standards and Guidelines, likely receive some degree of protection based on National Park management.

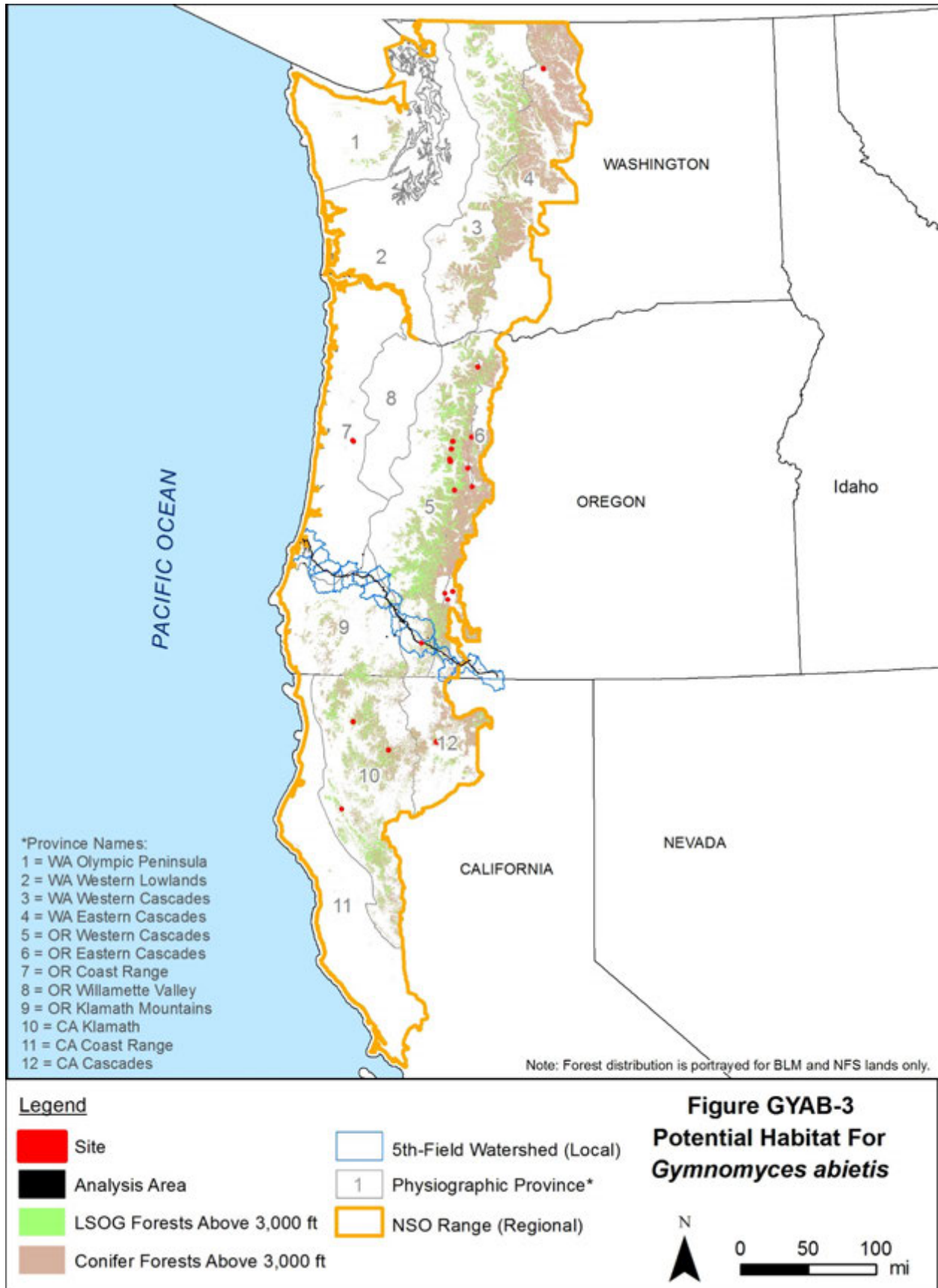
Gymnomycetes abietis is more commonly found in LSOG forests based on available data (13 of 21 total sites are in LSOG), but it has also been found in recently burned areas and may not be restricted to LSOG conditions. Based on current site locations, the species is found in coniferous forests above about 3,000 feet msl and has only 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 forests above 3,000 feet msl across the NSO range could provide habitat for *G. abietis* and support additional sites. These forests encompass an estimated 11.9 million acres on BLM and NFS lands in the NSO range, including an estimated 7 million acres in reserve land allocations (59 percent of the forests; Table GYAB-4). Of this acreage, an estimated 3.2 million acres are LSOG (see Figure GYAB-2), including 2 million acres in reserve land allocations (63 percent of the forests). Although coniferous forests are widespread across the NSO range, LSOG coniferous forests above 3,000 feet are less common.

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.







Local Distribution

Within the local area, *G. abietis* is found in one 5th-field watershed (Little Butte Creek) that overlaps the project area (see Table GYAB-5 and Figure GYAB-4). The only site in the local area is in an LSR on the Rogue River-Siskiyou National Forest. This site is in the western Cascade Range and appears to be isolated from other sites in the region because the nearest site is more than 35 miles northeast in the Eastern Cascade Range. Limited connectivity is available between the local site and other sites in the region based on the distance between the sites, although animals could transport spores across suitable habitat within the local area.

Coniferous forests above 3,000 feet msl encompass approximately 232,484 acres on BLM and NFS lands in the local area, with 109,346 acres in reserve land allocations (47 percent of the forests). Of this acreage, an estimated 69,528 acres are LSOG, including 38,262 acres in reserve land allocations (55 percent of the forests). Other sites may be located in the Cascade Range in areas that have not been previously surveyed.

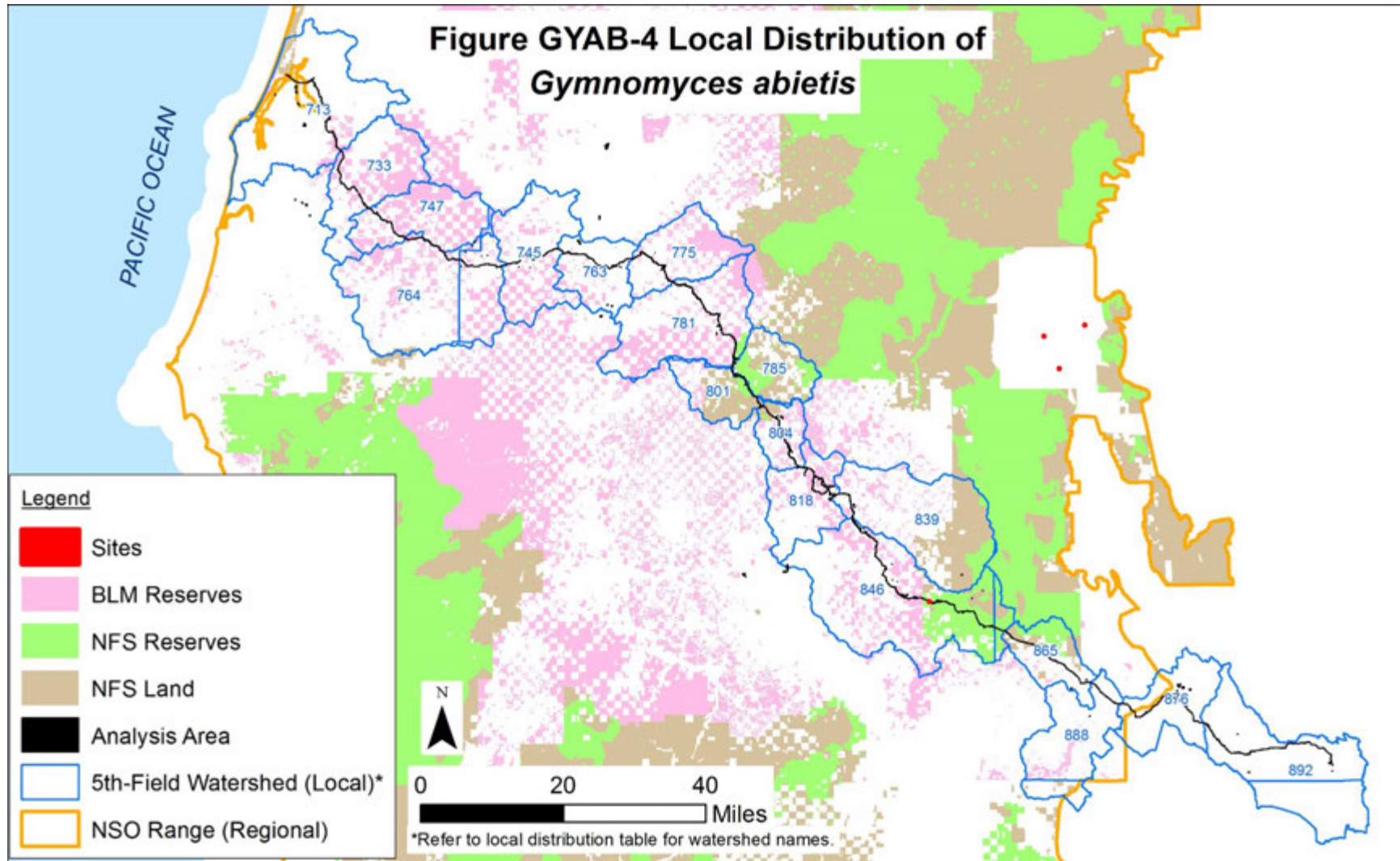
Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	-	-	-
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper 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)	-	-	-

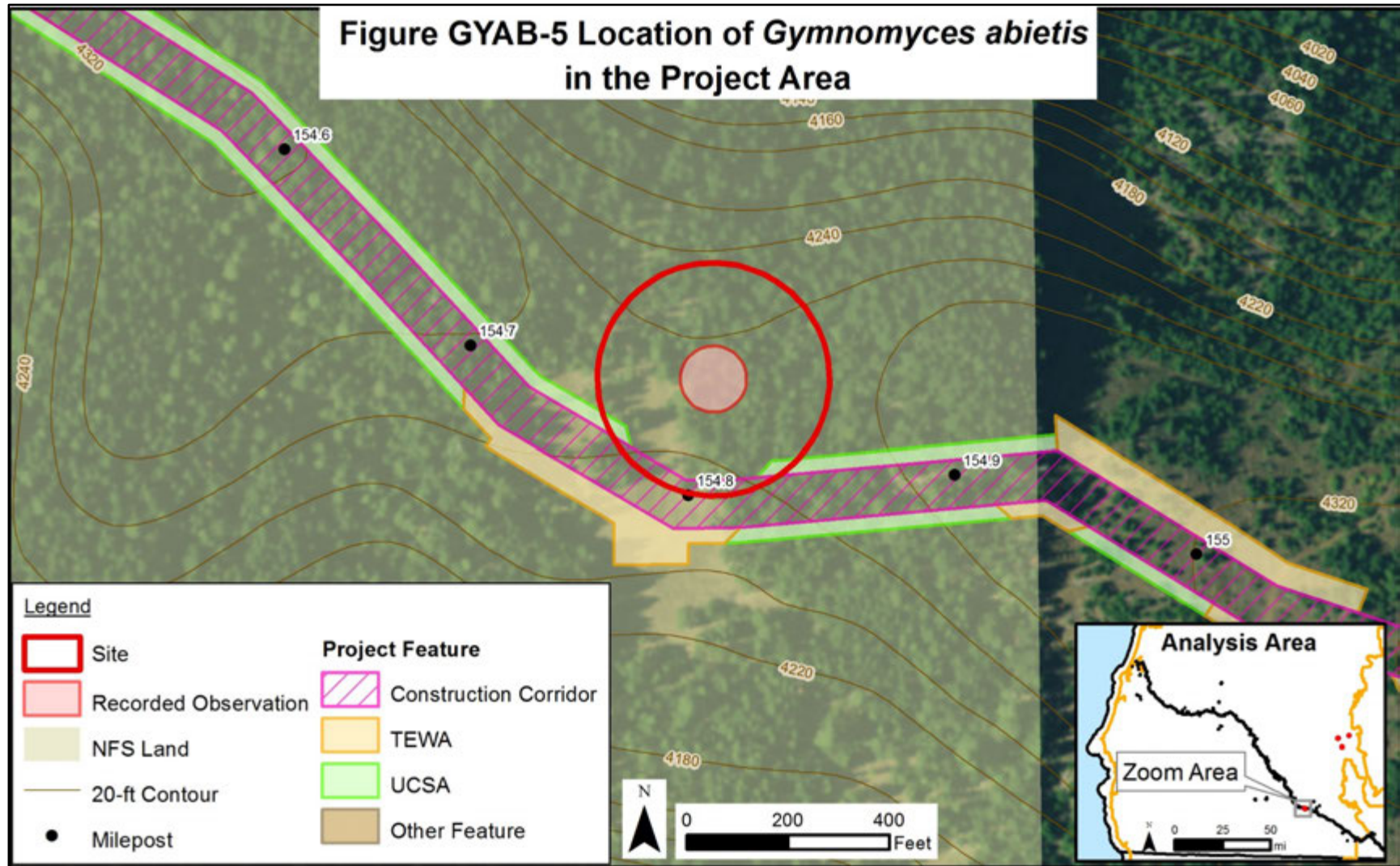
Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011

Analysis/Project Area Distribution

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

Surveys for the PCGP Project resulted in one observation of *G. abietis* in the survey area during spring 2011 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). This recorded observation was at MP 154.8 and comprises the single site in the analysis area.





Project Impacts

Analysis

The PCGP Project would affect one site out of the 18 sites on NFS lands in the region, representing approximately 6 percent of the sites (or one out of 21 total sites on all lands in the NSO range). Table GYAB-6 presents an overview of the features of the PCGP Project that would affect the *G. abietis* site. The construction corridor and associated work and storage areas would affect approximately 0.3 acre (8 percent) of the site (the site is approximately 3.8 acres), and the corridor would intersect the site at the southern edge of the site (see Figure GYAB-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 *G. abietis* in and near the project area. Due to the scattered distribution of the species and few sites near the project area, the effects on one site 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.

.TABLE GYAB-6		
Impacts to <i>Gymnomycetes abietis</i> Sites on NFS Lands in the Project Area		
Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	1	0.2 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 at the southern end of the site near MP 154.8. The recorded observation of the species is located 200 feet north of the project area where direct effects would not occur and indirect effects are unlikely (see Figure GYAB-5).

Due to conclusions made in previous persistence analyses (North State Resources 2014), the PCGP Project alignment was moved approximately 150 feet south to avoid direct impacts to the single site in the analysis area. Establishment of the 95-foot wide construction corridor and associated storage areas would disturb vegetation and soils about 200 feet from the observation within the site. The *G. abietis* observation is in a wooded area, with an open area located southwest of the observation (see Figure GYAB-5). In the vicinity of the observation, the corridor would occur mainly through the open area and significant modifications to microclimate conditions are not anticipated, although the removal of trees directly south of the observation may still change microclimate conditions adjacent to the site. The removal of forests and host trees and disturbance to soil could negatively affect *G. abietis* by removing its habitat, disturbing the roots of host trees, and affecting its mycorrhizal association with the trees; however, due to the distance away from the project area, individuals within the site are expected to persist despite nearby changes to the species' habitat. 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. Measures outlined 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 *G. abietis* near the project area.

Based on this analysis, *G. abietis* is likely to persist at the site following project implementation. This site is the only site in the local area and is the southernmost site in Oregon. It may be important for dispersal of the species between other sites to the north in the Cascade Range and sites to the southwest in the Klamath Mountains in California. Despite impacts to habitat near the site, *G. abietis* would still be found in the Cascade Range in Oregon, and opportunities for dispersal into the southern portion of the NSO range would still be possible.

Across the project area, the PCGP Project would remove an estimated 471 acres of coniferous forests above 3,000 feet msl, including 139 acres of LSOG coniferous forests above 3,000 feet msl. These impacts would result in a reduction of habitat that may be suitable for *G. abietis*. Within this impact area, about 257 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

Given site persistence would be maintained at the single site in the analysis area, one site of *G. abietis* would remain in LSRs on NFS lands in the local area, and 18 sites, including 10 in reserves, 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 10 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 56 percent of the *G. abietis* 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:

- *Gymnomyces abietis* 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. Since the species was listed in the 2001 ROD, new information has become available on the species, as described below:

- Although *G. abietis* is somewhat widely distributed across six physiographic provinces and three states in the region, the total number of sites is low (18 on NFS lands, 21 on all lands). *Gymnomycetes abietis* does not appear to be well distributed in any part of its range because sites are scattered and its distribution is spotty. The currently known number of sites on NFS and BLM lands is a decrease in the number of sites recorded in 2007.
- An estimated 56 percent of the sites (10 sites) are in reserves, which is a decrease in the proportion of 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 NSO range 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, where most sites are documented, and in the Klamath Mountains, where two sites are documented. A subcomponent of these forests likely provides habitat for *G. abietis*.
- The PCGP Project would affect one of 18 Forest Service-managed sites of *G. abietis*, representing approximately 6 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 150 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.
- The PCGP Project would not affect any sites in reserves. A total of five sites are in LSRs where management actions are restricted to those activities that benefit LSOG forests, and five sites are in Congressionally Reserved areas where management activities that may adversely affect *G. abietis* are unlikely.
- 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 acreage in the NSO range). An estimated 7 million acres (59 percent) of coniferous forests and 2 million acres (63 percent) of LSOG coniferous forests above 3,000 feet msl would remain in reserves in the NSO range.
- The remaining forests could support additional populations of *G. abietis*, 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 may 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.

2.18.4 Conclusions

If implemented as proposed, the PCGP Project would not likely affect site persistence of *G. abietis* at one site on NFS land 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 *G. abietis* 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 471 acres of coniferous forests and 139 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 species 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. Although a single natural disturbance event or combination of events could affect a significant portion of sites in the Oregon Cascade Range, other sites are scattered across the region and are less likely to be collectively affected by a single event.
- The single site of *G. abietis* 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 150 feet south to avoid direct impacts to the site. Based on the above conclusions, *G. abietis* 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 *G. abietis* 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.

2.19 HYGROPHORUS CAERULEUS

Hygrophorus caeruleus is a gilled mushroom species in the Hygrophoraceae family and does not have a common name.

2.19.1 Regulatory Status and Ranking

The 2001 ROD, including the 2001-2003 ASRs modifications to the S&M species list, identifies *H. caeruleus* as a Category B (rare) species. ORBIC evaluated *H. caeruleus* 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). It was not included in the most recent update of *Rare, Threatened, and Endangered Species of Oregon* (ORBIC 2016). In 2010, the species was considered to be at moderate to high risk of extinction due to a restricted range, few populations, steep declines, or other factors within its global range (G2G3) and was considered to be at high risk of extinction due to very restricted range, very few populations, steep declines, or other factors in Oregon (S2). It is not considered a BLM or Forest Service Sensitive or Strategic species in Oregon.

2.19.2 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 *H. caeruleus*. It grows in small groups or solitary (The Fungi of California 2010) and is likely mycorrhizal with conifer trees (ORBIC 2004). Individuals are found in conifer duff (The Fungi of California 2010) and are associated with moist soil conditions, particularly near melting snowbanks or where snow has recently melted and the ground remains moist (ORBIC 2004). Fruiting has been documented in the spring, from May through July, and occasionally into fall (Castellano et al. 1999, Cushman and Huff 2007). As with other gilled mushrooms, *H. caeruleus* is presumed to be dependent on wind for the dispersal of spores (Castellano and O'Dell 1997).

Range

Hygrophorus caeruleus is known only from western North America where it occurs in mountainous regions near the northern portion of the Great Basin (ORBIC 2004). It has been found from the Sierra Nevada in California north into Washington and east to Idaho (ORBIC 2004, Trappe, pers. comm. 2013). 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' range may be more restricted than it was historically. This restriction may be a result of habitat modifications and other environmental factors, as discussed below under Threats.

Population Status

ORBIC (2004) reported *H. caeruleus* from about nine element occurrences in the Pacific Northwest in 2004. Most of these occurrences were in Oregon (5), with fewer in Washington (2), California (1), and Idaho (1) (ORBIC 2004). ORBIC estimated that three of the element occurrences were in protected areas in the NSO range in 2004. This species was believed to be endemic to Washington and Oregon prior to 1999 (Castellano et al. 1999), but occurrences have more recently been reported in Idaho and California (ORBIC 2004). In 2004, *H. caeruleus* had a narrow range and limited distribution within its range (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 five new sites of *H. caeruleus* in the NSO range between 1998 and 2006, and seven total sites were documented by 2006, including four in reserves or protected areas. The 2007 Final SEIS reported six sites on NFS and BLM lands and seven 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 *H. caeruleus*, and resulted in nine new observations of individuals or populations of *H. caeruleus*. These observations have increased the number of sites documented in BLM and Forest Service records by more than two-fold. Based on the increased number of sites since 1998 as a result of the increased number of surveys, more survey effort may 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

Hygrophorus caeruleus is found at mid-elevations in montane coniferous forests, typically in conifer duff (Castellano and O'Dell 1997, The Fungi of California 2010). It occurs near melting snowbanks in soil in association with roots of conifer trees (Castellano et al. 1999) and may be restricted to true firs (Castellano and O'Dell 1997). Many of the known populations have been found where wildfires are frequent on a historical basis (ORBIC 2004). *Hygrophorus caeruleus* may prefer specific microclimate conditions of LSOG forests, although it is also found in younger open forests (Trappe, pers. comm. 2013), and it may not be restricted to LSOG conditions.

Threats

Threats to *H. caeruleus* include logging, development, mining, fires, road and trail construction, and recreational activities (Castellano and O'Dell 1997, ORBIC 2004). These activities can remove host trees and disturb soil. Drastic changes to its habitat from logging and development are major threats to the species (ORBIC 2004). This species has been found in open forests, which suggests that populations may not be sensitive to edge effects (Trappe, pers. comm. 2013).

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 *H. caeruleus* with one other species (Group 11 of Castellano and O'Dell 1997). The primary guidance is to maintain habitat conditions at all known sites by retaining old-growth forest structure and soil conditions, including coarse woody debris, and avoid disturbance at or around known sites, such as from removal of host trees or modification of canopy. 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 *H. caeruleus*:

- As a mycorrhizal species, *H. caeruleus* 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.

2.19.3 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 *H. caeruleus* 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 HYCA-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 85 observations from BLM and Forest Service geodatabases were converted into 56 sites in the NSO range (region). Table HYCA-2 shows the total number of sites on NFS land and other land ownerships across the regional, local, and analysis areas. Table HYCA-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 HYCA-1 displays the regional distribution of the species across NFS lands, Figure HYCA-2 displays the extent of the known sites located in protected areas (NFS lands, NFS reserves, BLM reserves, and NPS lands), and Figure HYCA-3 displays the species' regional distribution as well as the extent of coniferous and LSOG coniferous forests between 2,000 and 7,000 feet msl on BLM and NFS lands within the currently known range of the species.

Number of <i>Hygrophorus caeruleus</i> Sites (2017)	
Location*	Number of Sites
Regional Area	56
Local Area	18
Analysis Area (Project Area)	6 (4)

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.

Distribution of <i>Hygrophorus caeruleus</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	47	14	6
BLM	9	5	-
NPS	-	-	-
Fish and Wildlife Service	-	-	-
Other (Private, State, etc.)	4	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 HYCA-3

Distribution of *Hygrophorus caeruleus* 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)	9	-	-
Congressionally Reserved (CR)	3	-	-
Late Successional Reserve (LSR)	10	5	1
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) ^{a/}	1	-	-
Managed Late Successional Area (MLSA)	2	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	23	9	5
Riparian Reserve	-	-	-
Bureau of Land Management	Regional Sites	Local Sites	Analysis Area Sites
Administratively Withdrawn (AW)	-	-	-
Congressional Reserve	-	-	-
District Designated Reserve	4	2	-
Harvest Land Base	9	5	-
Late Successional Reserve	2	2	-
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

Hygrophorus caeruleus has a somewhat limited distribution across four physiographic provinces in Washington (Eastern Cascades), Oregon (Cascades East and West), and California (Cascades) (see Figure HYCA-1). All sites are found along the Cascade Range, with most sites located on the eastern side. Clusters of sites are located in the Oregon Cascade Range, where the species appears to be locally abundant; however, sites in Washington and California appear to be scattered and somewhat isolated from the other sites in the region. The species is not found outside the Cascade Range and appears to have a scattered distribution across the mountain range. *Hygrophorus caeruleus* does not appear to be well distributed within its range in the NSO range.

Four of 56 known sites are at least partially located on private or state lands, 47 sites are at least partially on NFS lands, and nine sites at least partially located on BLM 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 32 sites on the Fremont-Winema National Forest. Sites on other National Forests include three sites on the Deschutes, one site on the Gifford Pinchot, five sites on the Mt. Hood, one site on the Wenatchee, and two sites on the Shasta-Trinity National Forest.

Across the NSO range, 14 sites are at least partially located in reserve lands managed by the Forest Service, including 10 sites in LSRs, three sites in Congressionally Reserved areas, and one site in a Known Owl Activity Center (see Figure HYCA-2). This represents 30 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. While several sites are partially located in BLM reserves, all sites on BLM

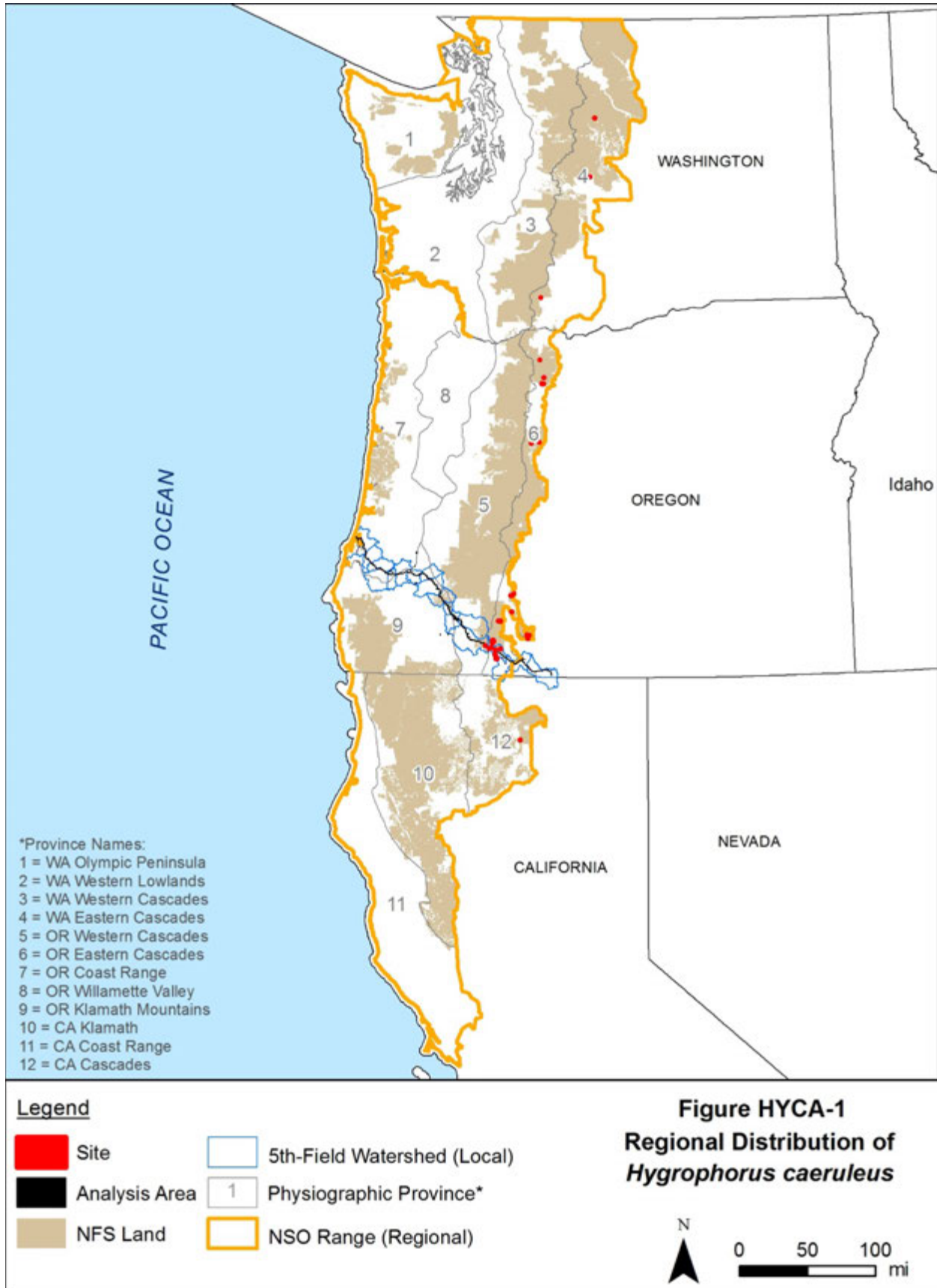
lands in the region are at least partially located on Harvest Land Base and are not expected to be protected under BLM management.

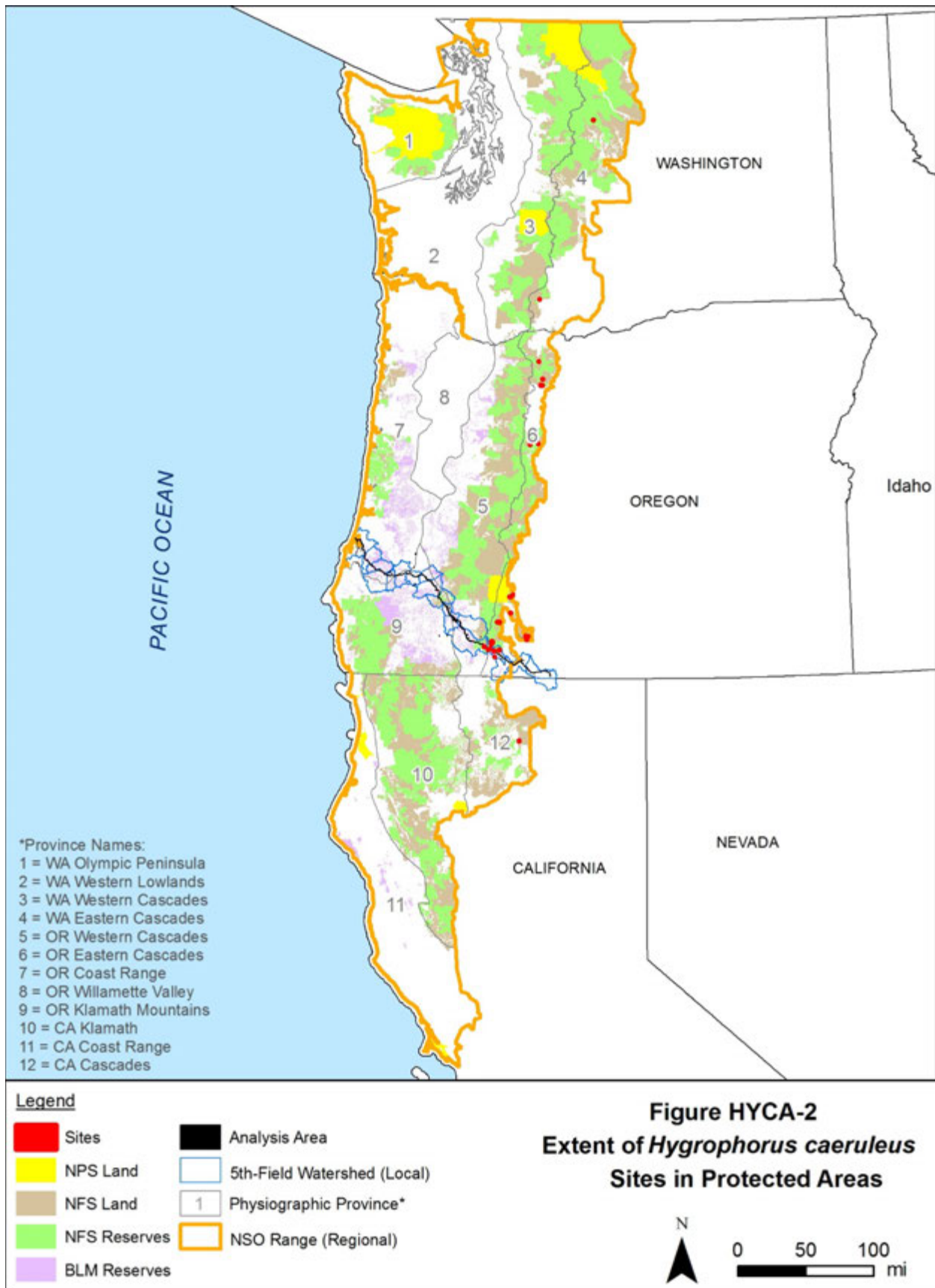
Hygrophorus caeruleus is more commonly found in LSOG forests (40 of 56 total sites are in LSOG), but it is also somewhat common in non-LSOG forests and has been found in younger coniferous forests. Based on current site locations, the species has been found in coniferous forests between about 2,000–7,000 feet msl and has only been documented in parts of Oregon and Washington. 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, between 2,000–7,000 feet msl across the NSO range could provide habitat for *H. caeruleus* and support additional sites. These forests encompass an estimated 14 million acres on BLM and NFS lands in the NSO range, including an estimated 8.3 million acres in reserve land allocations (59 percent of the forests; Table HYCA-4). Of this acreage, an estimated 4 million acres are LSOG (see Figure HYCA-3), including 2.6 million acres in reserve land allocations (64 percent of the forests). Although coniferous forests are widespread across the mountain ranges in the NSO range, LSOG coniferous forests are less common.

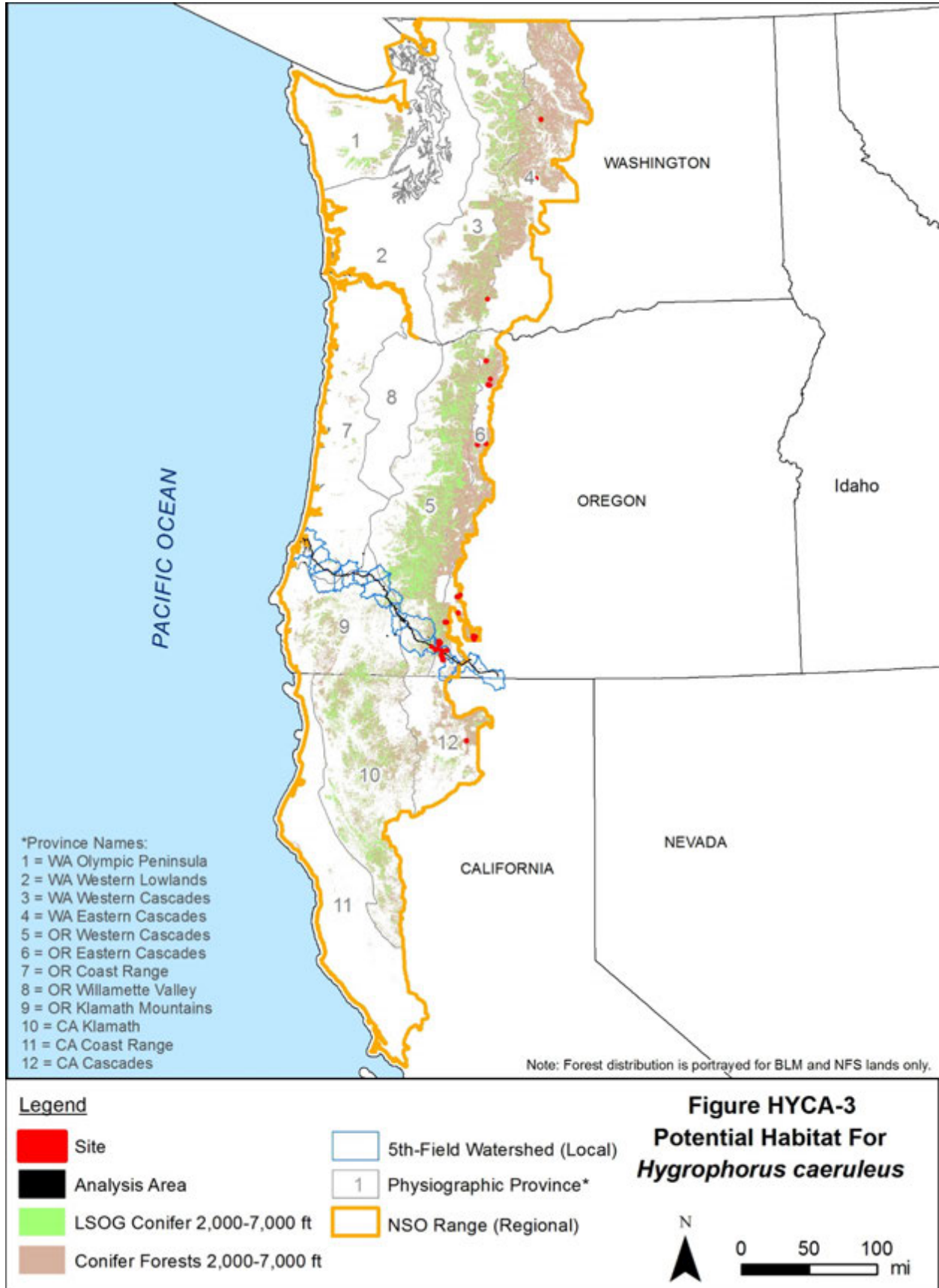
TABLE HYCA-4

Extent of Forests That Could Provide Habitat for <i>Hygrophorus caeruleus</i> on NFS and BLM Lands ^{a/}				
Location	Coniferous Forests between 2,000-7,000 feet		LSOG Forests below 2,000-7,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	13,968,404	8,257,684	4,020,181	2,563,746
Local Area	328,613	178,814	104,916	65,073
Project Area	789	518	225	152

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

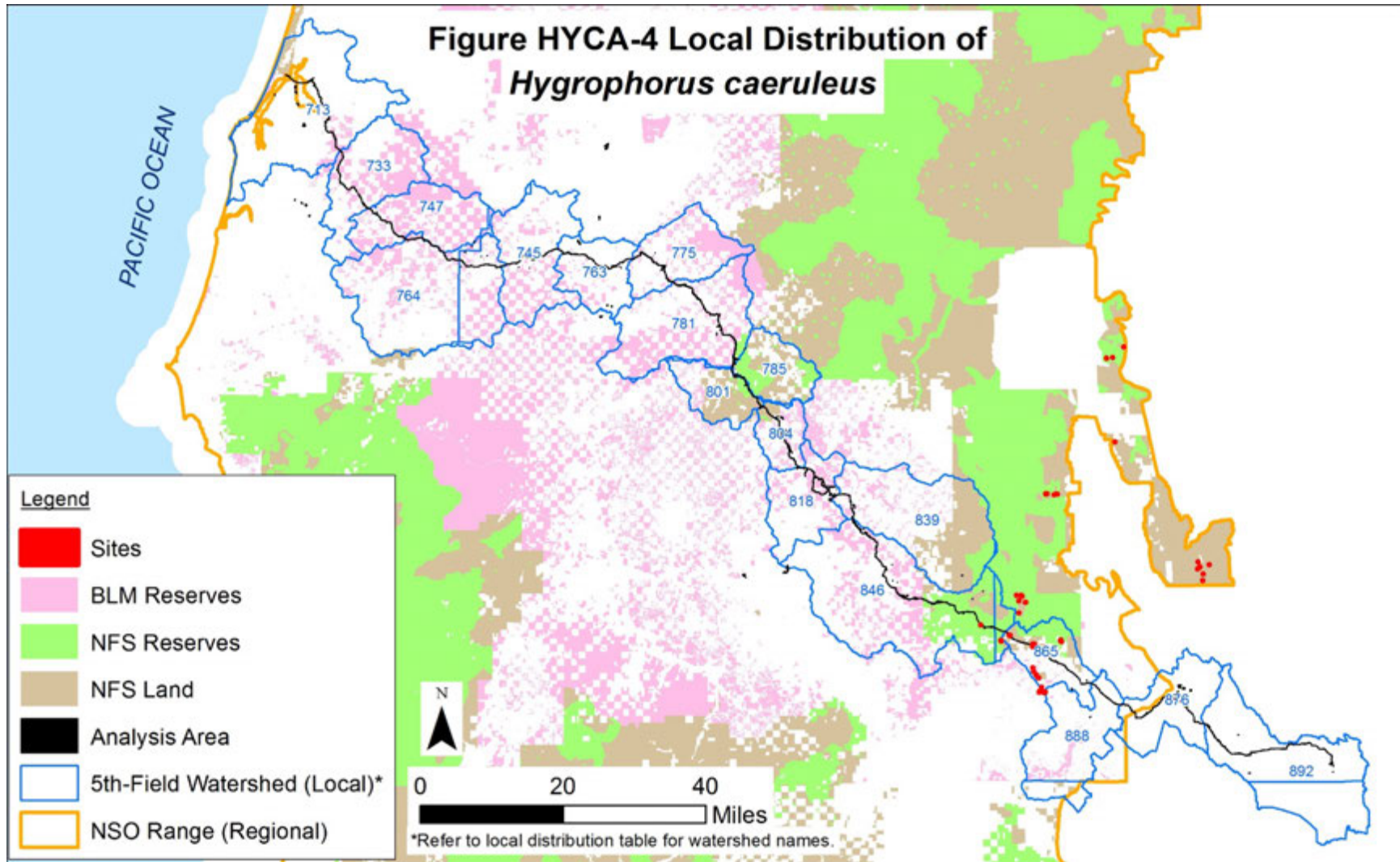
Within the local area, *H. caeruleus* is found in two 5th-field watersheds (Little Butte Creek and Spencer Creek) that overlap the project area (see Table HYCA-5 and Figure HYCA-4). The sites are clustered and near one another in the Cascade Range in the eastern portion of the local area. Within the Cascade Range, multiple avenues of connectivity appear to be available between sites based on the extent of coniferous forests and abundance of sites in the mountain range, and opportunities for dispersal exist within the local area and to nearby regional areas. Many regional sites are located on NFS lands within 20 miles to the north in the Cascade Range.

Fourteen of the 18 sites in the local area are at least partially on NFS lands (Rogue River-Siskiyou and Fremont-Winema National Forests), with two of these sites also partially on private lands. Five sites are in LSRs, and nine sites are on lands designated as Other (Matrix). The five sites in LSRs represent 36 percent of the sites on NFS lands in the local area. All of the sites in the Little Butte Creek watershed and two sites in the Spencer Creek watershed are in reserves.

Coniferous forests between 2,000–7,000 feet msl encompass approximately 328,613 acres on BLM and NFS lands in the local area, with 178,814 acres in reserve land allocations (54 percent of the forests). Of this acreage, an estimated 104,916 acres are LSOG, including 65,073 acres in reserve land allocations (62 percent of the forests). Other sites may be located in the Cascade Range in areas that have not been previously surveyed based on the number of sites and extent of forests that may provide suitable habitat in the mountain range.

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)	3	3	-
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)	15	2	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.



Analysis/Project Area Distribution

The analysis area contains six sites of *H. caeruleus*, and the project area contains four sites. All of the analysis area sites are on NFS lands (Rogue River-Siskiyou and Fremont-Winema National Forests). Five sites are on land designated as Other (Matrix) and one site is in an LSR. The analysis area sites are found in two 5th field watersheds (Little Butte Creek and Spencer Creek). The sites are restricted to a small portion of the eastern side of the analysis area and are clustered near each other. Several sites are located within the immediate vicinity of the analysis area (see Local Distribution discussion above).

Surveys for the PCGP Project resulted in 26 total observations of the species in nine locations in or near the project area during 2010, 2012, and 2014 (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). Twenty-one of these recorded observations comprise the six sites in the analysis area; the other observations are in sites outside the analysis area. Within the project area, one site is between MPs 164.2 and 164.3, two sites are near MP 168.8, and three sites are near MP 172.5.

Project Impacts

Analysis

The PCGP Project would affect six out of the 47 sites on NFS lands in the region, representing approximately 13 percent of the sites (or six out of 56 total sites on all lands in the NSO range). Table HYCA-6 provides an overview of the features of the PCGP Project that would affect the *H. caeruleus* sites. The construction corridor and associated work and storage areas would affect approximately 3.5 acres (nine percent) of the sites (the sites encompass approximately 35.8 acres), with some sites experiencing greater impacts than others (see Figures HYCA-5, HYCA-6, and HYAC-7). 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 *H. caeruleus* in and near the project area. Due to the somewhat limited distribution of the species and proportion of sites affected, the effects on six sites 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.

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	4	2.6 ac
Temporary Extra Work Area (TEWA)	2	0.3 ac
Uncleared Storage Area (UCSA)	3	0.6 ac
Roads (TMP)	-	-
Other Minimal Disturbance Activities	-	-

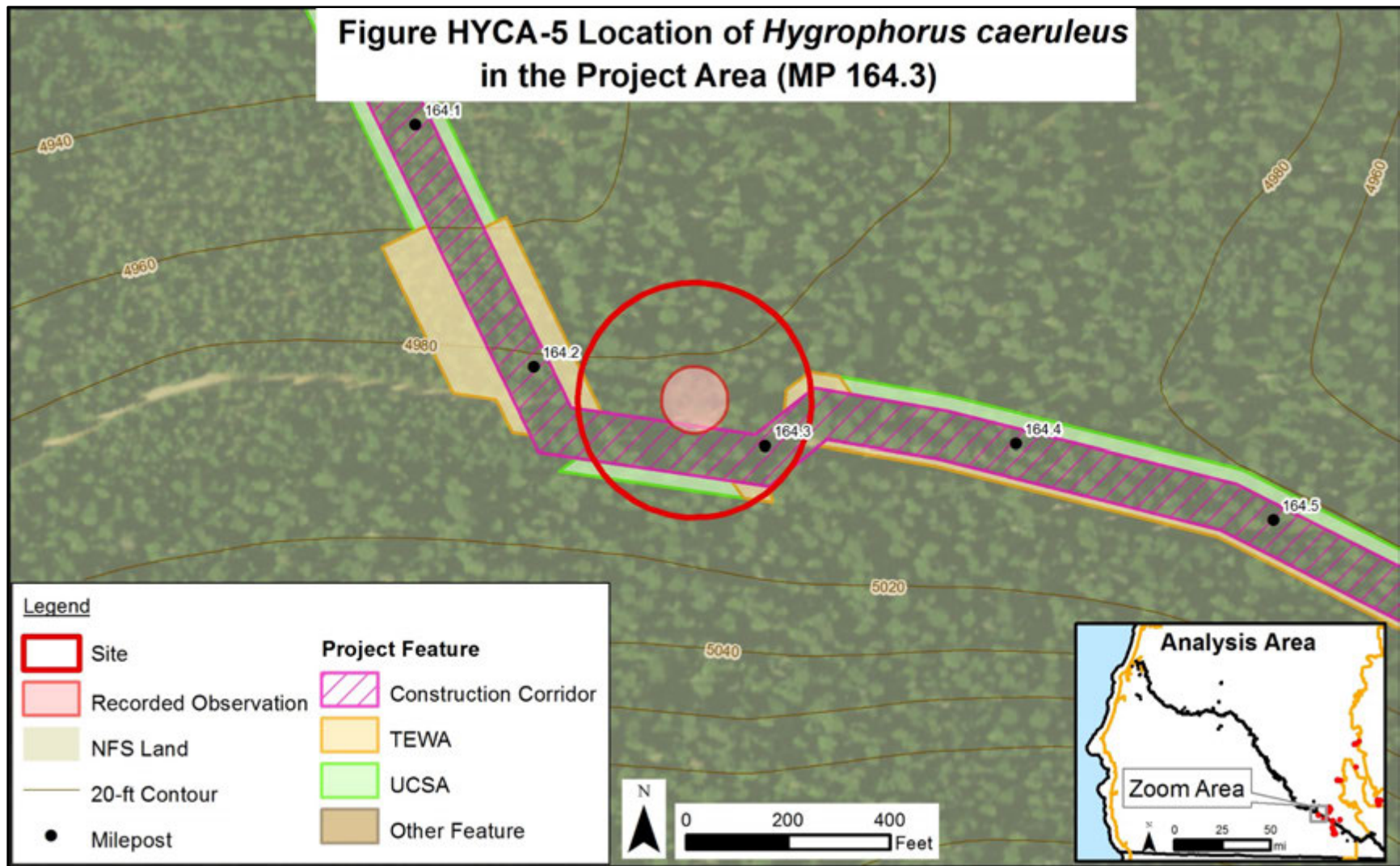
ac = acres
Note: Site counts are not additive because some sites would be subject to impacts from multiple project activities.

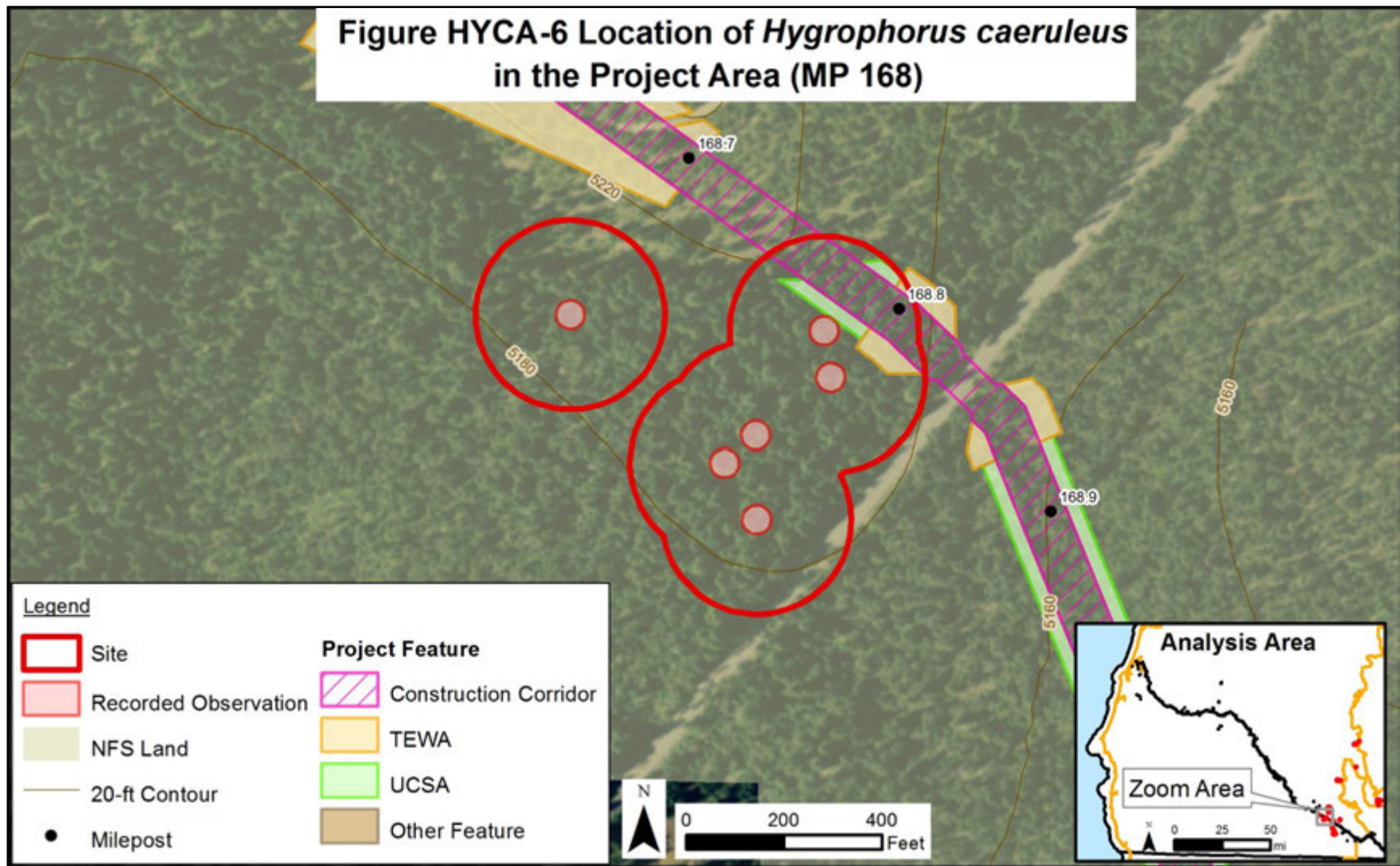
The PCGP Project would result in ground disturbance and vegetation removal in four out of the six sites in the analysis area (Table HYCA-7). The only recorded observation at site at MP 164.3 is within the project area, and would likely be removed during activities within the corridor (see

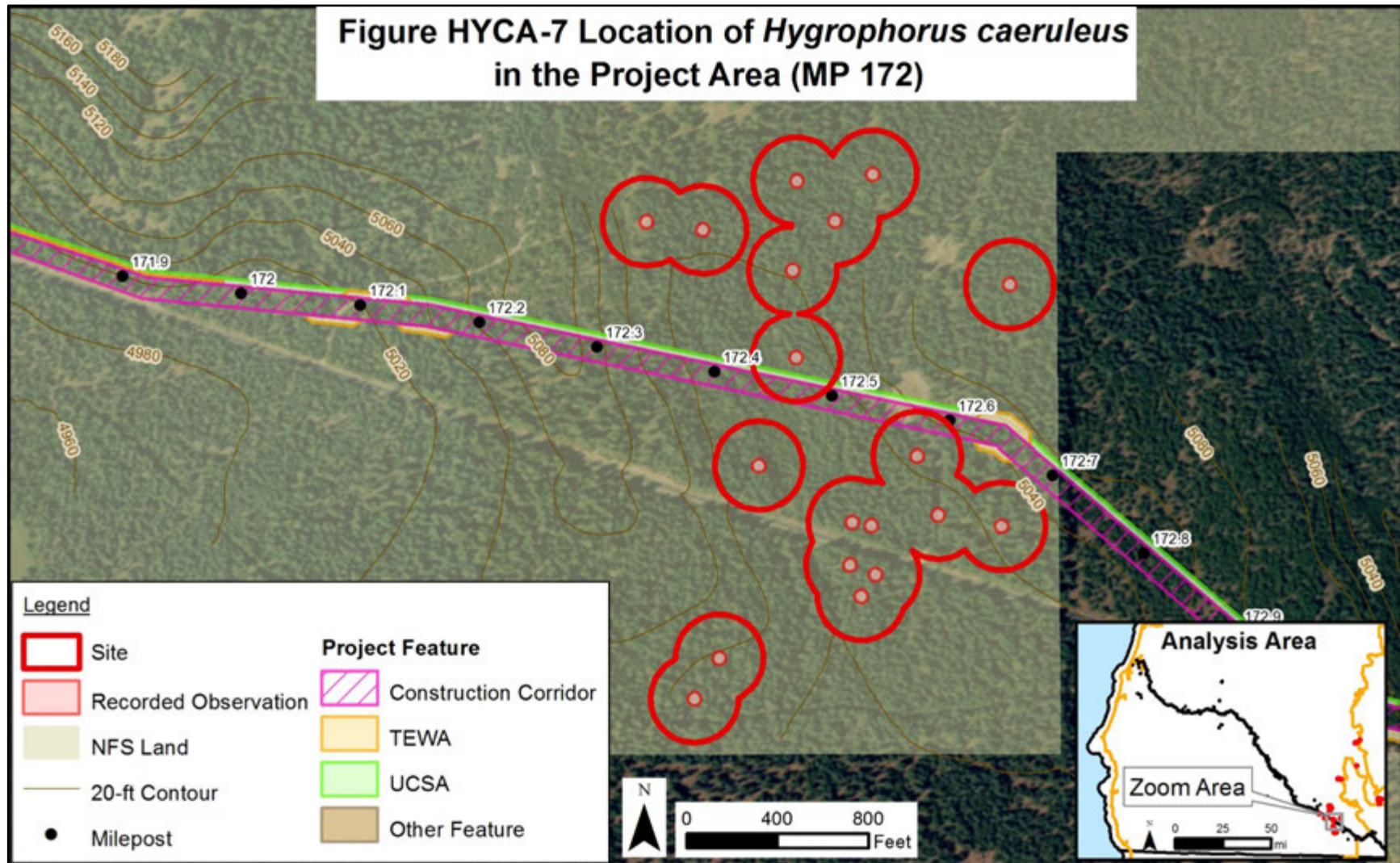
Figure HYCA-5). Three sites are large, multi-observation sites (MP 168.8, MP 172.4 (north), and MP 172.5-172.7) (Figures HYCA-6 and HYCA-7). The majority of the observations within these sites are a sufficient distance away from the project area to avoid direct or indirect effects. The remaining two sites at MP 172.4 (south) and MP 168.7 are not within the project area and would not likely be removed. For all of the sites, including the two sites outside the project area, 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. No direct impacts are anticipated in the two sites outside the project area.

Site Location	Source of Impacts	Area of Disturbance	Individuals Likely to Persist?
MP 164.3	Corridor	1.0 ac	No
	TEWA	0.1 ac	
	UCSA	0.2 ac	
MP 168.7	n/a	n/a	Yes
MP 168.8	Corridor	0.7 ac	Yes
	TEWA	0.1 ac	
	UCSA	0.2 ac	
MP 172.4 (south of project area)	n/a	n/a	Yes
MP 172.4 (north of project area)	Corridor	0.5 ac	Yes
	UCSA	0.2 ac	
MP 172.5-172.7	Corridor	0.4 ac	Yes

Notes: MP = milepost; ac = acres







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 625 acres of coniferous forests between 2,000–7,000 feet msl, including 166 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 331 acres (53 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 625 acres of coniferous forests and 166 acres of LSOG coniferous forests between 2,000–7,000 feet msl (a negligible amount of the forests). An estimated 53 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 2001-2003 ASRs 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 snowbanks 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 <i>Mycena overholtsii</i> Sites (2017)	
Location*	Number of Sites
Regional Area	205
Local Area	10
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 MYOV-2			
Distribution of <i>Mycena overholtsii</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	201	10	1
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 <i>Mycena overholtsii</i> 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	-
Marbled Murrelet Area (LSR3)	-	-	-
Northern Spotted Owl Activity Center (LSR4) @/	-	-	-
Managed Late Successional Area (MLSA)	2	-	-
Not Designated (ND)	-	-	-
Other (Matrix, Other)	90	9	1
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	-	-

National Forest Service	Regional Sites	Local Sites	Analysis Area Sites
Late Successional Reserve	1	-	-
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.

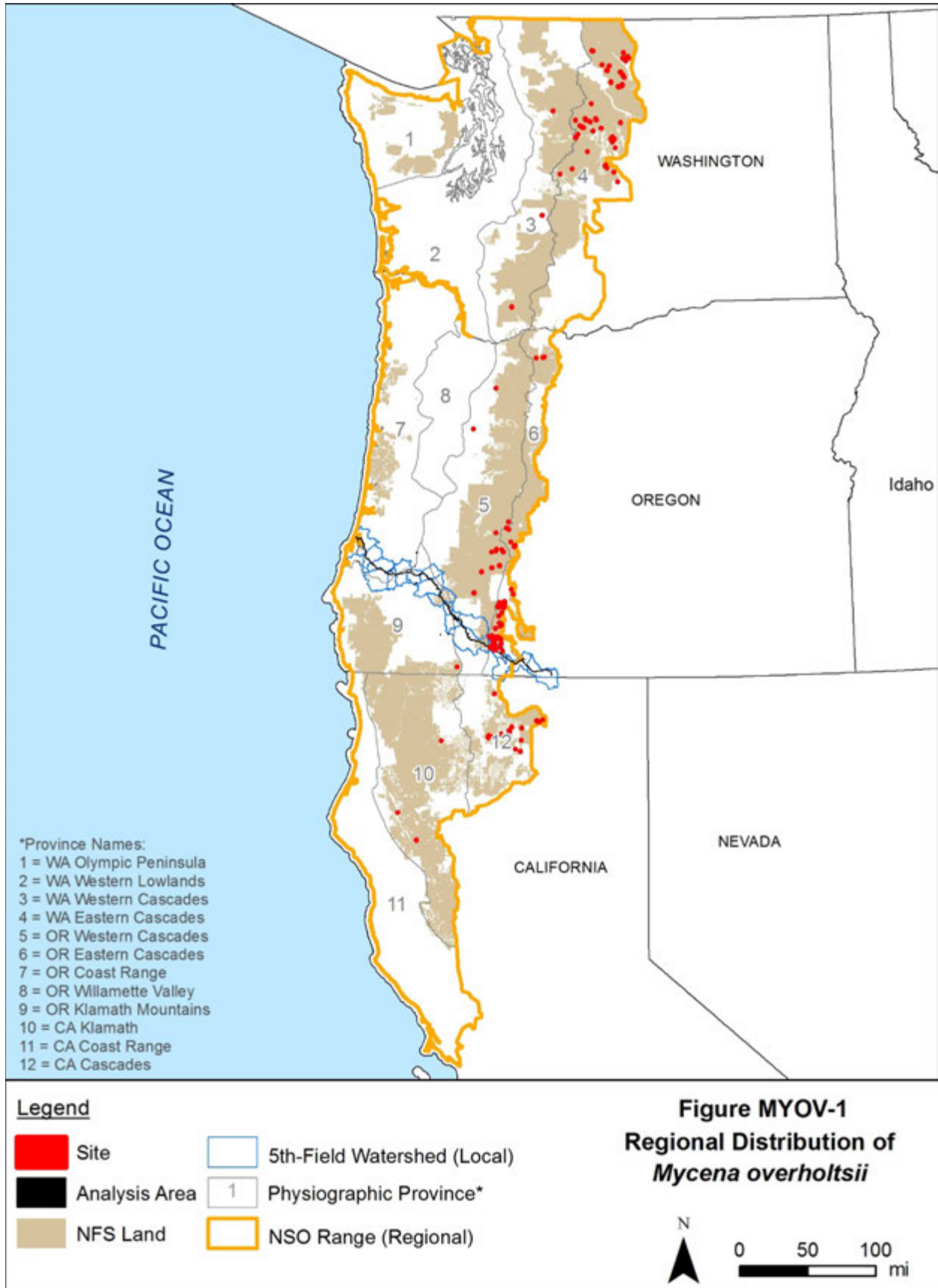
Mycena overholtsii is more commonly found in LSOG forests based on available data (118 of 205 total sites are in LSOG), but is also relatively common in non-LSOG forests and has been found in younger forests adjacent to LSOG stands. Based on current site locations, the species has been found in coniferous 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,

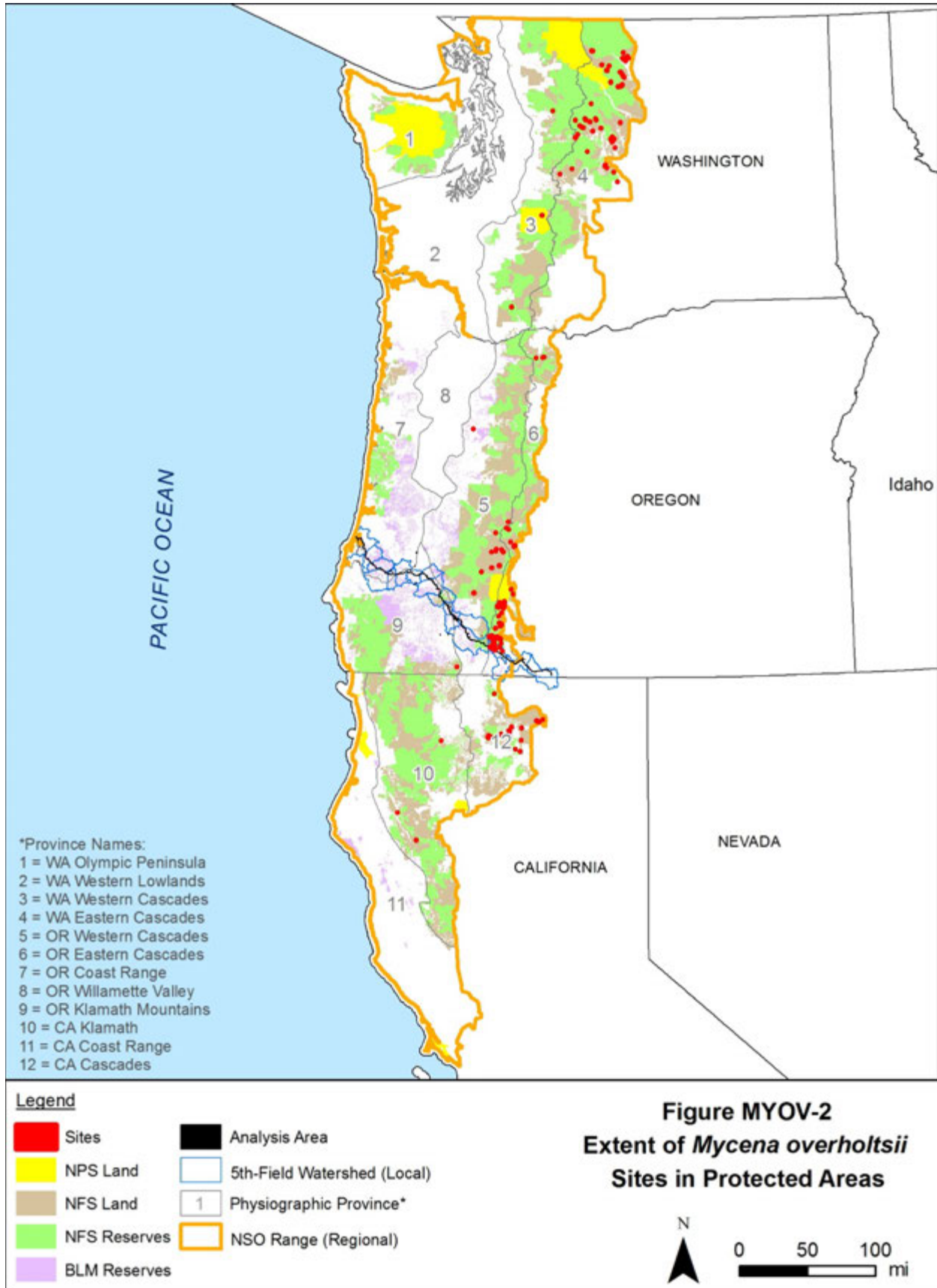
including the LSOG component of these forests, within the NSO range could provide habitat for *M. overholtsii* and support additional sites. These forests encompass an estimated 14.1 million acres on BLM and NFS lands in the eastern part of the NSO range, including an estimated 8.3 million acres in reserve 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.

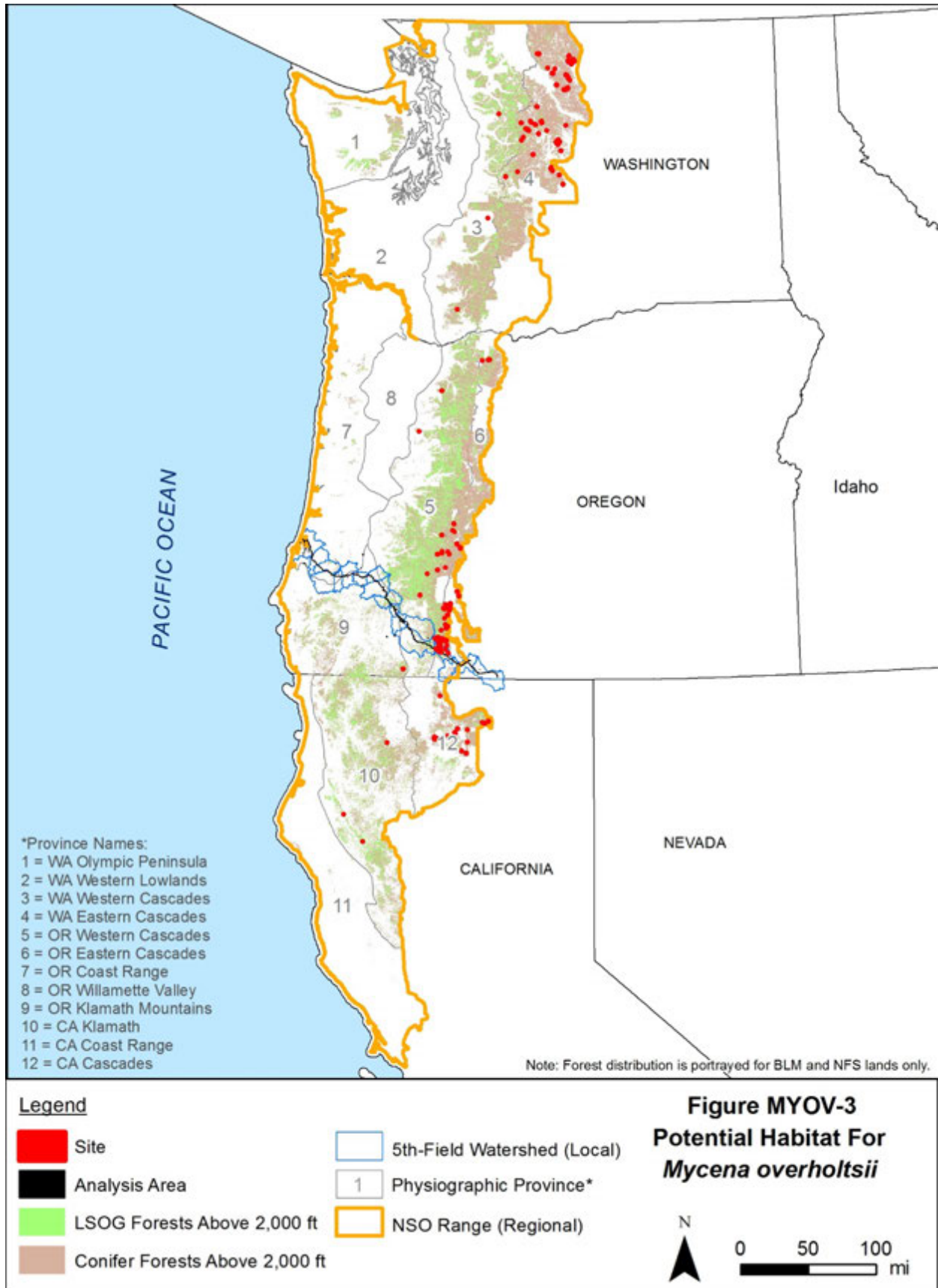
TABLE MYOV-4

Extent of Forests That Could Provide Habitat for <i>Mycena overholtsii</i> 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.







Local Distribution

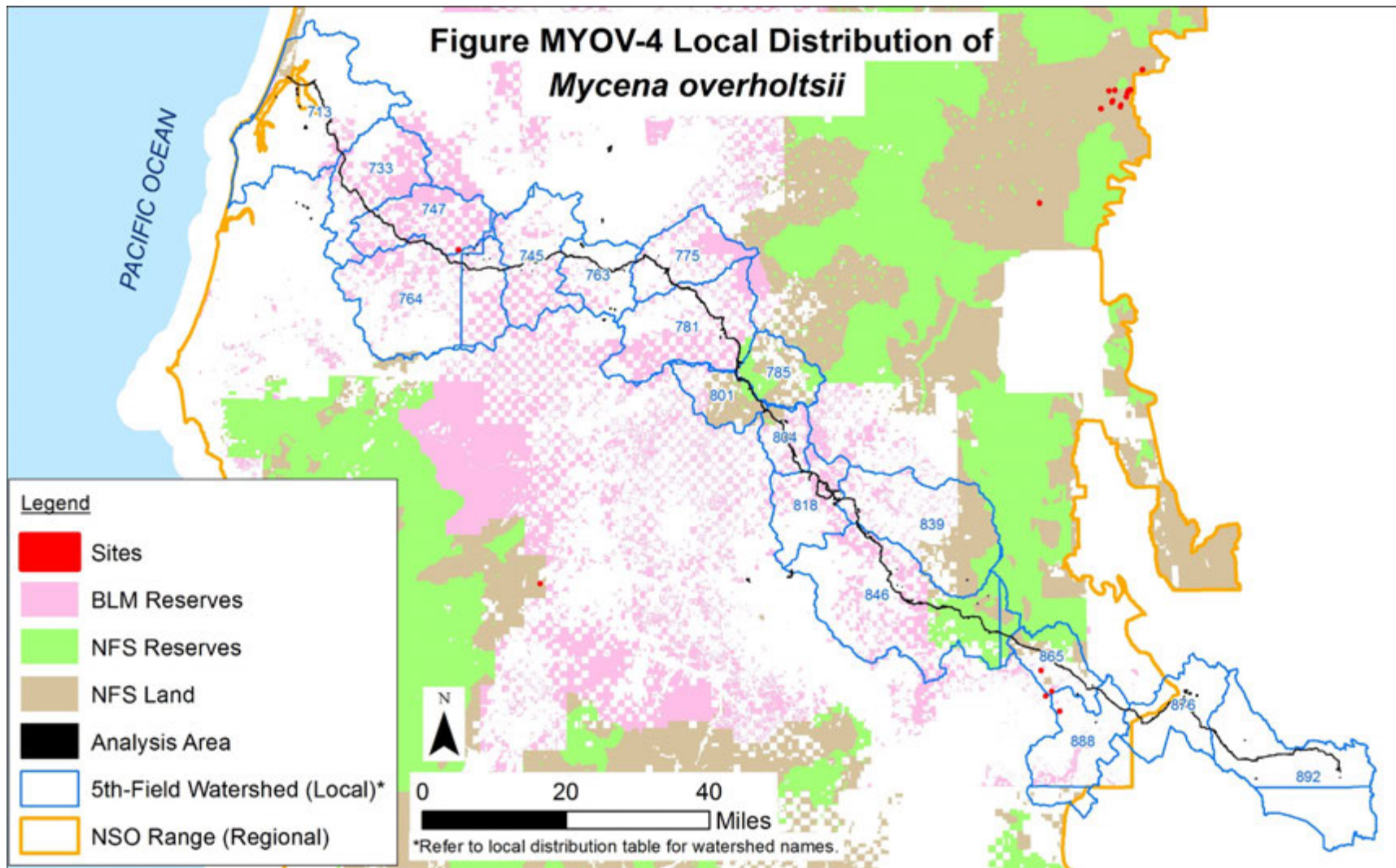
Within the local area, *M. overholtsii* is found in two 5th field watersheds (Little Butte Creek and Spencer Creek) that overlap the project area (see Table MYOV-5 and Figure MYOV-4). The sites are near one another in the Cascade Range in the eastern portion of the local area. Within the Cascade Range, 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).

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 <u>a/</u>	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 <u>a/</u>	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.



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 one site out of the 201 sites on NFS lands in the region, representing less than 1 percent of the sites (or one 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* site. The construction corridor and associated storage areas would affect approximately 1.3 acres within the site (about 45 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 *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 0.8 acre of vegetation and soils within the site 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 the 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 0.2 acre of understory habitat in the site, potentially making the habitat unsuitable for the species or removing individuals.

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
Uncleared Storage Area (UCSA)	1	0.2
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 619 acres of coniferous forests above 2,000 feet msl, including 162 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 523percent) 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 single site as a result of the PCGP Project, nine sites of *M. overholtsii* would remain on NFS lands in the local area, including two at least partially a reserve, and 200 sites, including 94 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 94 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 one of 201 sites of *M. overholtsii* on NFS lands, representing less than 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 (200) would remain on NFS lands in the region with a somewhat wide distribution across Washington, Oregon, and California. Some sites (nine 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 not affect any sites in reserves, and the percentage of sites in reserves would remain about the same (47 percent). Of the remaining sites, 70 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 one site; however, the remaining sites in the NSO range would continue to provide a reasonable assurance of species persistence because:

- With project implementation, 200 sites would remain on NFS lands across the region, and nine sites would remain on NFS lands in the local area. Additionally, one site would remain on 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 one site, the site is 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 the site as part of the population.
- The PCGP Project would remove approximately 619 acres of coniferous forests and 161 acres of LSOG coniferous forests above 2,000 feet msl (a negligible amount of the forests). An estimated 53 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 the *M. overholtsii* site 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 *M. overholtsii* 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 site would waive implementation of Management Recommendations for the *M. overholtsii* 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.

2.21 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 2001-2003 ASRs 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 <i>Polyozellus multiplex</i> 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.	

Appendix F.5. Survey and Manage Species Persistence Evaluation

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.

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

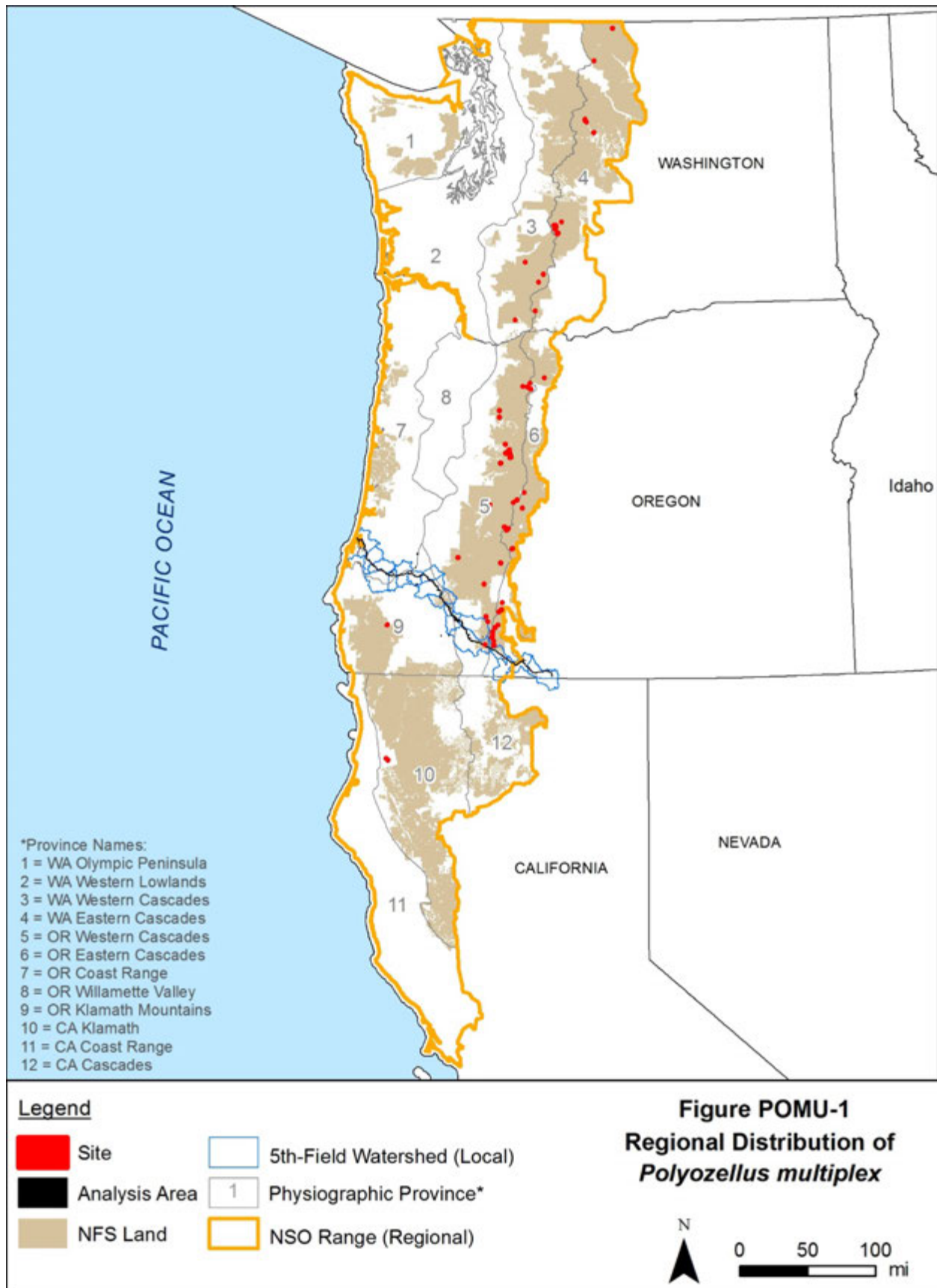
Forest. The remaining 60 sites on NFS lands are on the Deschutes, Gifford Pinchot, Mt. Hood, Okanogan-Wenatchee, and Willamette National Forests.

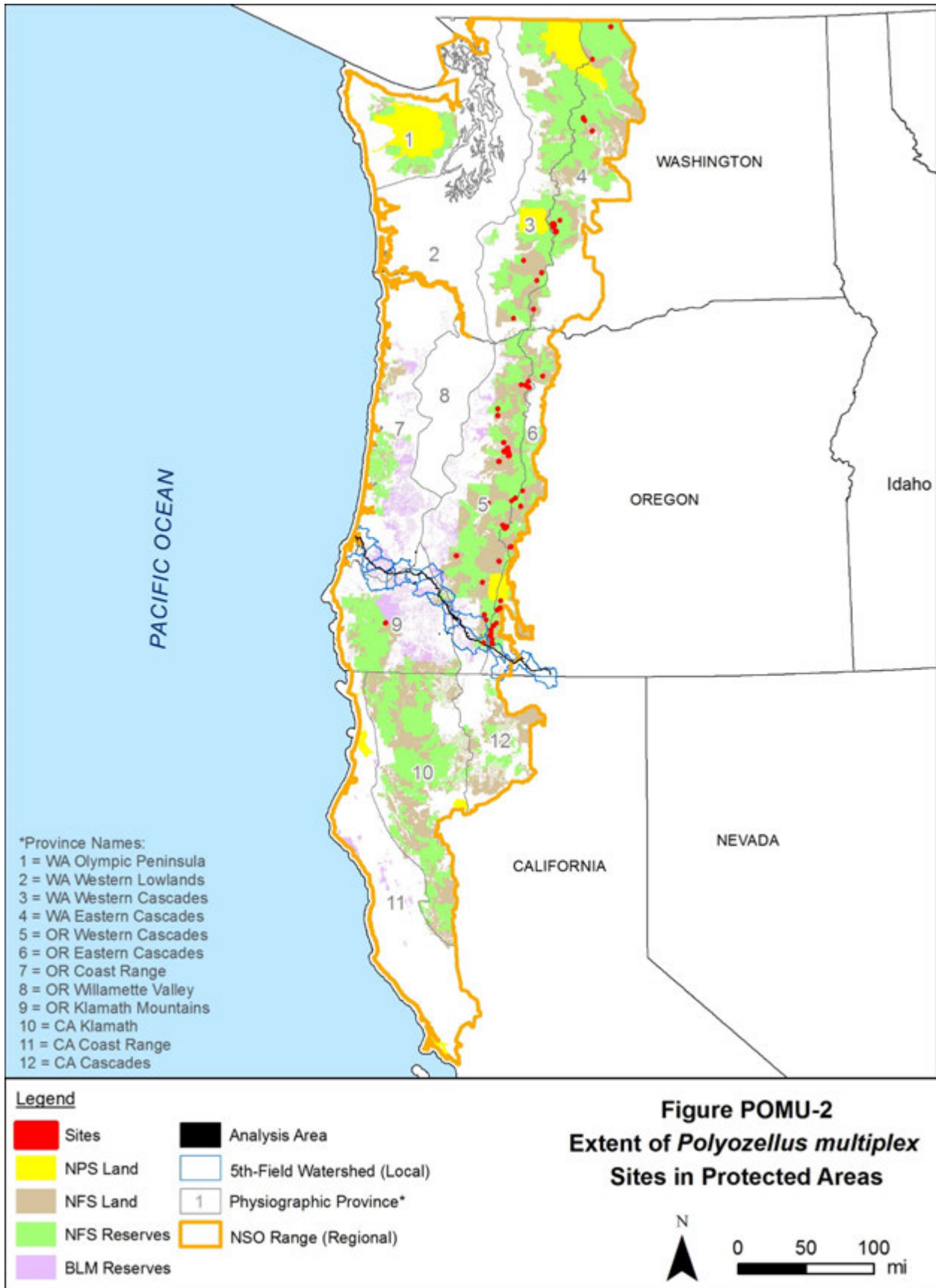
Across the NSO range, 40 sites are at least partially located in reserve lands managed by the Forest Service, including 17 at least partially in LSRs, one in a Known Owl Activity Center, and 24 at least partially in Congressionally Reserved areas (see Figure POMU-2). This represents 38 percent of the 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.

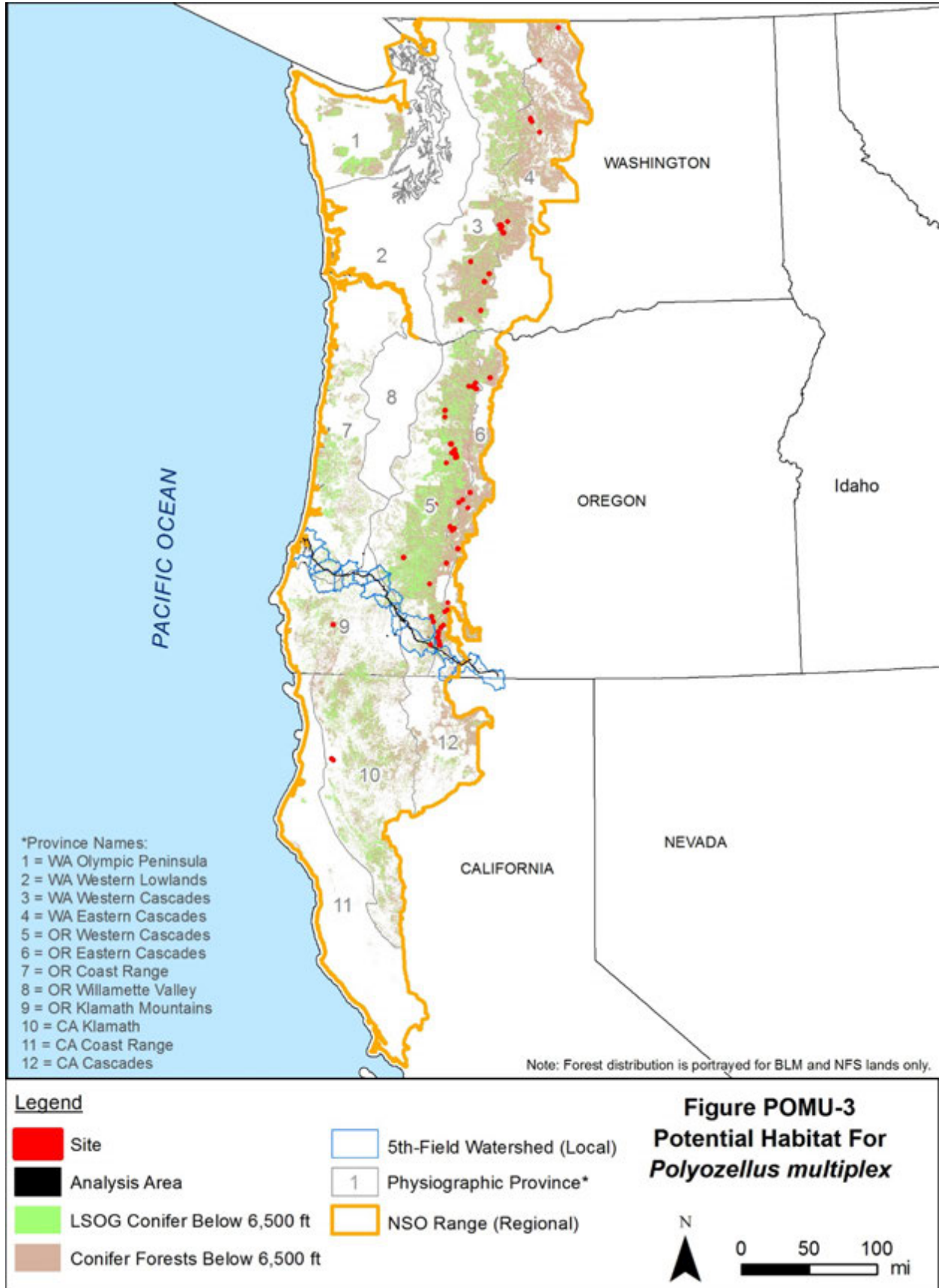
Polyozellus multiplex is more common in LSOG forests based on available data (66 of 87 total sites are in LSOG), but is also found in non-LSOG forests. Based on current site locations, the species is primarily found in coniferous forests below about 6,300 feet msl in Oregon and Washington, but it is 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.

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.







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).

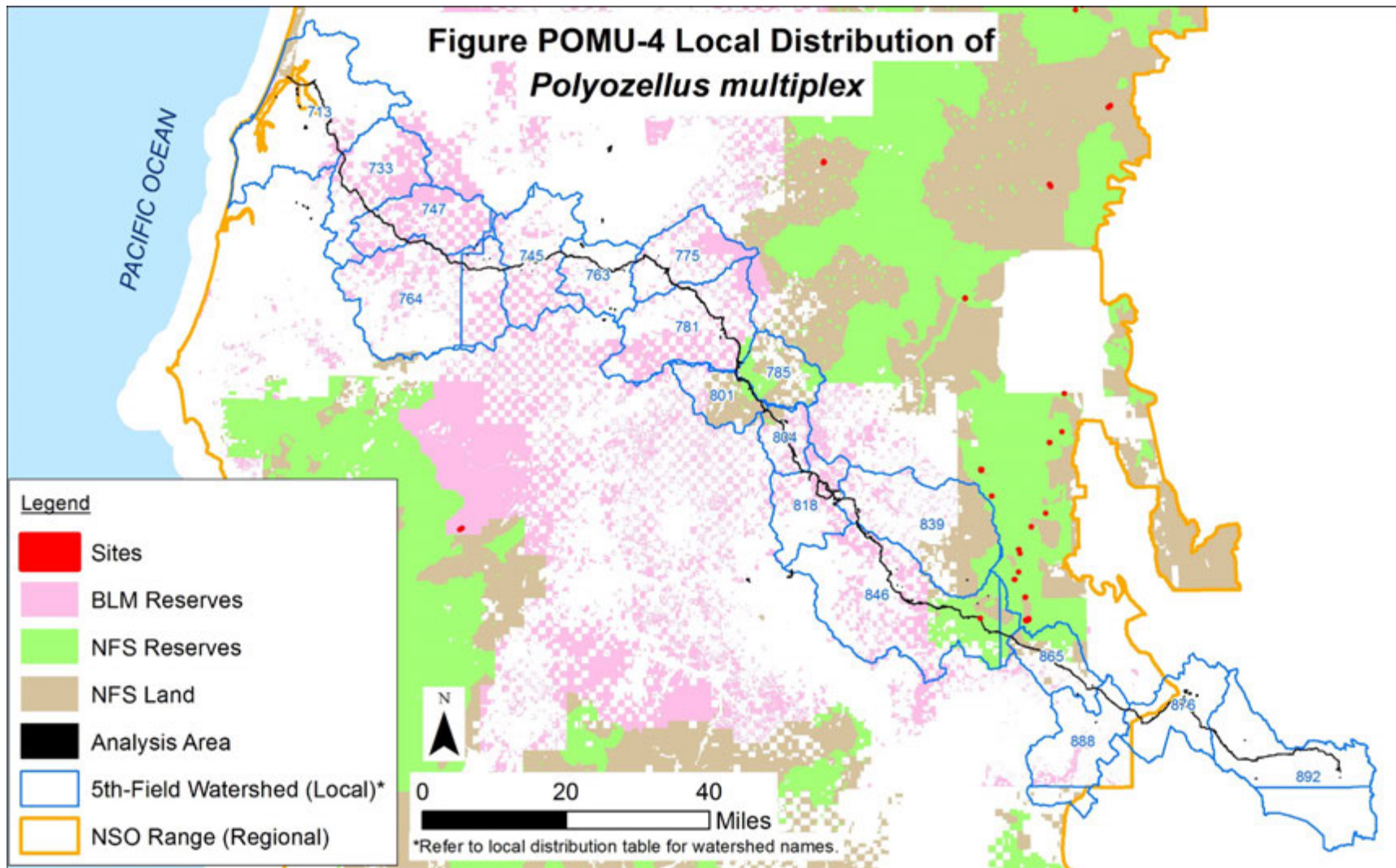
Watershed (HUC5 ID)	Number of Sites	Number of Sites in NFS Reserve Lands	Number of Sites in BLM Reserve Lands
Big Butte Creek (839)	-	-	-
Coos Bay Frontal (713)	-	-	-
East Fork Coquille River (747)	-	-	-
Elk Creek-South Umpqua (785)	-	-	-
Klamath River-John C Boyle Reservoir (888)	-	-	-
Lake Ewauna-Upper 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.



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.

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 806 acres of coniferous forests, including 222 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 427 acres (53 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 806 acres of coniferous forests and 222 acres of LSOG coniferous forests below 6,500 feet msl (a negligible amount of the forests). An estimated 53 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 2001-2003 ASRs 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 <i>Ramaria araiospora</i> 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 <i>Ramaria araiospora</i> 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)	-	-	-
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

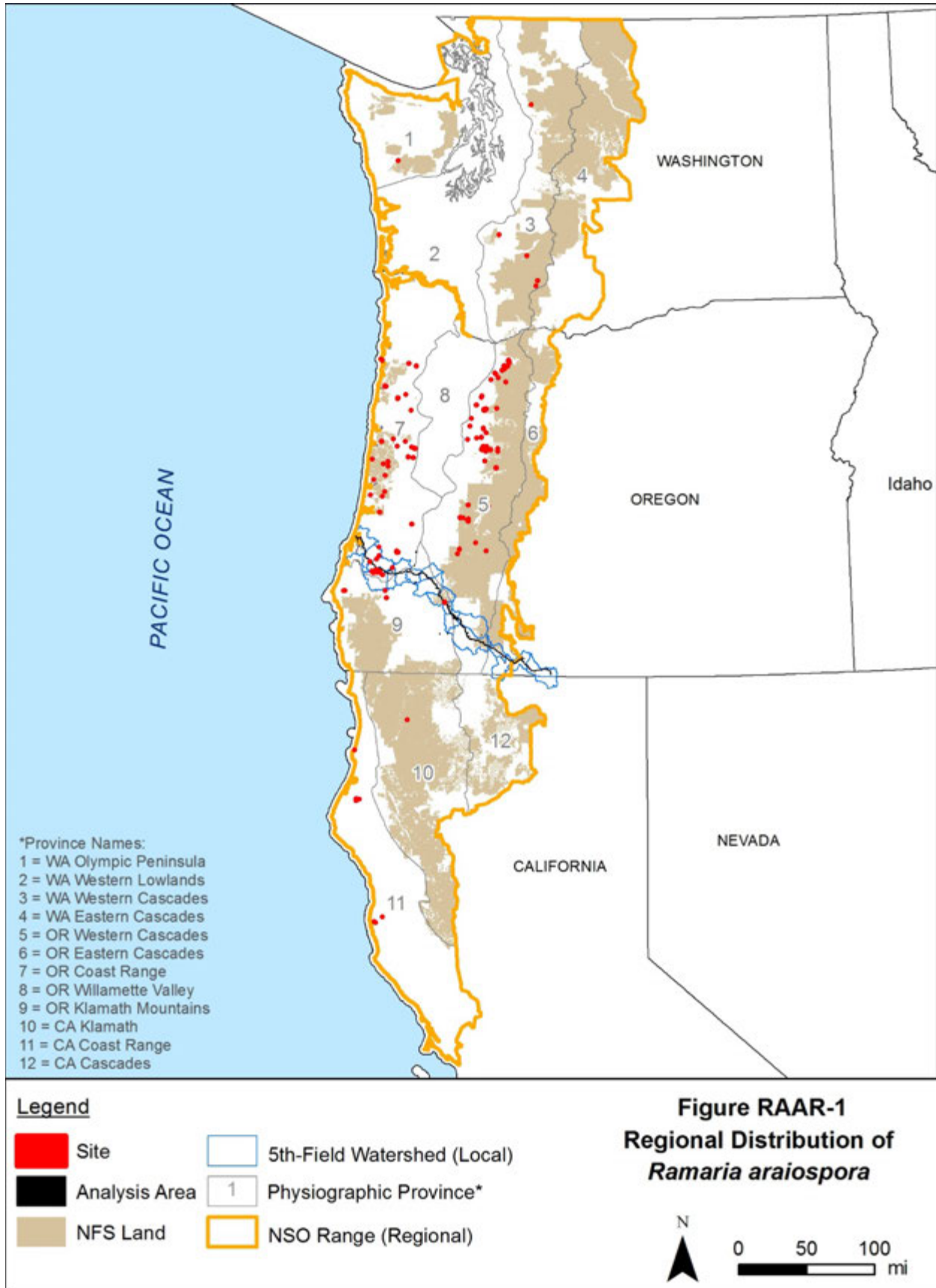
management plan components. Additionally, 39 sites are located entirely in reserve lands managed by BLM, which represents 51 percent of the total number of BLM-managed sites in the region. While the 39 sites in BLM reserves are not covered by the S&M Standards and Guidelines, they likely receive some degree of protection through BLM reserve management.

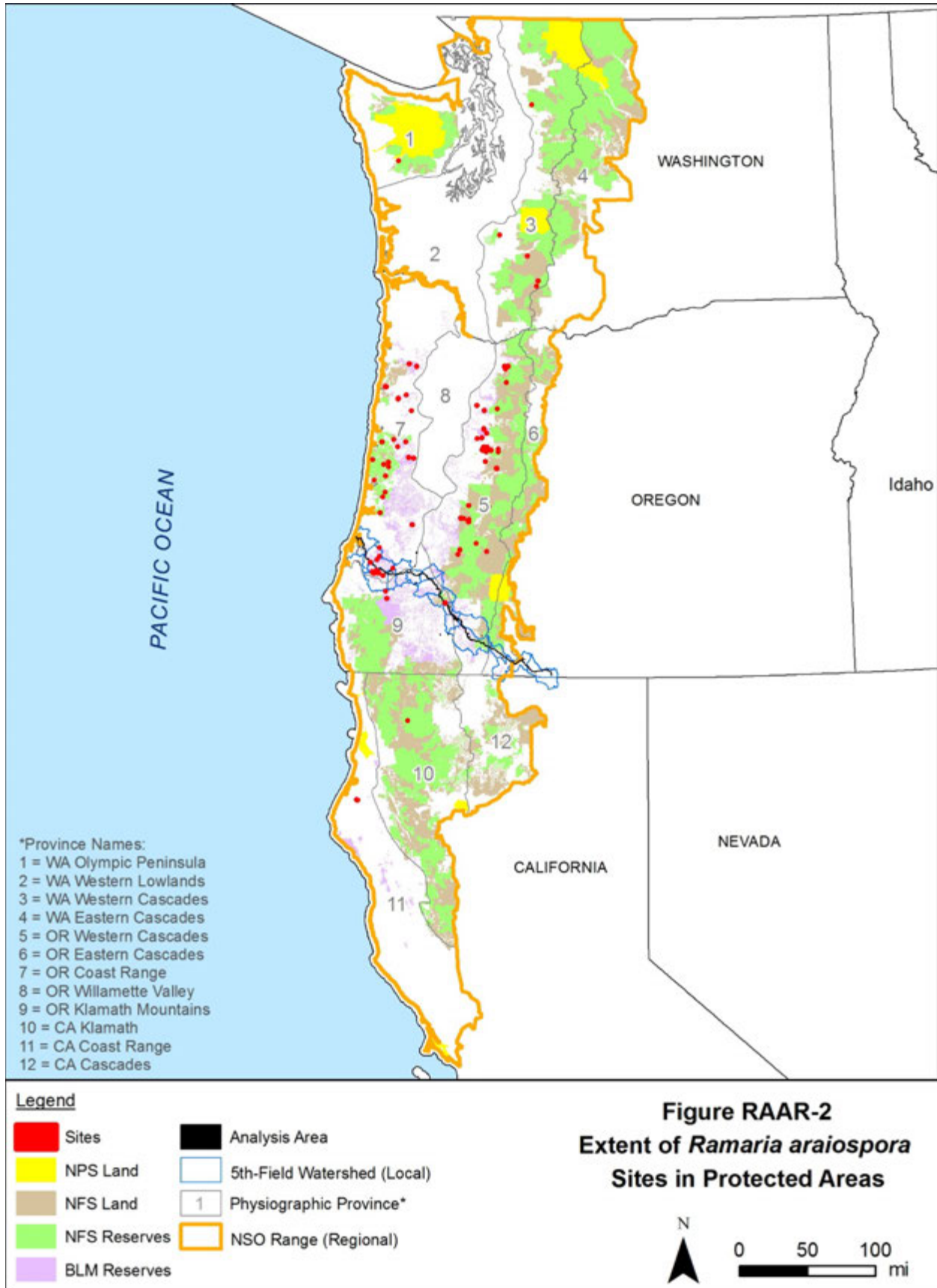
Ramaria araiospora is primarily found in LSOG forests based on available data (142 of 152 total sites are in LSOG), but it is also found in non-LSOG forests and has been found in younger forests near LSOG stands. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous 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.

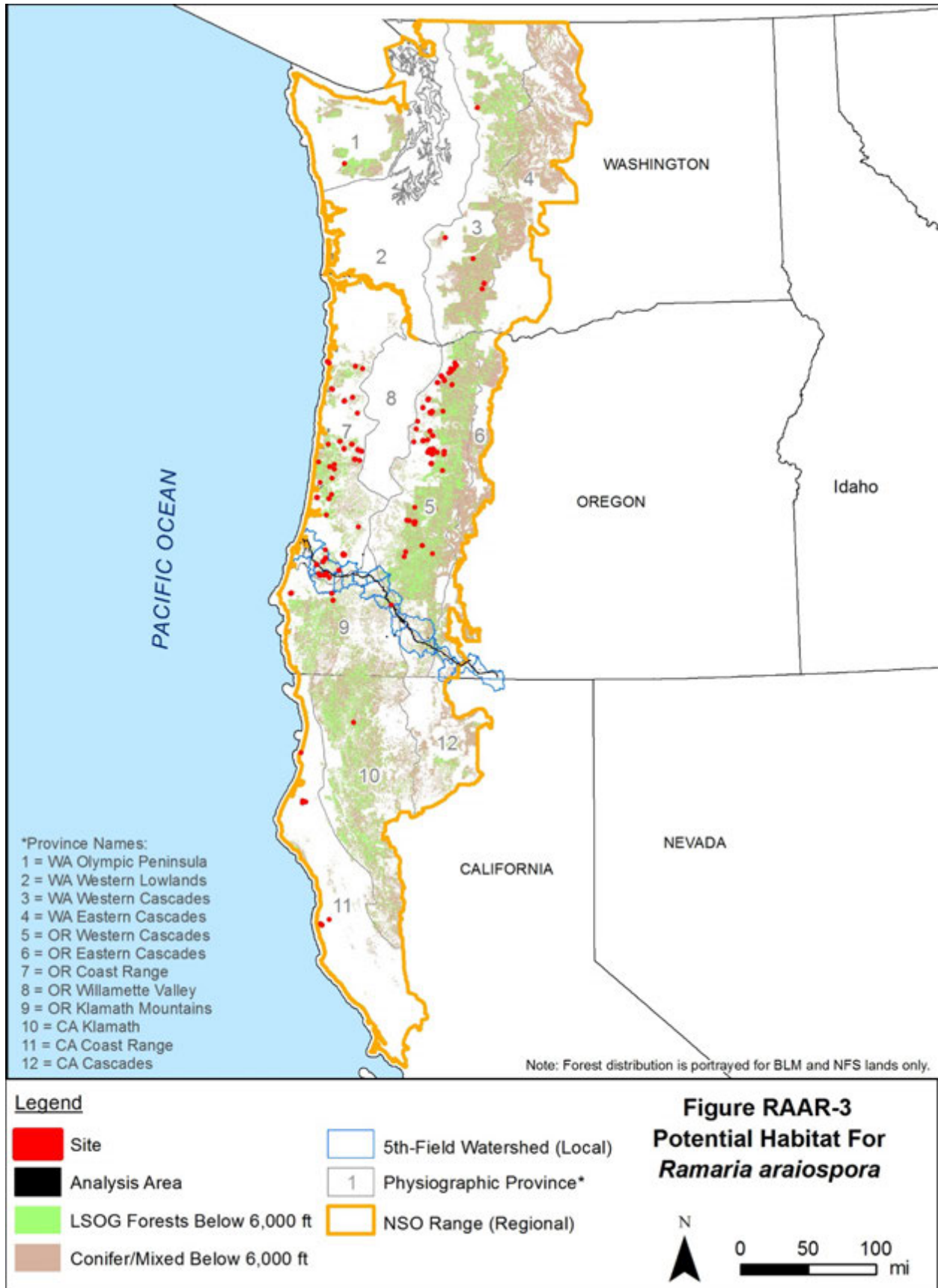
TABLE RAAR-4

Extent of Forests That Could Provide Habitat for <i>Ramaria araiospora</i> 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.







Local Distribution

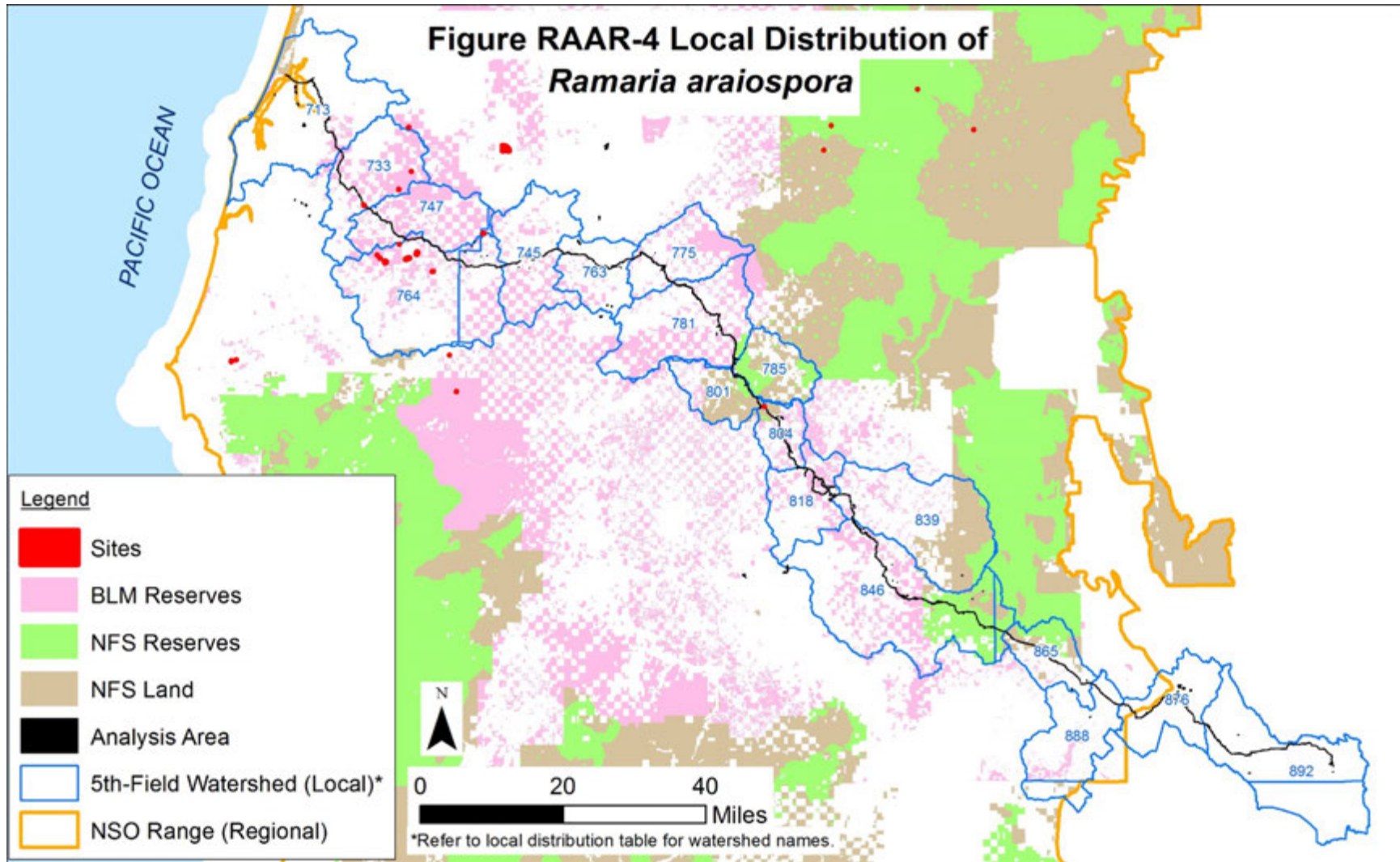
Within the local area, *R. araiospora* is found in four 5th-field watersheds that overlap the project area (see Table RAAR-5 and Figure RAAR-4). Most sites are clustered and near one another in the Middle Fork and North Fork Coquille River, and East Fork Coquille River watersheds in the western portion 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.

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).



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 <i>Ramaria araiospora</i> 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 1,132 acres of coniferous and mixed hardwood-coniferous forests below 6,000 feet msl, including 244 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 244 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 1,132 acres of coniferous and mixed hardwood-coniferous forests and 244 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 2001-2003 ASRs 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 et 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 <i>Ramaria coulterae</i> 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 <i>Ramaria coulterae</i> 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 <i>Ramaria coulterae</i> 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) <u>a/</u>	-	-	-
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.			
<u>a/</u> 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.

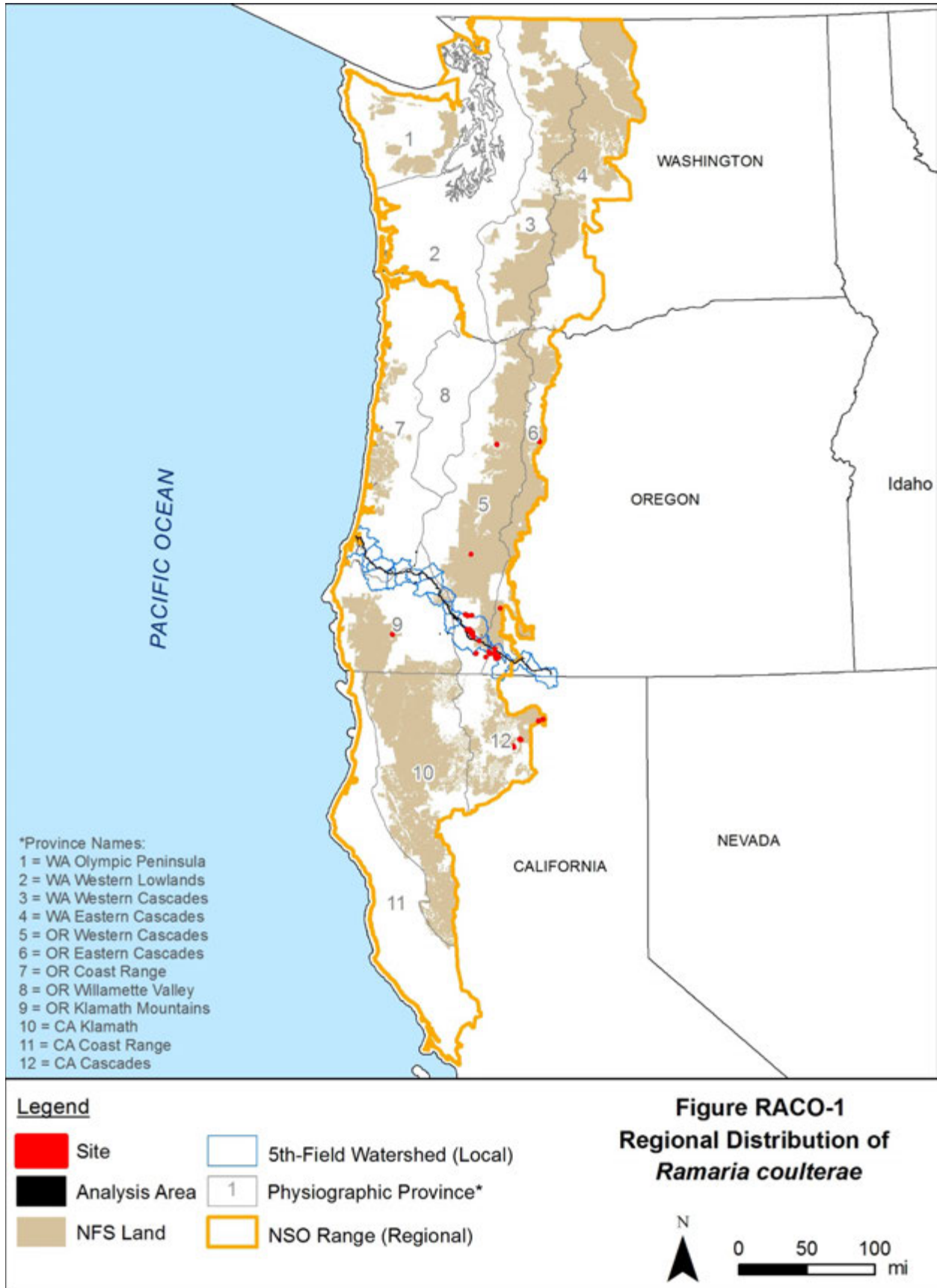
Across the NSO range, six sites are located entirely in reserve lands managed by the Forest Service, all of which are located in LSRs (See Figure RACO-2). These sites represent 32 percent of the total NFS-managed sites in the region. The remaining NFS sites on other land allocations receive some level 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.

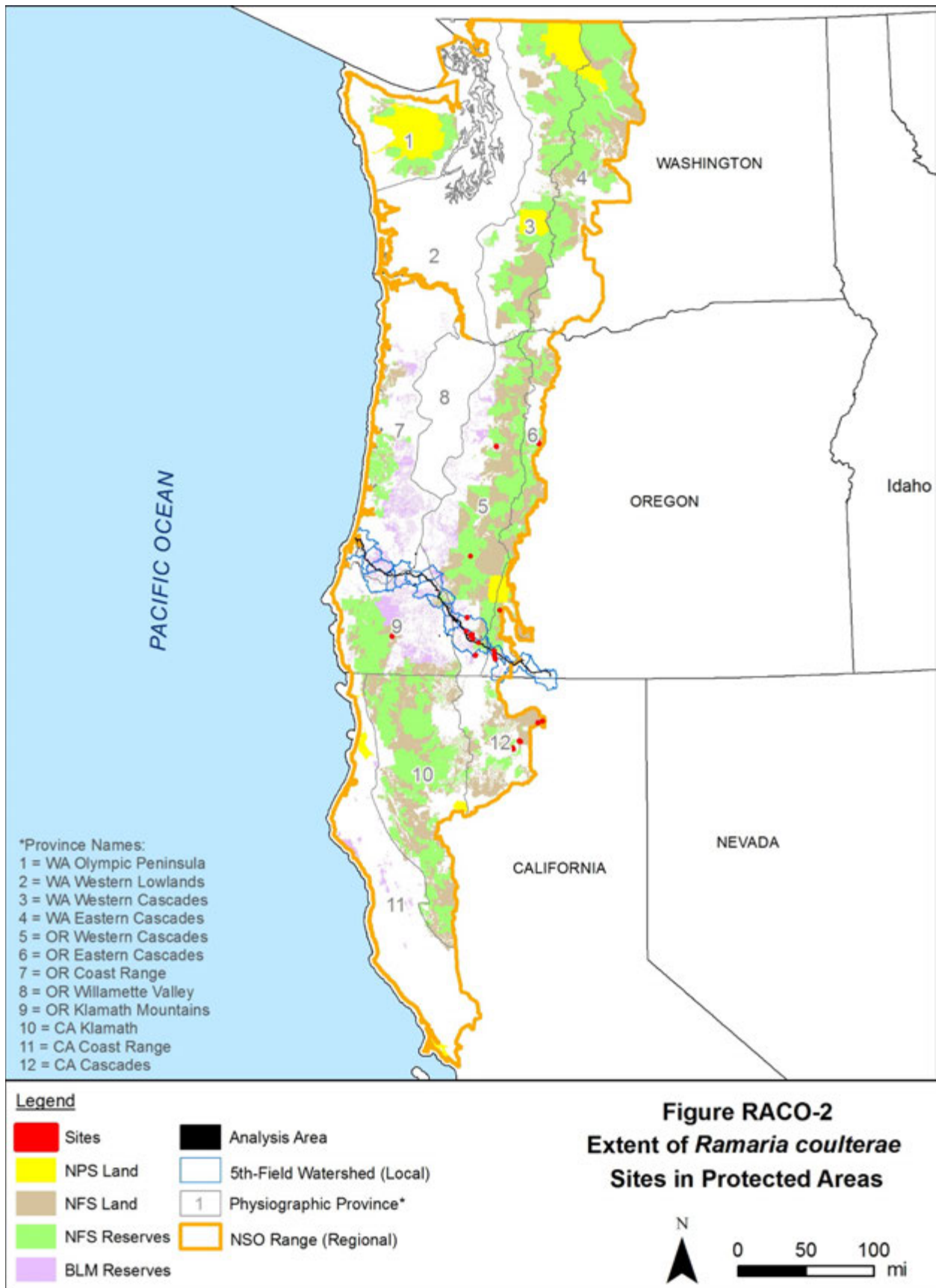
Ramaria coulterae is primarily found in LSOG forests based on available data (56 of 67 total sites are in LSOG). Based on current site locations, the species is found in coniferous forests above 3,000 feet msl throughout most of the NSO range. Due to the extent of known sites, the amount of potential 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.

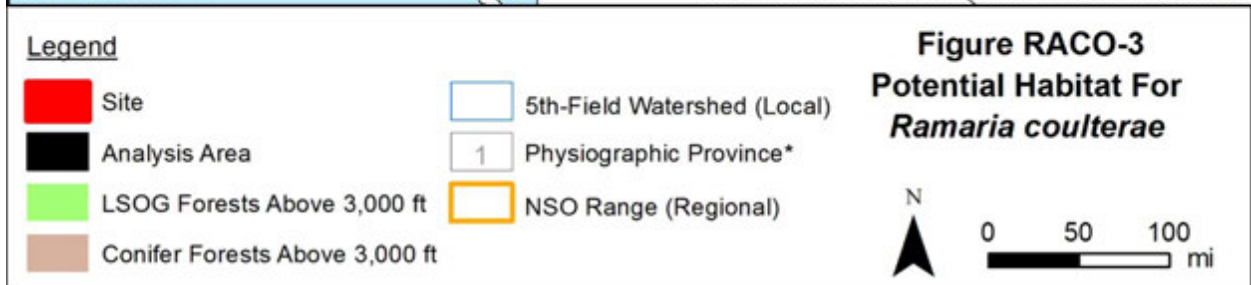
TABLE RACO-4

Extent of Forests That Could Provide Habitat for <i>Ramaria coulterae</i> 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.







Local Distribution

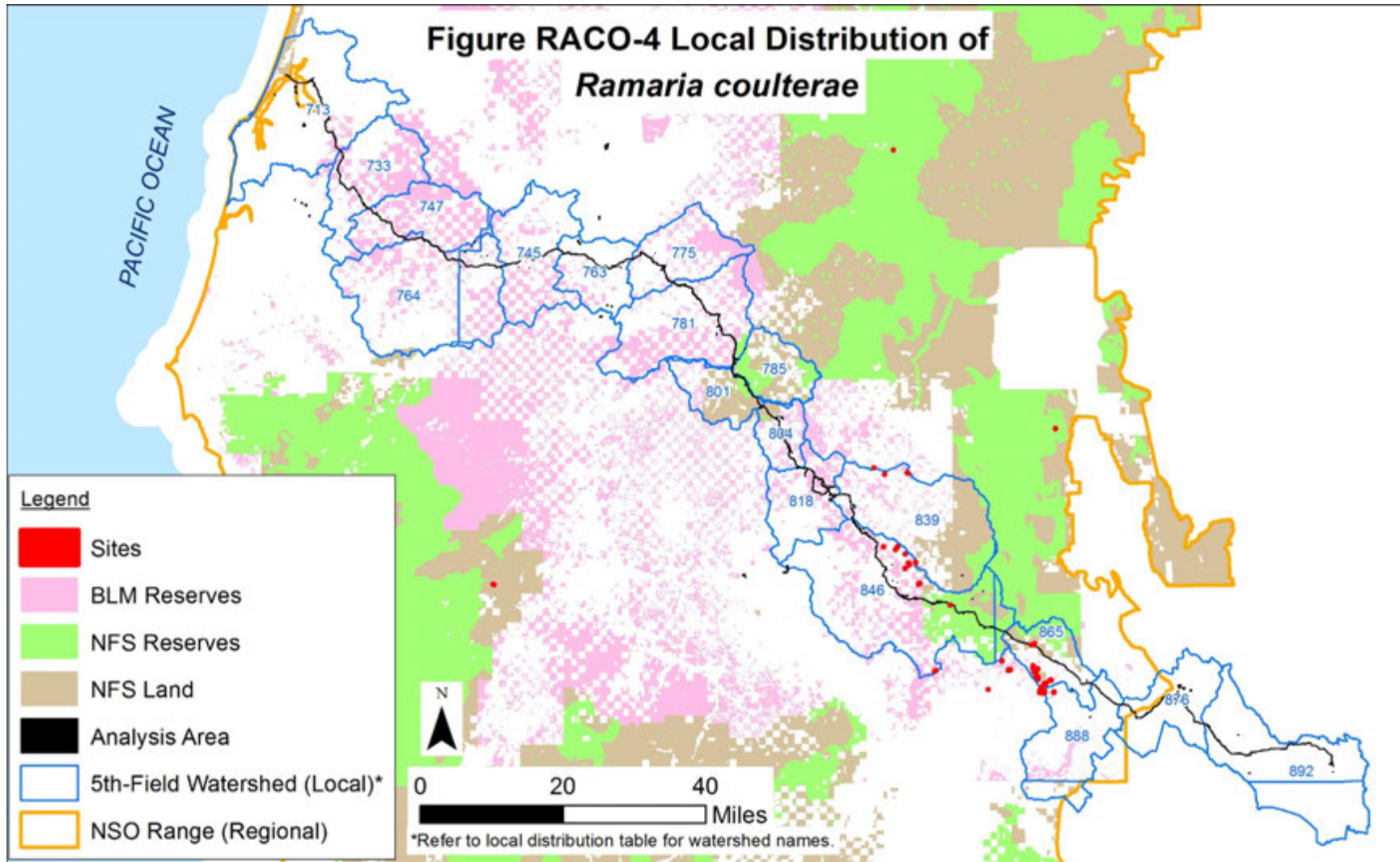
Within the local area, *R. coulterae* is distributed across four 5th-field watersheds that overlap the project area (see Figure RACO-4 and Table RACO-5.) Most sites are clustered in the Little Butte Creek and Spencer Creek watersheds, with the population in the Spencer Creek watershed crossing the boundary 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).

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.



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 <i>Ramaria coulterae</i> 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.			

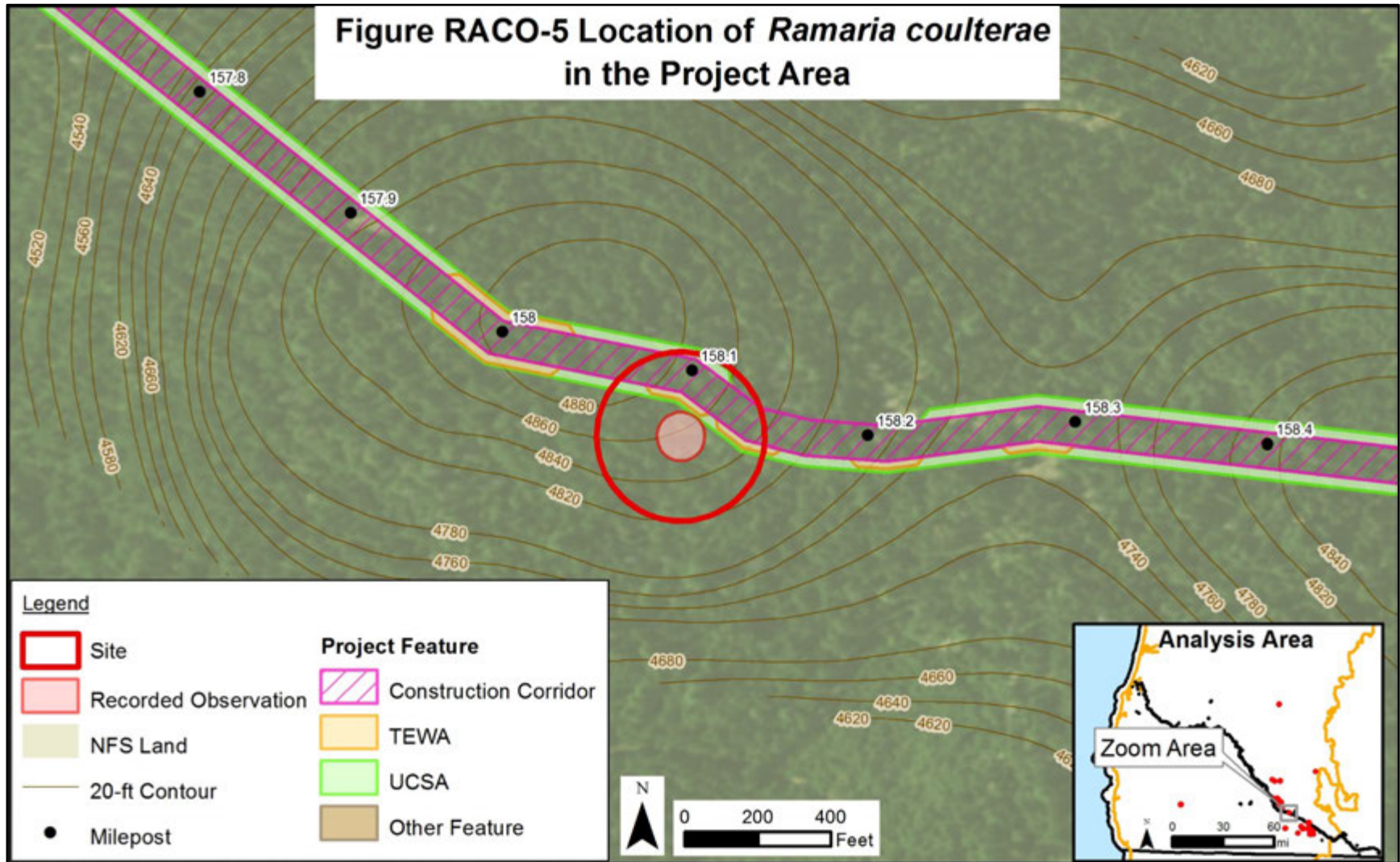
The PCGP Project would result in ground disturbance and vegetation removal in three sites in the analysis area (Table RACO-7). The only recorded observation of the species in two of these sites (MP 158.1 and MP 172.2) would likely be removed by construction within the corridor (see Figures RACO-5 and 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.

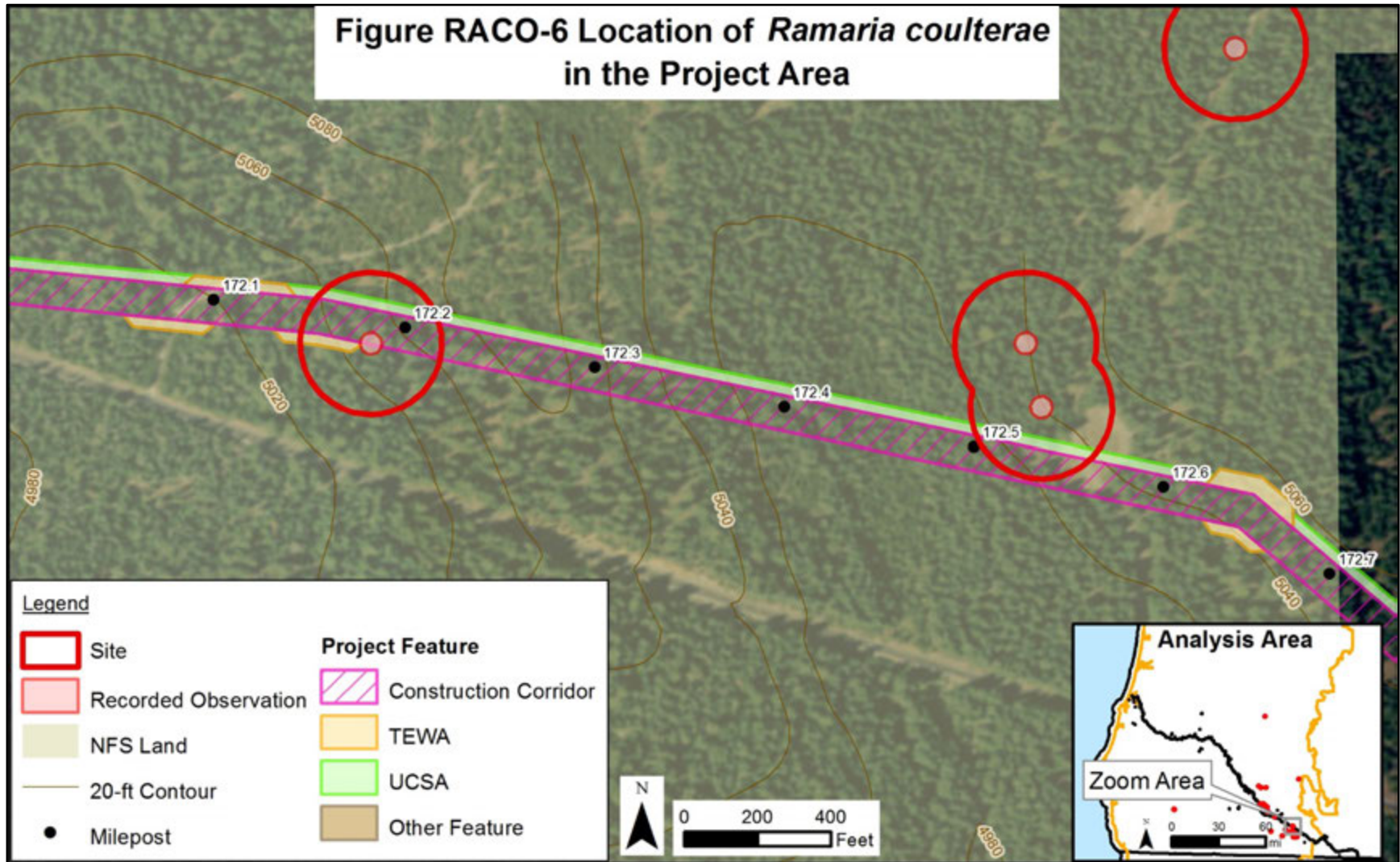
Site Location	Source of Impacts	Area of Disturbance	Individuals Likely to Persist?
MP 158.1	Corridor	0.9 ac	No
	TEWA	0.1 ac	
	UCSA	0.3 ac	
MP 172.2	Corridor	0.8 ac	No
	TEWA	0.1 ac	
	UCSA	0.2 ac	
MP 172.5	Corridor	0.4 ac	Yes
	UCSA	0.2 ac	

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).





Across the project area, the PCGP Project would remove an estimated 471 acres of coniferous forests above 3,000 feet msl, including 139 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 257 acres (55 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 471 acres of coniferous forests and 139 acres of LSOG coniferous forests above 3,000 feet msl (a negligible amount of the forests). An estimated 55 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 2001-2003 ASRs 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.

Number of <i>Ramaria rubrievanescens</i> Sites (2017)	
Location*	Number of Sites
Regional Area	143
Local Area	8
Analysis Area (Project Area)	2 (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.

Distribution of <i>Ramaria rubrievanescens</i> 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)	-	-	-
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

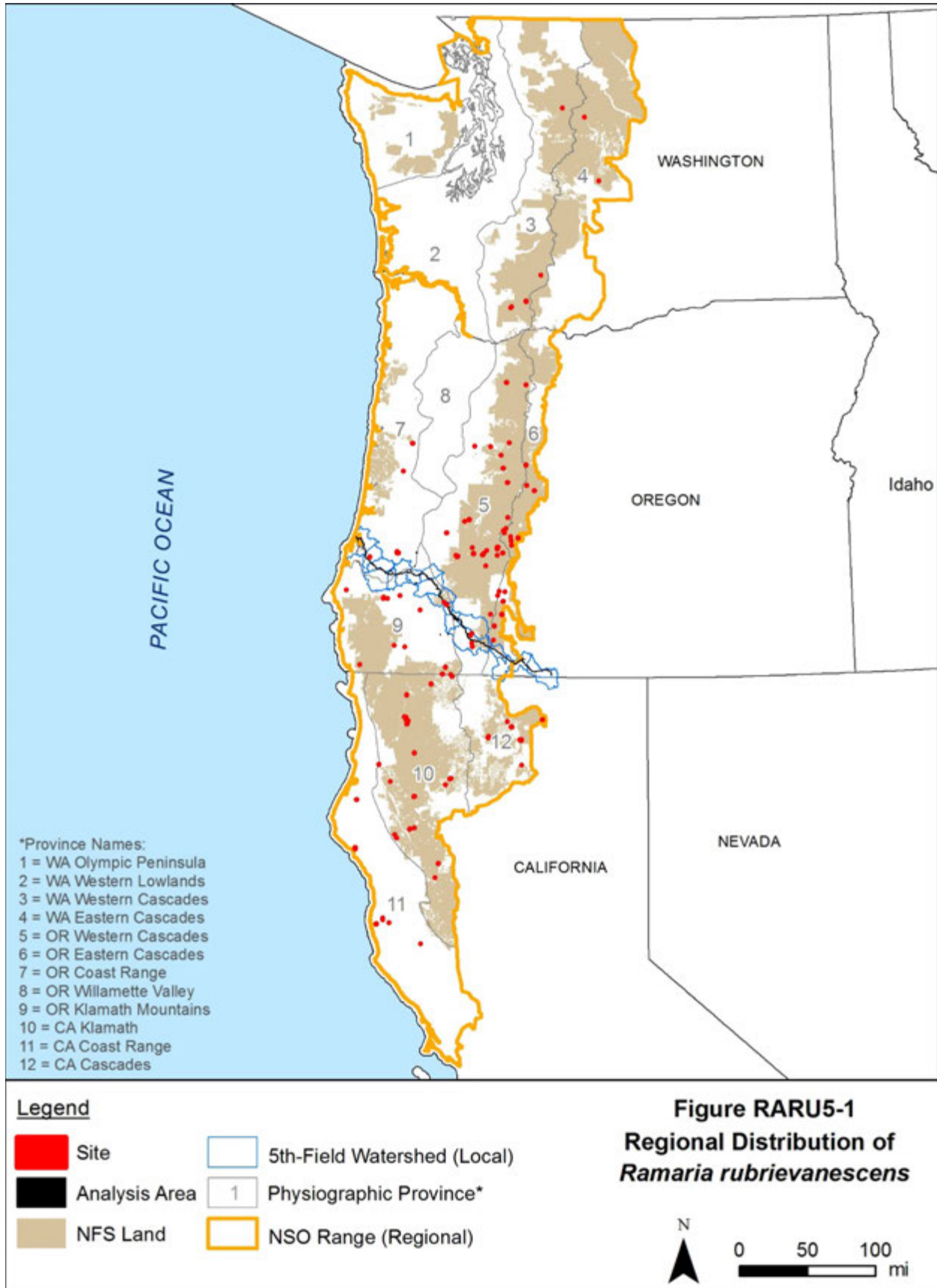
level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 25 sites are located entirely in BLM reserve lands, which represents 83 percent of the total number of BLM-managed sites in the region. While the 25 sites in BLM reserves and the four 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.

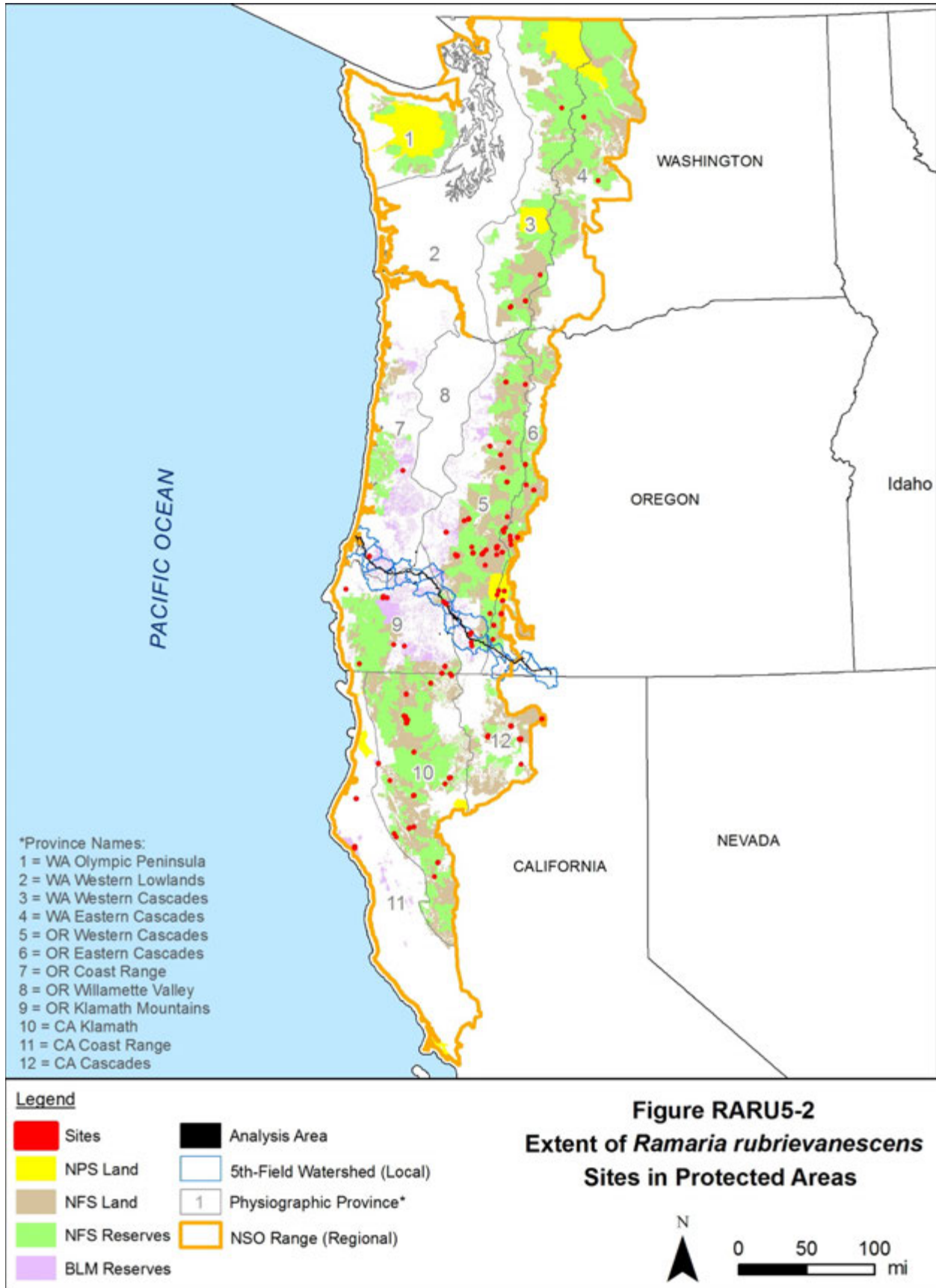
Ramaria rubrievanescens is more common in LSOG forests based on available data (114 of 143 total sites are in LSOG), but it is also somewhat common in non-LSOG forests and has been found in urban parks and younger forests near LSOG stands. Based on current site locations, the species is found in coniferous 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.

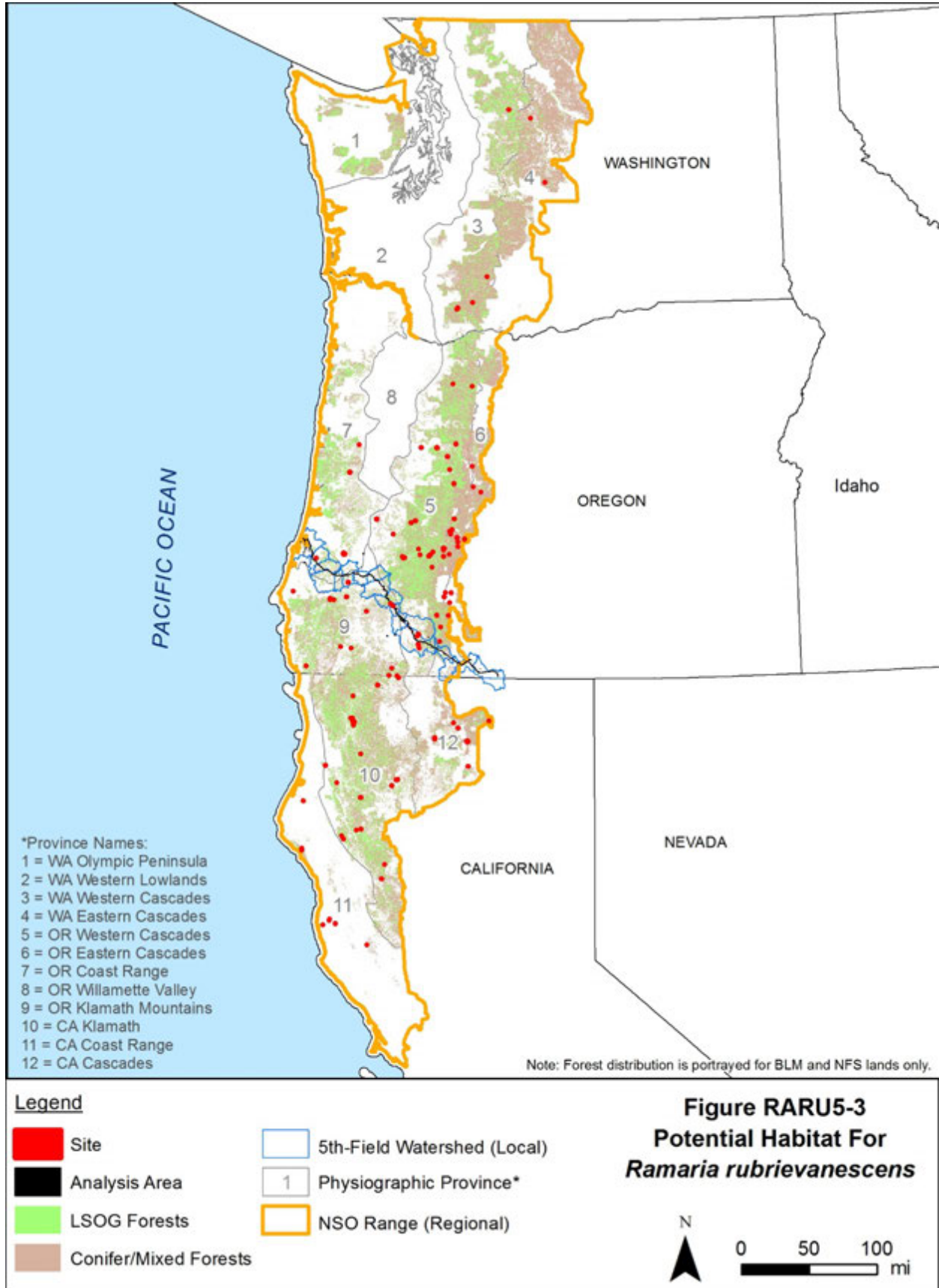
TABLE RARU5-4

Extent of Forests That Could Provide Habitat for <i>Ramaria rubrievanescens</i> 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.







Local Distribution

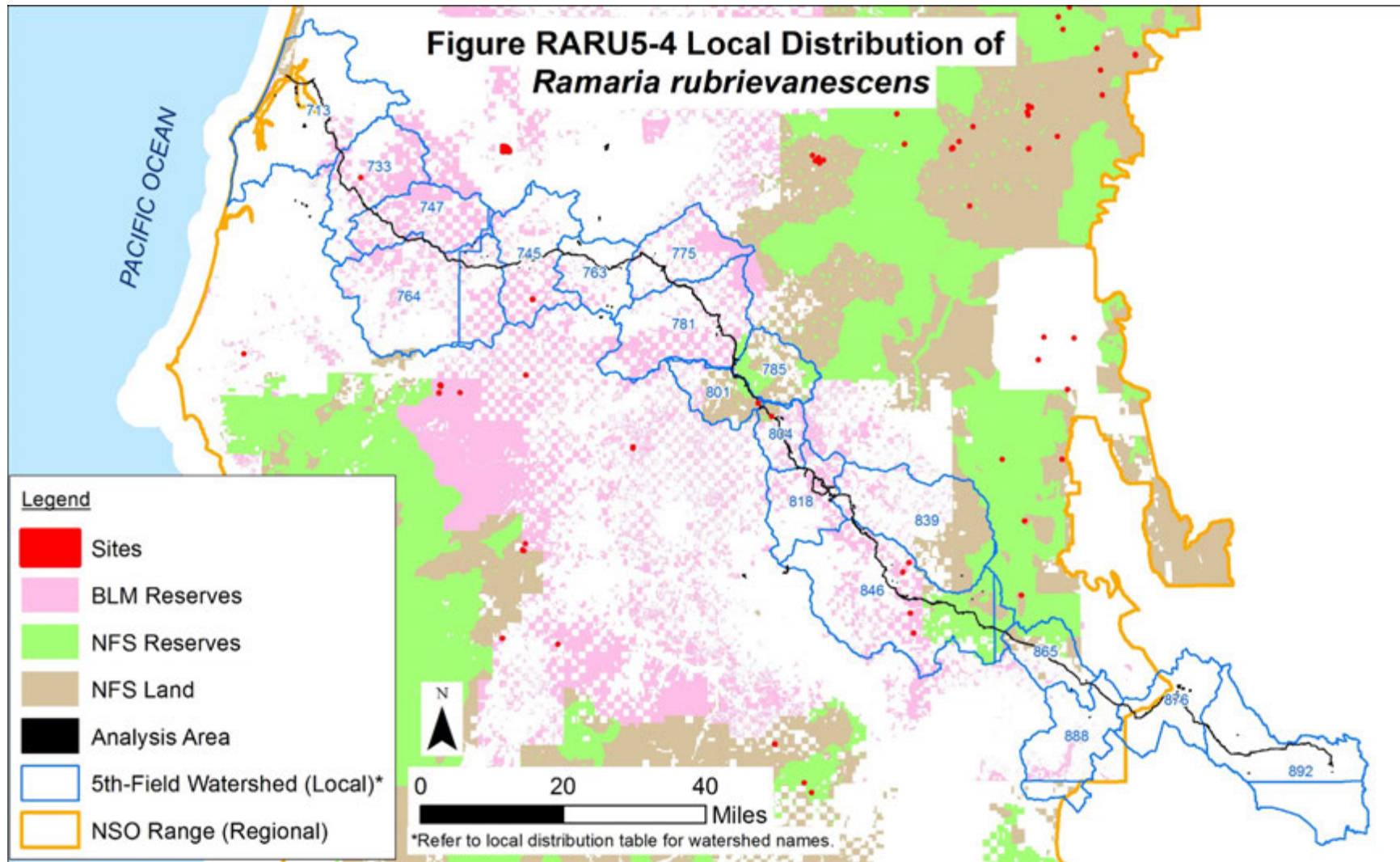
Within the local area, *R. rubrievanescens* is distributed across five 5th-field watersheds that overlap the project area (see Table RARU5-5 and Figure RARU5-4). The sites appear somewhat scattered across the watersheds, with sites in three general groups (Little Butte Creek, Trail Creek/Upper Cow Creek/Elk 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.

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).



Analysis/Project Area Distribution

The analysis area contains two sites of *R. rubrievanescens*, both of which are on NFS lands (Umpqua National Forest) on lands designated as Other (Matrix). The project area only contains one site. 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 two sites in the analysis area, located 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 0.8 acres within the sites (about 8 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 0.7 acre of vegetation and soil within one site and could result in the removal of *R. rubrievanescens* 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 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 <i>Ramaria rubrievanescens</i> 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)	-	-
Uncleared Storage Area (UCSA)	1	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 1,128 acres of coniferous and mixed hardwood-coniferous forests, including 241 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 Reserved 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 1,128 acres of coniferous and mixed hardwood-coniferous forests and 241 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 2001-2003 ASRs 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.

Appendix F.5. Survey and Manage Species Persistence Evaluation

TABLE RARU6-1	
Number of <i>Ramaria rubripermanens</i> Sites (2017)	
Location*	Number of Sites
Regional Area	231
Local Area	70
Analysis Area (Project Area)	8 (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 RARU6-2			
Distribution of <i>Ramaria rubripermanens</i> 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 <i>Ramaria rubripermanens</i> 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.

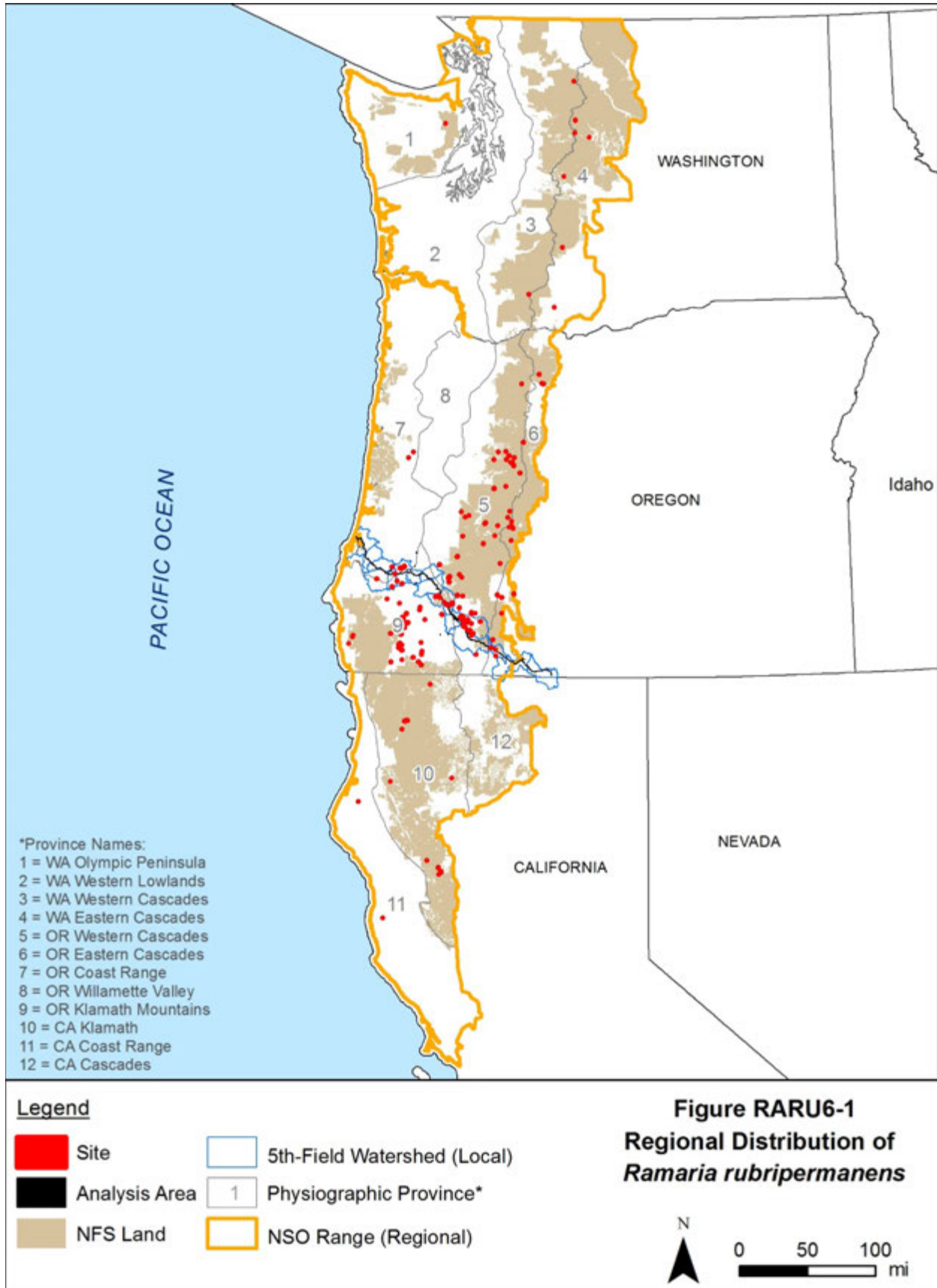
Across the NSO range, 35 sites are at least partially located in reserve lands managed by the Forest Service, including 19 in LSRs, three in Known Owl Activity Centers, and 13 in Congressionally Reserved areas. This represents 34 percent of the total NFS-managed sites in the region. The remaining NFS 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.

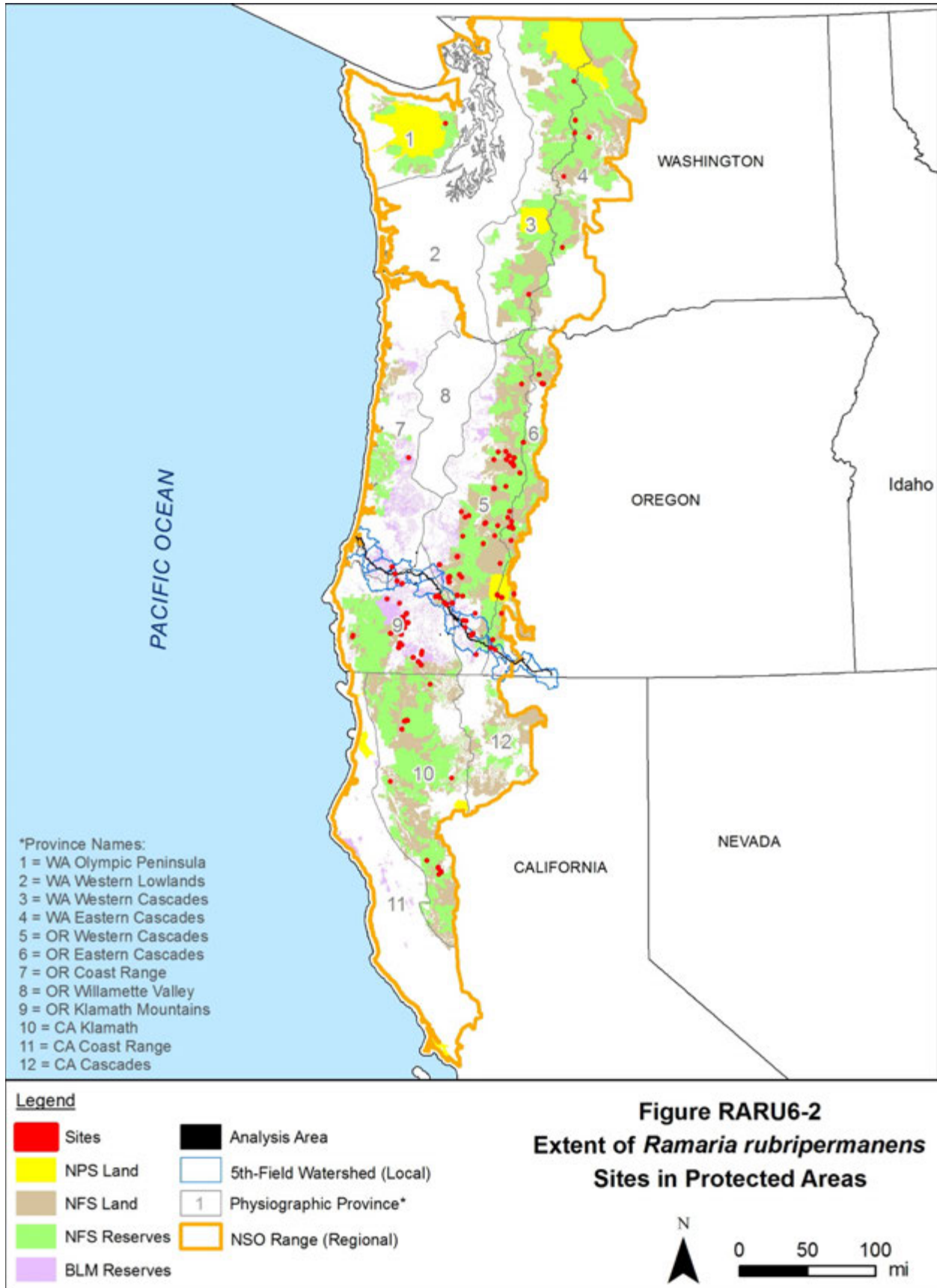
Ramaria rubripermanens is more common in LSOG forests based on available data (181 of 231 total sites are in LSOG), but it is also somewhat common in non-LSOG forests and has been found in urban parks and younger forests near LSOG stands. Based on current site locations, the species is found in coniferous 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.

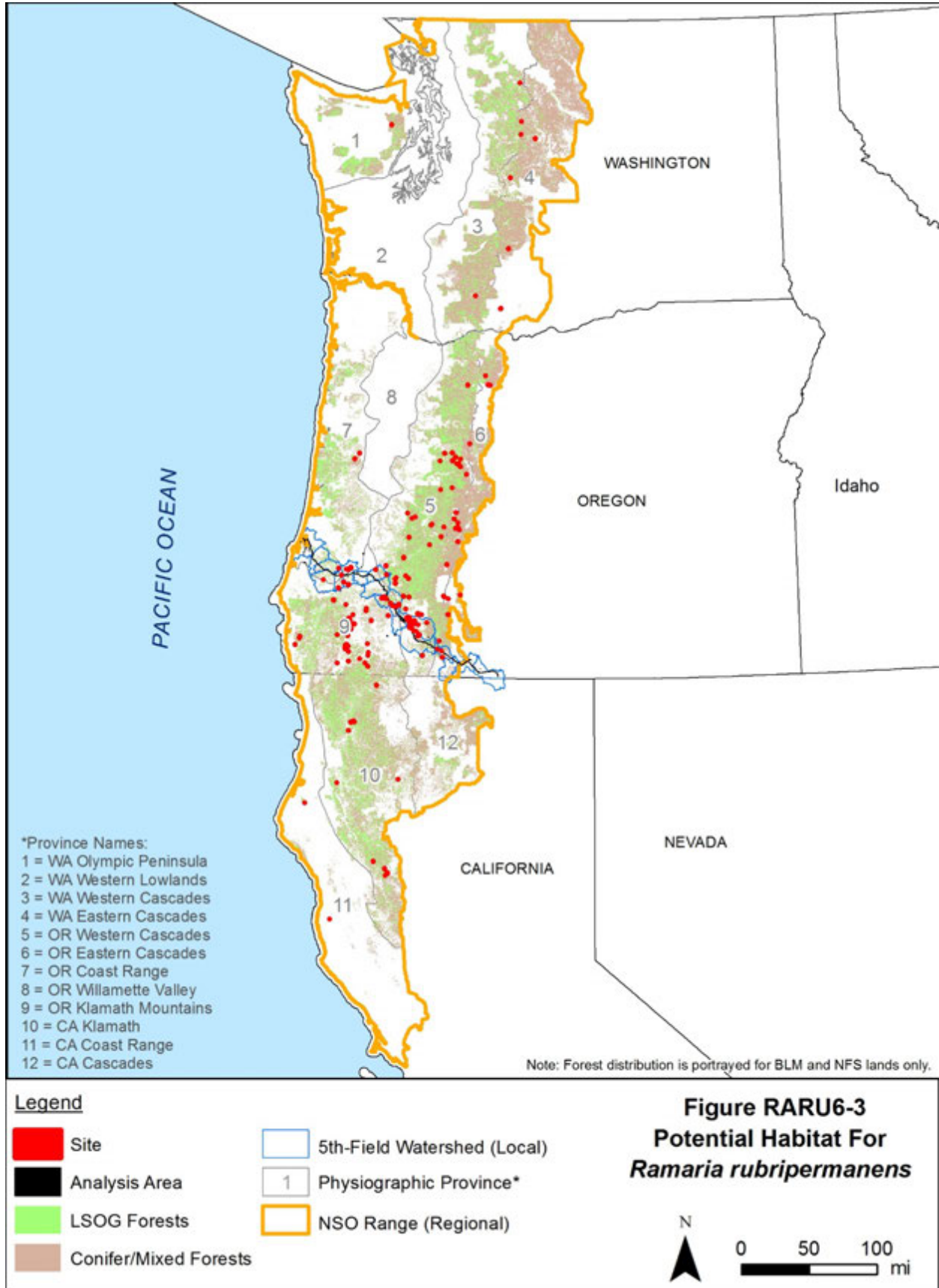
TABLE RARU6-4

Extent of Forests That Could Provide Habitat for <i>Ramaria rubripermanes</i> 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.







Local Distribution

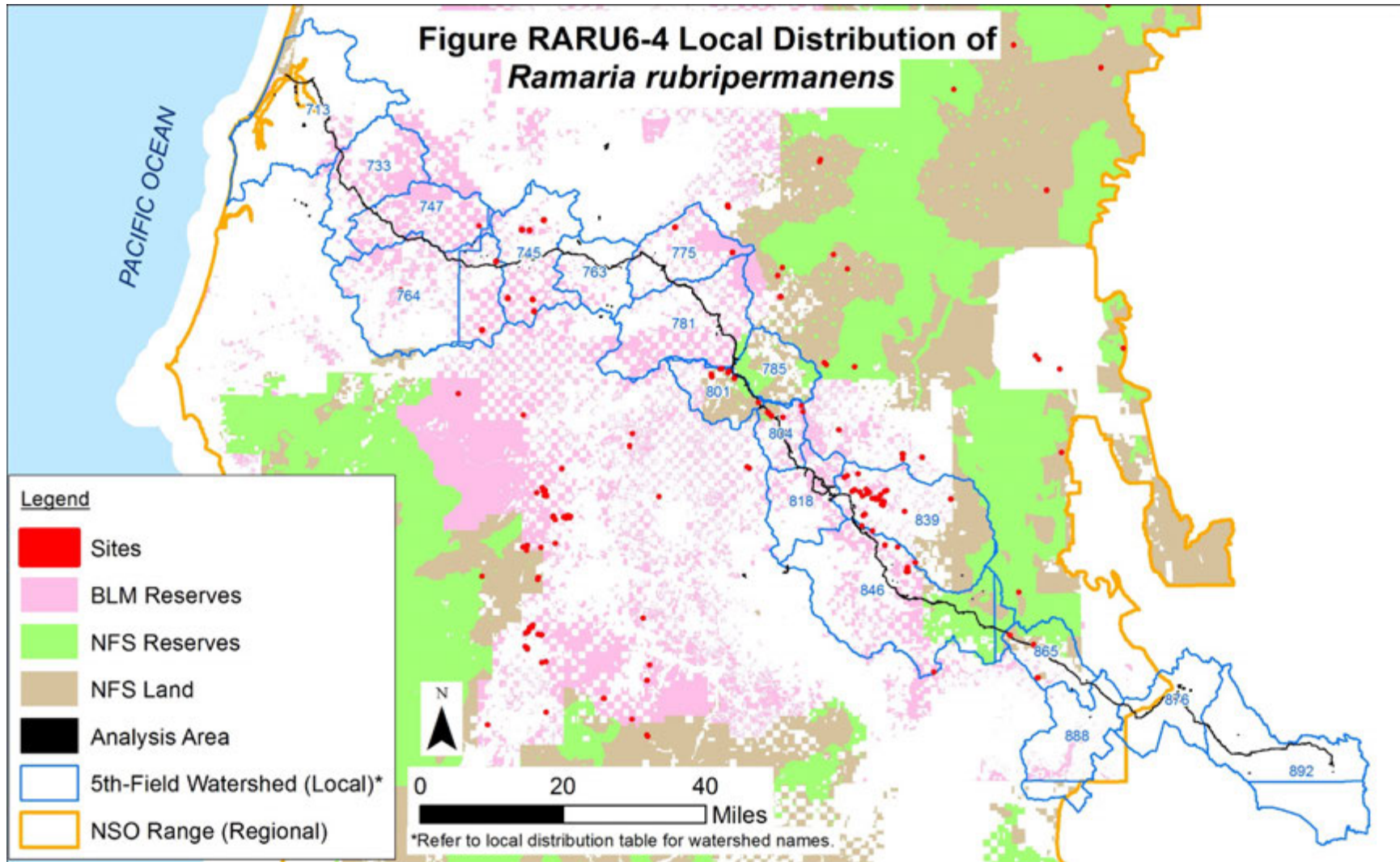
Within the local area, *R. rubripermanens* is distributed across eleven 5th-field watersheds that overlap the project area (see Figure RARU6-4 and Table RARU6-5.) Most of the sites appear clustered and near one another in the Cascade Range and eastern Klamath Mountains, whereas sites in the Coast Range 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.

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 <u>a/</u>	-	-
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).



Analysis/Project Area Distribution

The analysis area contains eight sites of *R. rubripermanens*, and the project area contains five 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 5.9 acres within five of the sites (about 25 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 <i>Ramaria rubripermanens</i> Sites on NFS Lands in the Project Area		
Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	5	4.5 ac
Temporary Extra Work Area (TEWA)	2	0.3 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 4.5 acres of vegetation and soil within five sites and could result in the removal of *R. rubripermanens* populations or individuals. Disturbance in the TEWAs would result in similar

impacts on about 0.3 acre within two 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 1,128 acres of coniferous and mixed hardwood-coniferous forests, including 241 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 1,128 acres of coniferous and mixed hardwood-coniferous forests and 241 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 2001-2003 ASRs 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 <i>Rhizopogon truncatus</i> 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.	

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.

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.

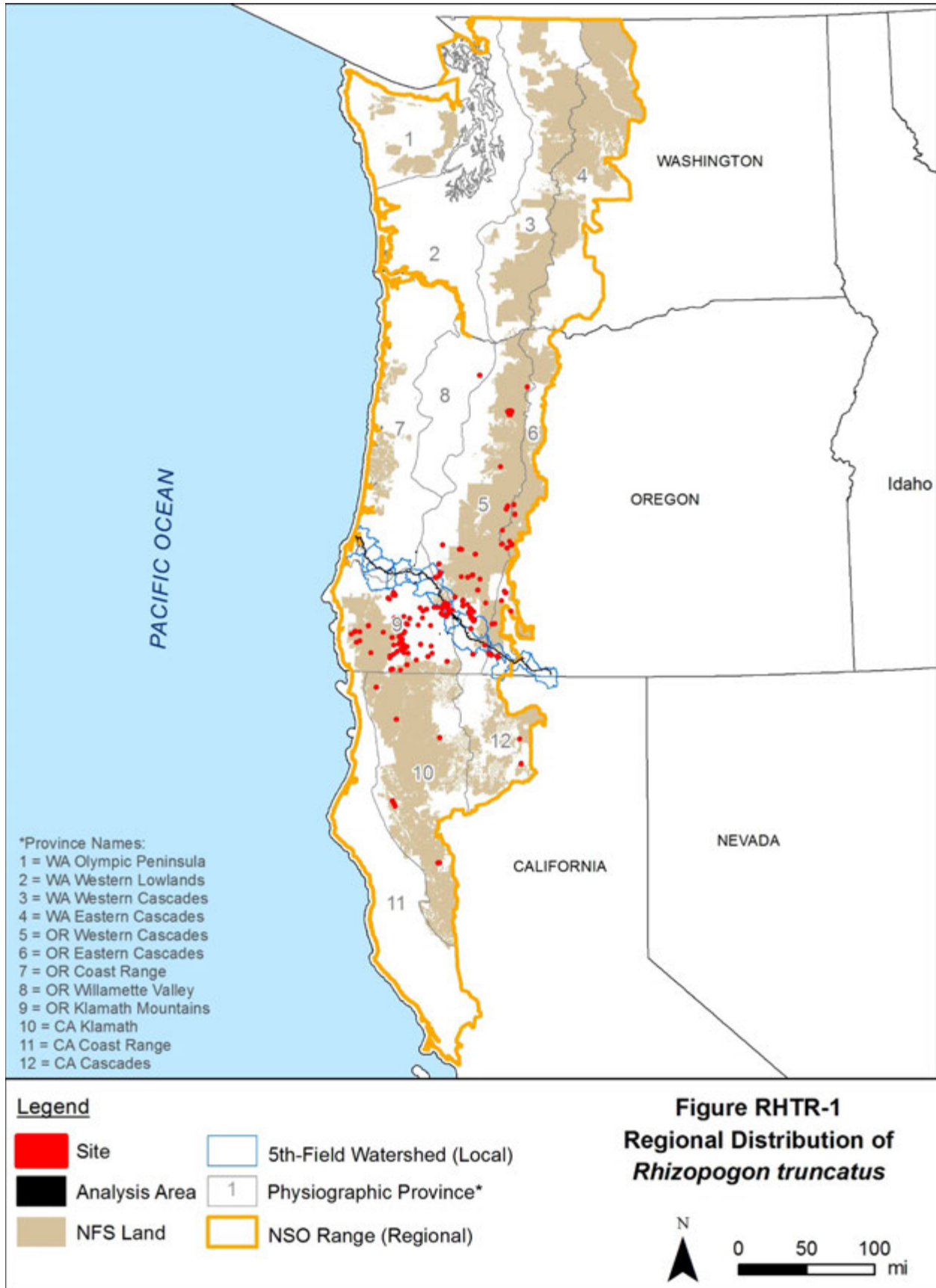
Regional Distribution

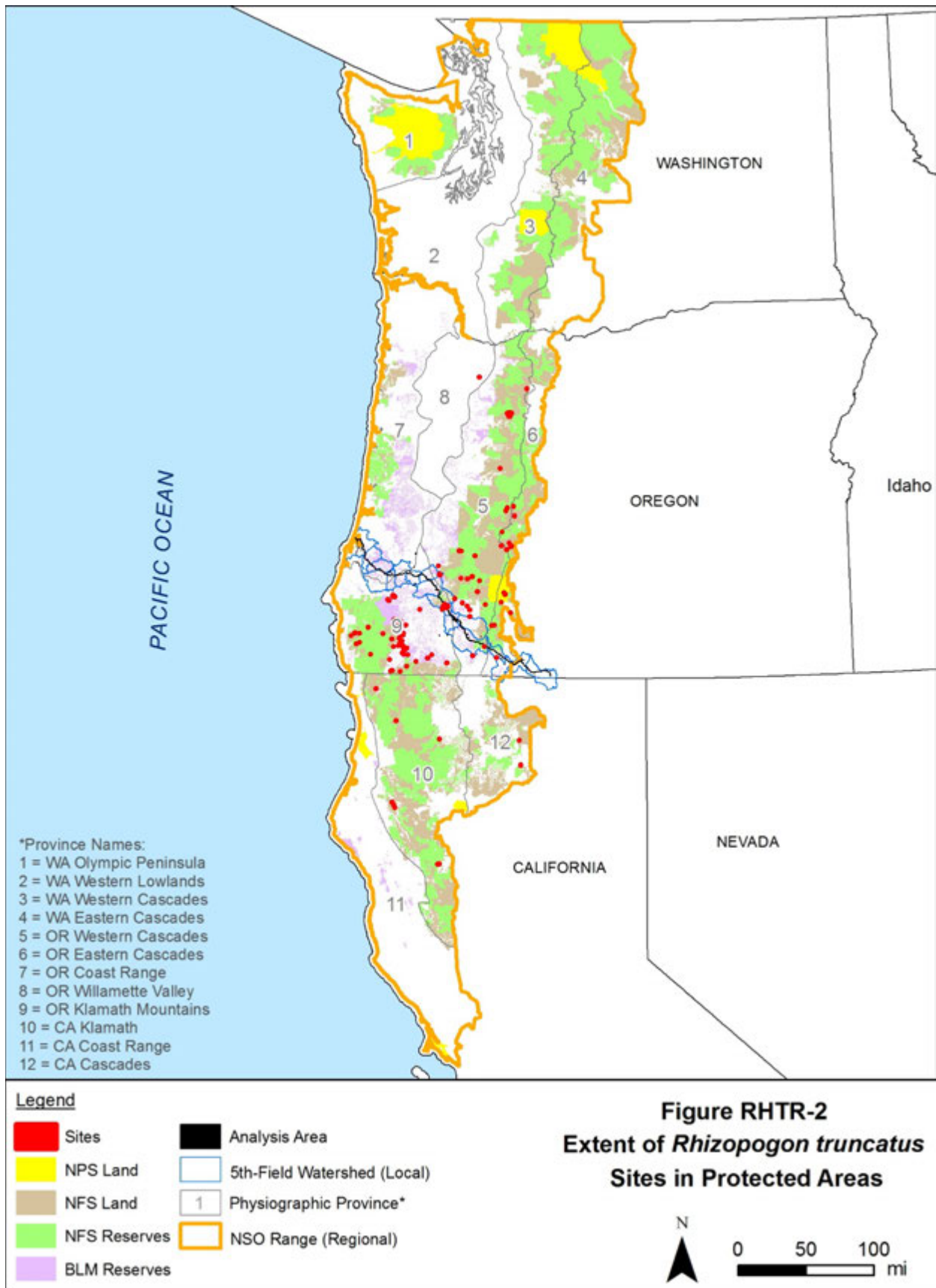
Rhizopogon truncatus has a somewhat wide distribution across six physiographic provinces in Oregon (Willamette Valley, Cascades East and West, and Klamath Mountain) and California (Cascades, Klamath). Most sites are found in the Klamath Mountains, where the sites tend to be clustered or relatively close 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.

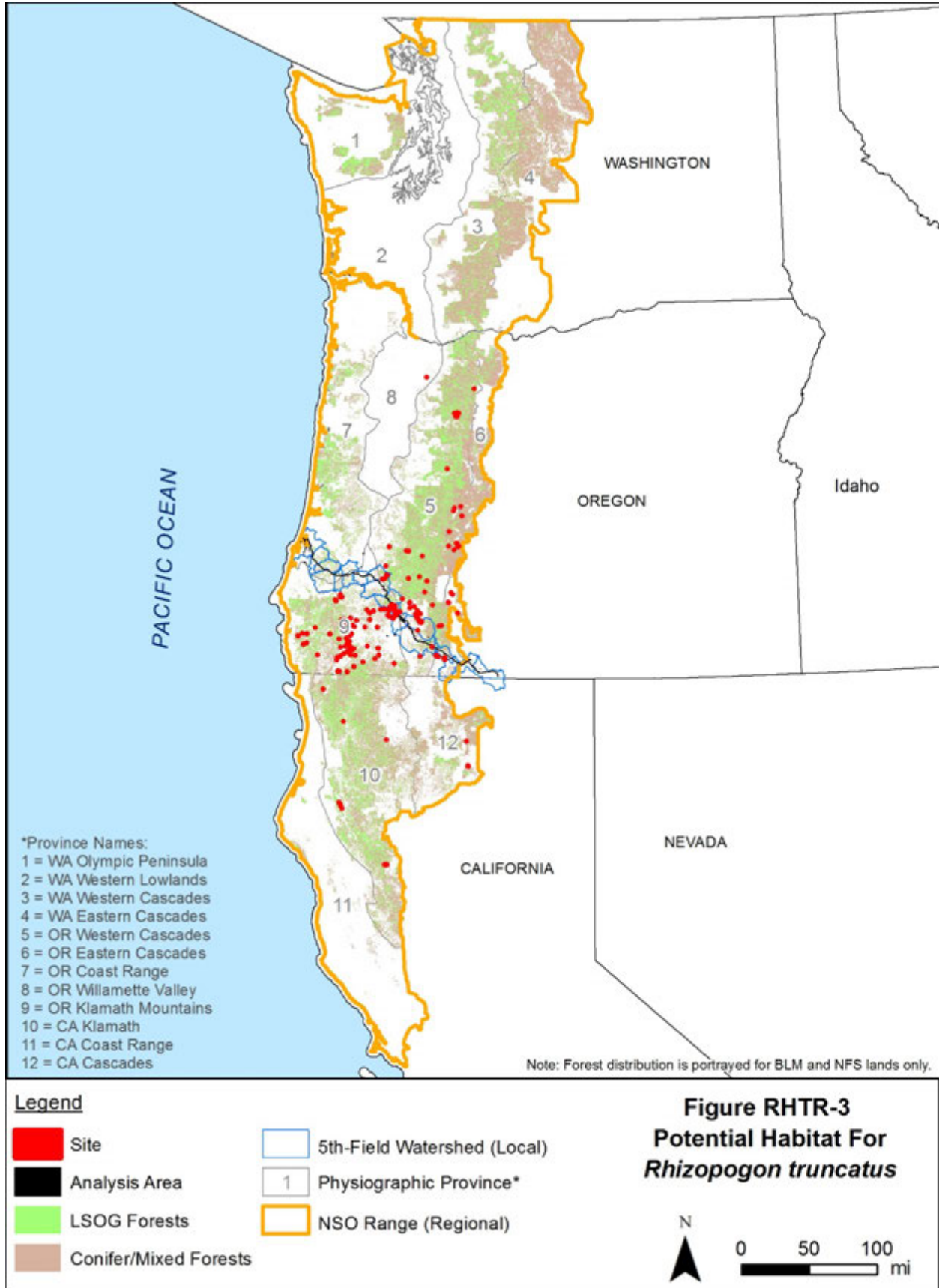
Forty-one of 210 known sites are at least partially located on private or state lands; three sites are on NPS lands (Crater Lake National Park); 131 sites are at least partially located on BLM lands;

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.

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

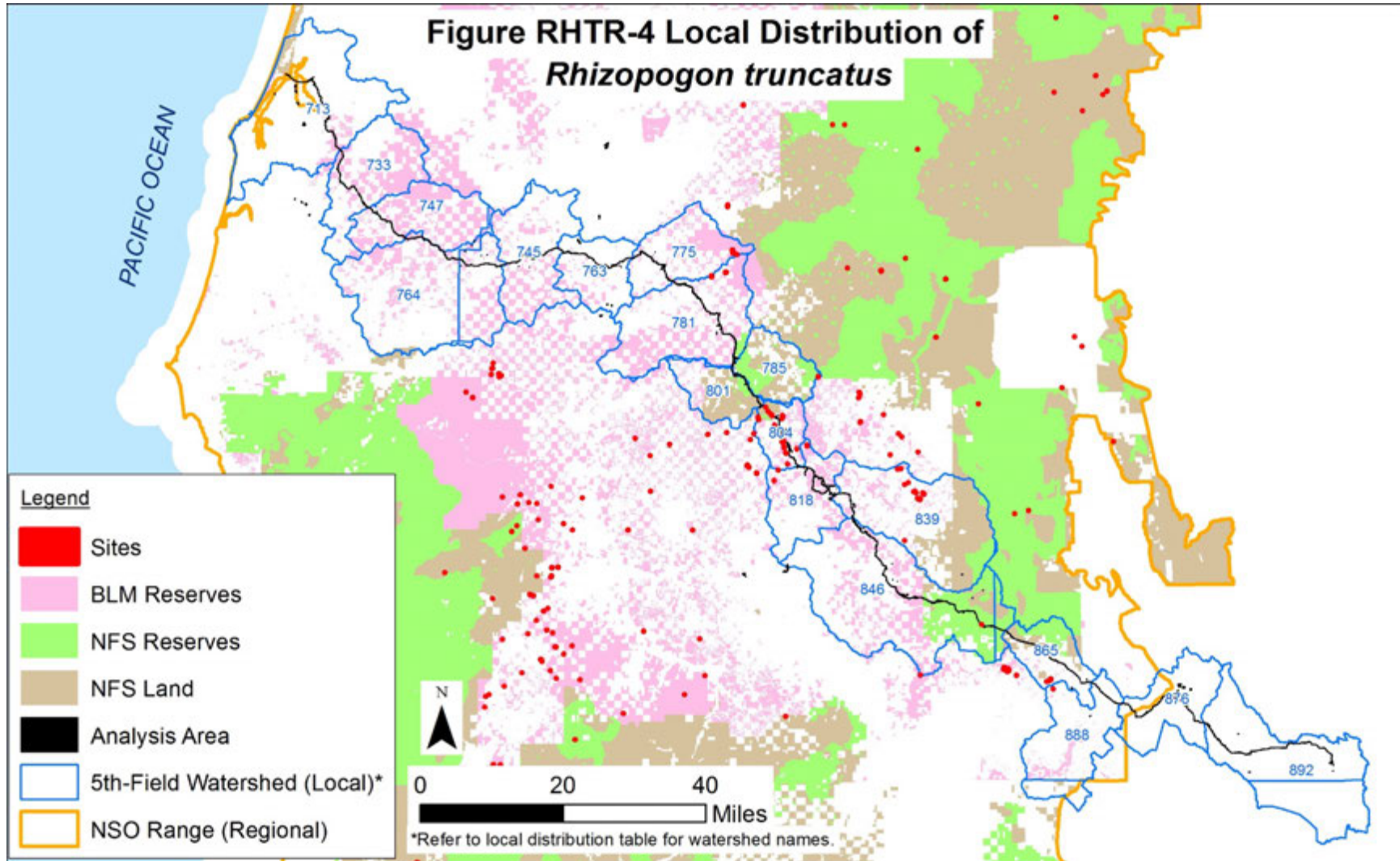
Extent of Forests That Could Provide Habitat for *Rhizopogon truncatus* on NFS and BLM Lands ^{a/}

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.



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.

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.

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 1,128 acres of coniferous and mixed hardwood-coniferous forests, including 241 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 1,128 acres of coniferous and mixed hardwood-coniferous forests and 241 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 2001-2003 ASRs 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 Columbia (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 shortly 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 <i>Sarcodon fuscoindicus</i> 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 <i>Sarcodon fuscoindicus</i> 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 <i>Sarcodon fuscoindicus</i> 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.

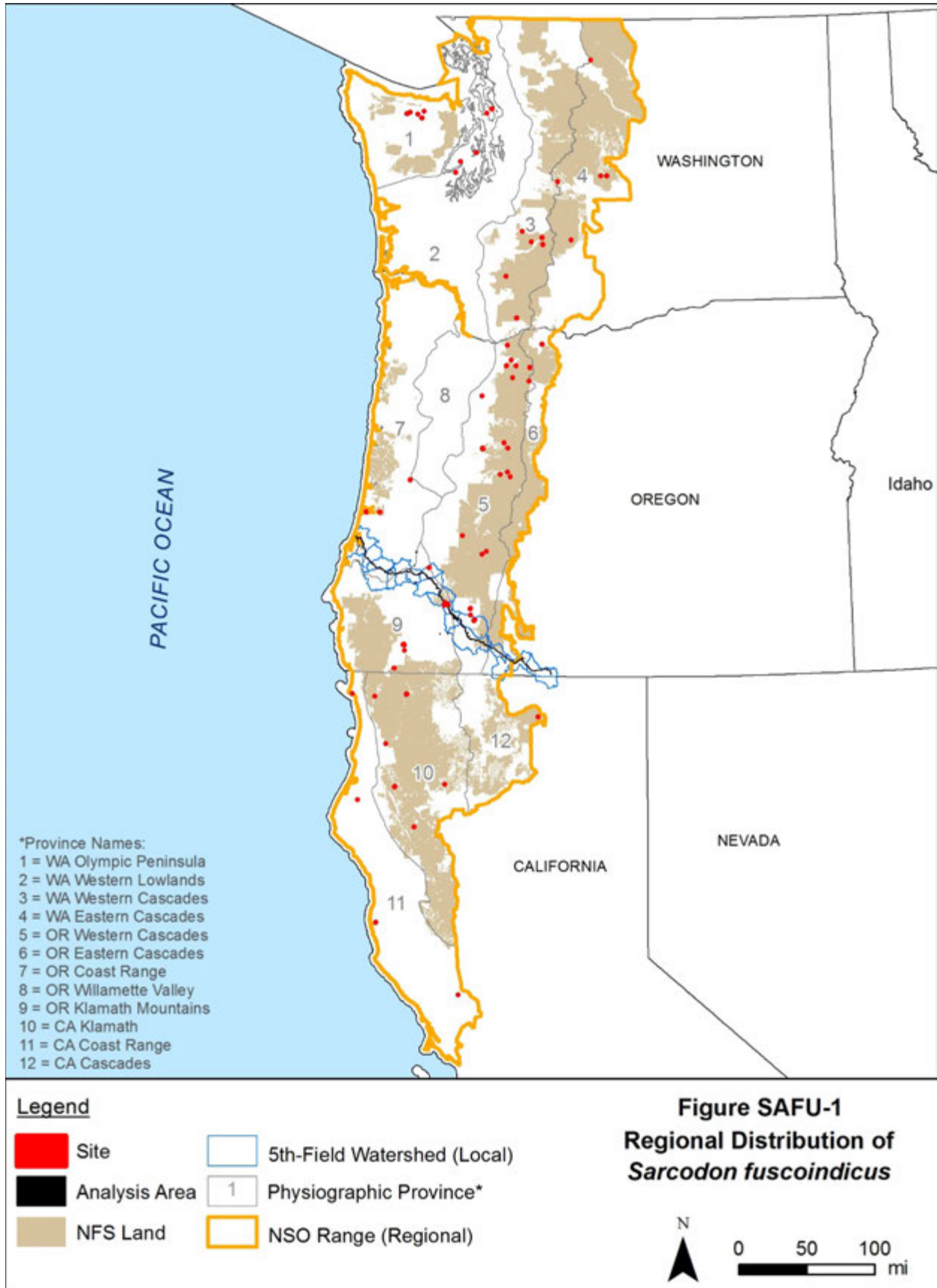
Across the NSO range, 18 sites are located entirely in reserve lands managed by the Forest Service, including 14 in LSRs and four in Congressionally Reserved areas (see Figure SAFU-2). These sites represent 46 percent of the total NFS-managed sites in the region. The remaining NFS sites on other land 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.

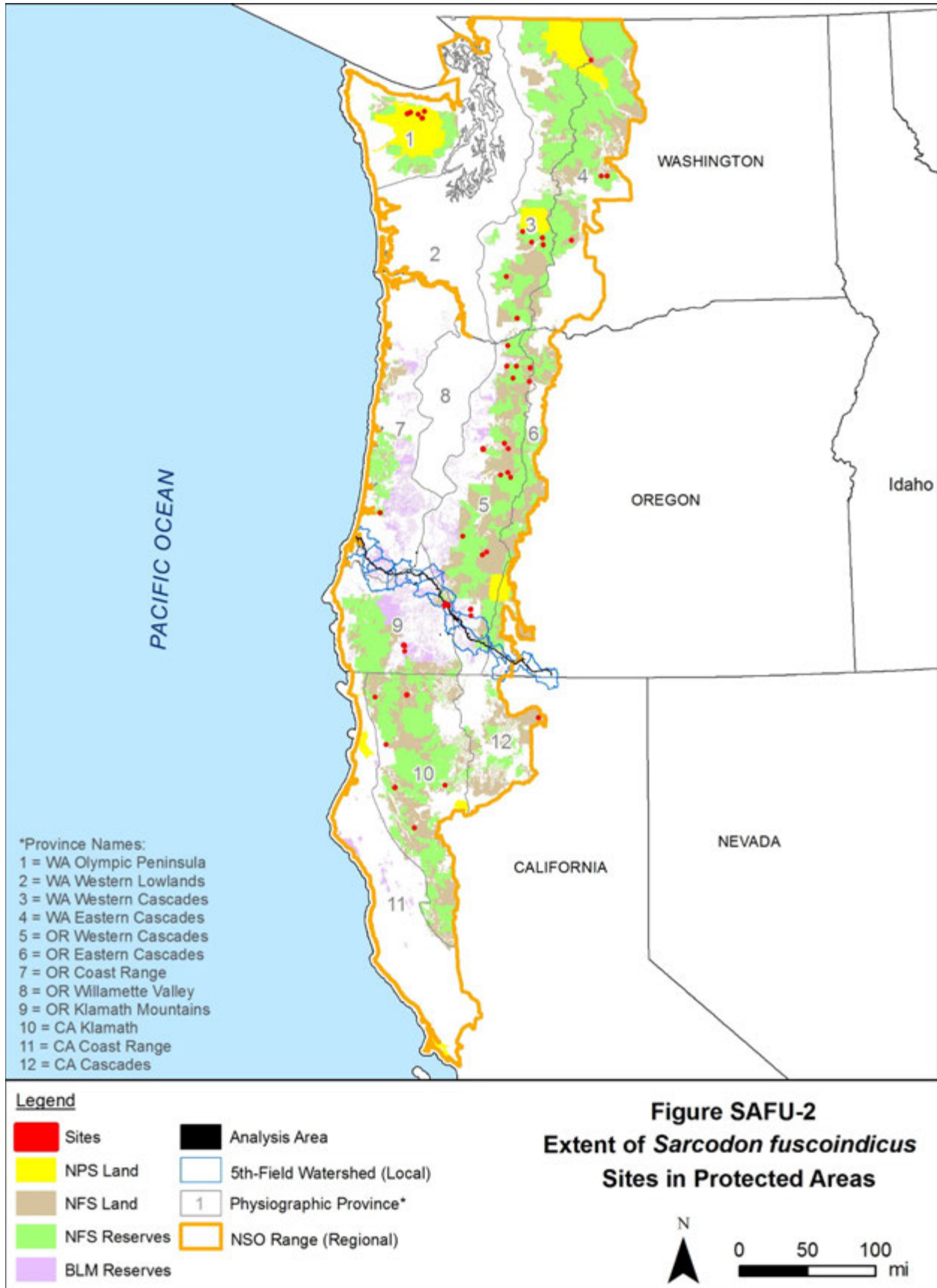
Sarcodon fuscoindicus is primarily found in LSOG forests based on available data (54 of 74 total sites are in LSOG). Based on current site locations, the species is found in all forest types below 4,500 feet msl throughout most of the NSO range. Due to the extent of known sites, the amount of potential 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.

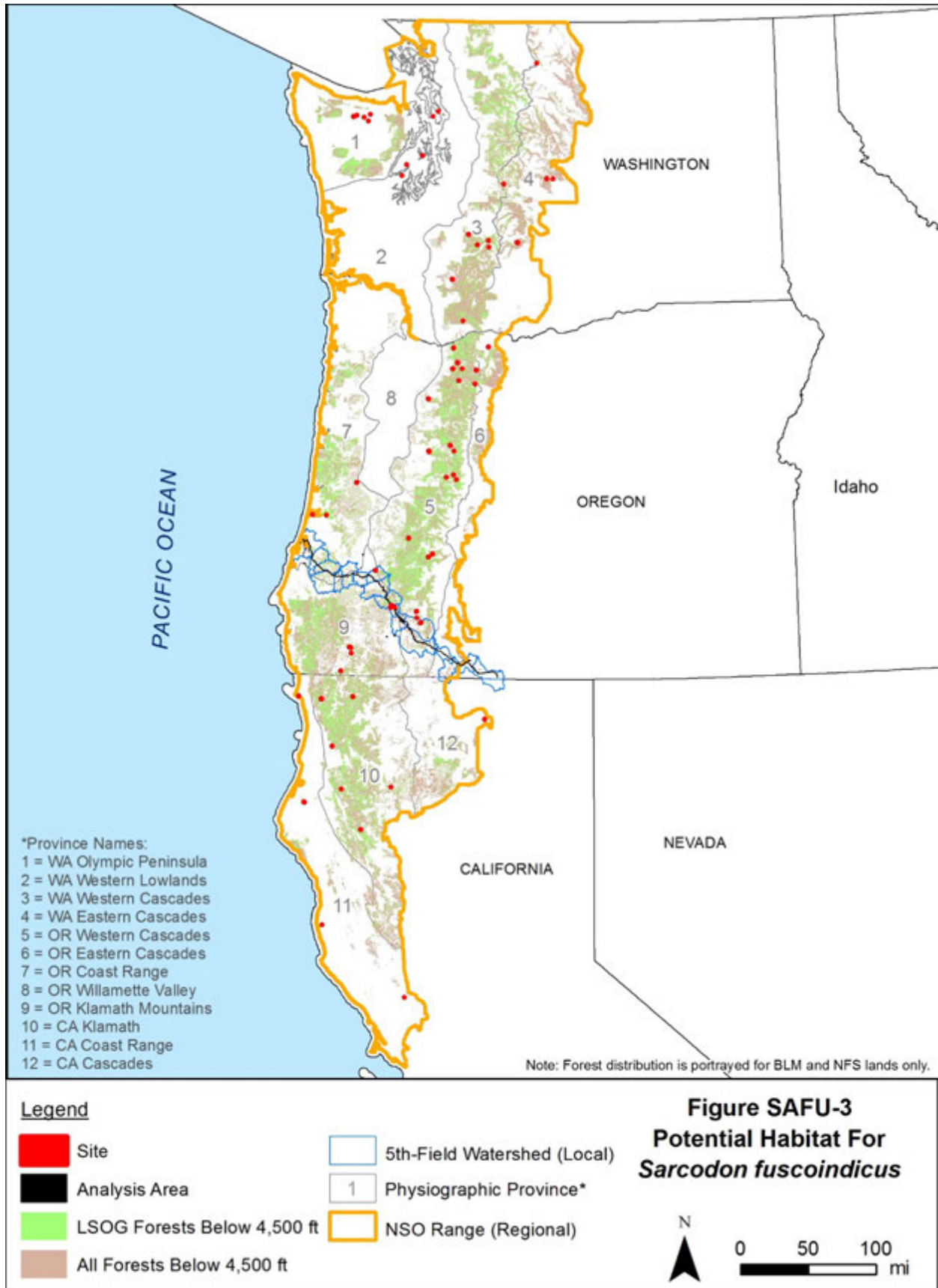
TABLE SAFU-4

Extent of Forests That Could Provide Habitat for <i>Sarcodon fuscoindicus</i> 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 Moerur 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

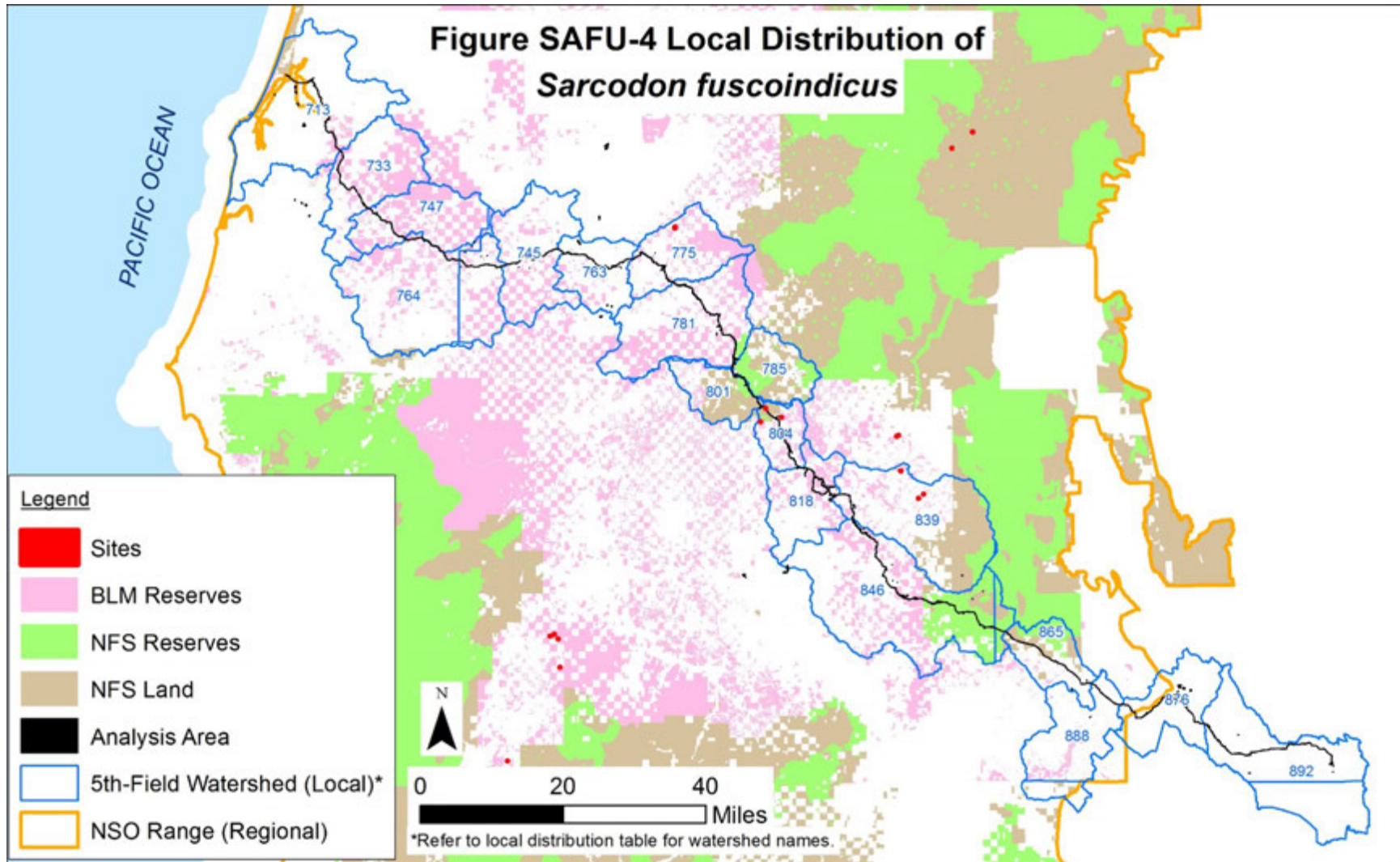
Within the local area, *S. fuscoindicus* is distributed across three 5th-field watersheds that overlap the project area (see Table SAFU-5 and Figure SAFU-4). Two clusters of sites are present in the Trail Creek and Big Butte Creek watersheds, and one site is somewhat isolated in the northern portion 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.

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).



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).

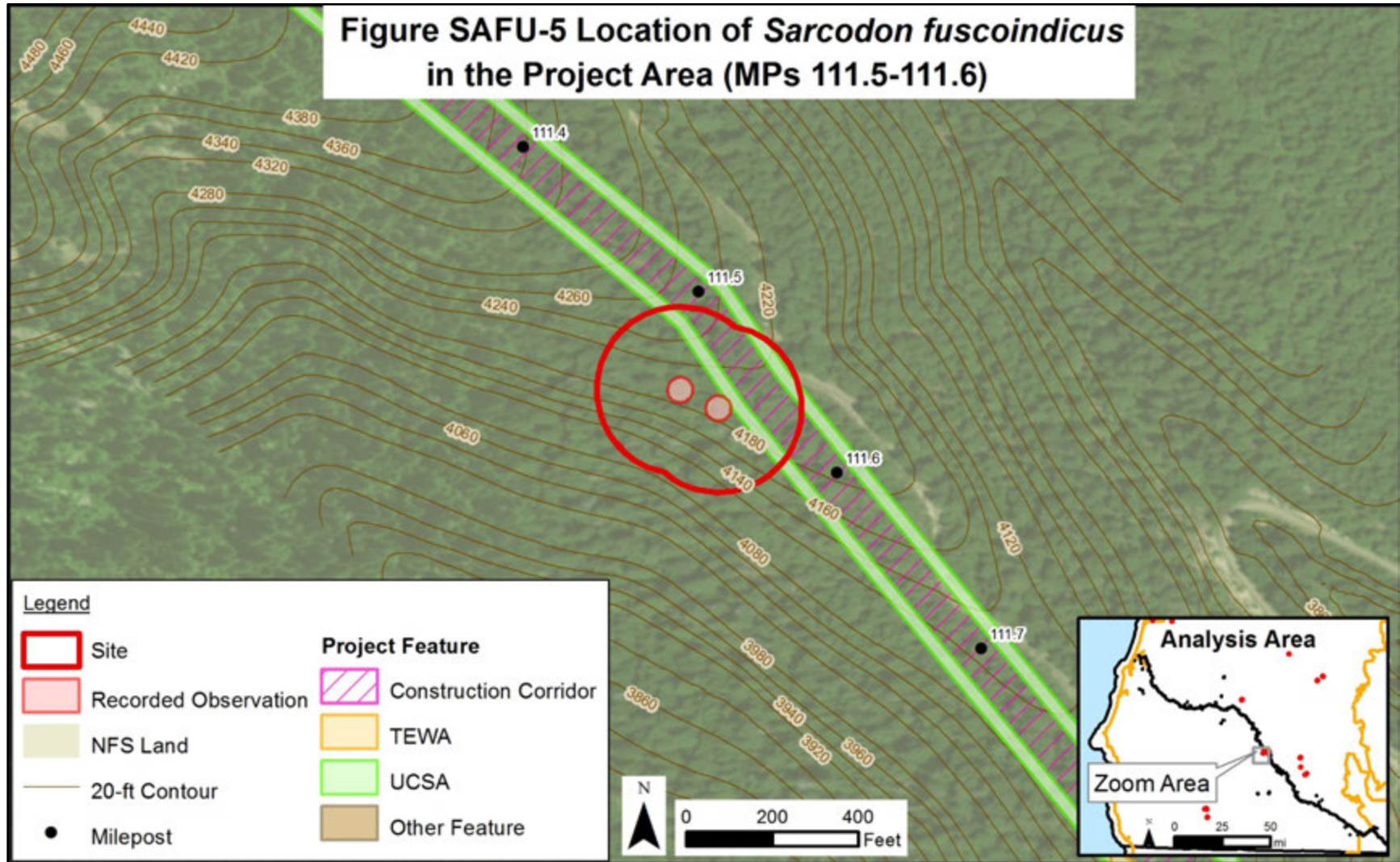
Surveys for the PCGP Project resulted in two total observations of the species in one location in or near the project area (Siskiyou BioSurvey LLC 2012a, 2016a [unpublished data]). These recorded observations comprise the one site in the analysis area. Within the project area, the site is at approximately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



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.

The pipeline route variation between MPs 111.5 and 11.6 (described in section 3.4.2.7 of the DEIS has been incorporated into the proposed route to avoid the *Sarcodon fuscoindicus* site. Under this variation, the construction right-of-way between MPs 111.5 and 111.6 would be shifted at least 25 feet to the northeast, and the UCSA on the southwest side of the construction right-of-way would be eliminated. As a result, at least one of the two known occurrences of this species within the site would be at least 100 feet from any Project-related disturbance (see DEIS figure 3.4-7). Based on this analysis of the site on NFS lands, *S. fuscoindicus* is 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 980 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 4,500 feet msl, including 174 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 can be maintained at the single site on NFS lands as a result of the changes in the proposed project to shift the alignment and eliminate an UCSA, this site this *S. fuscoindicus* site would remain on NFS lands in the local area, and 38 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 no sites of *S. fuscoindicus* on NFS lands, representing approximately three percent of the sites on NFS lands in the NSO range. Assuming site persistence can be maintained at the single site, a low-moderate number of sites (38) 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. 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 not affect site persistence of *S. fuscoindicus* on NFS lands, but would affect 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 no *S. fuscoindicus* sites 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 980 acres of coniferous, mixed hardwood-coniferous, and hardwood forests and 174 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 has been adjusted to avoid this site per the recommendations made in the DEIS. 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 because the construction corridor has been relocated to avoid this site.. 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 2001-2003 ASRs 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 observations 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 <i>Sedecula pulvinata</i> 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.	

Appendix F.5. Survey and Manage Species Persistence Evaluation

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.

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.

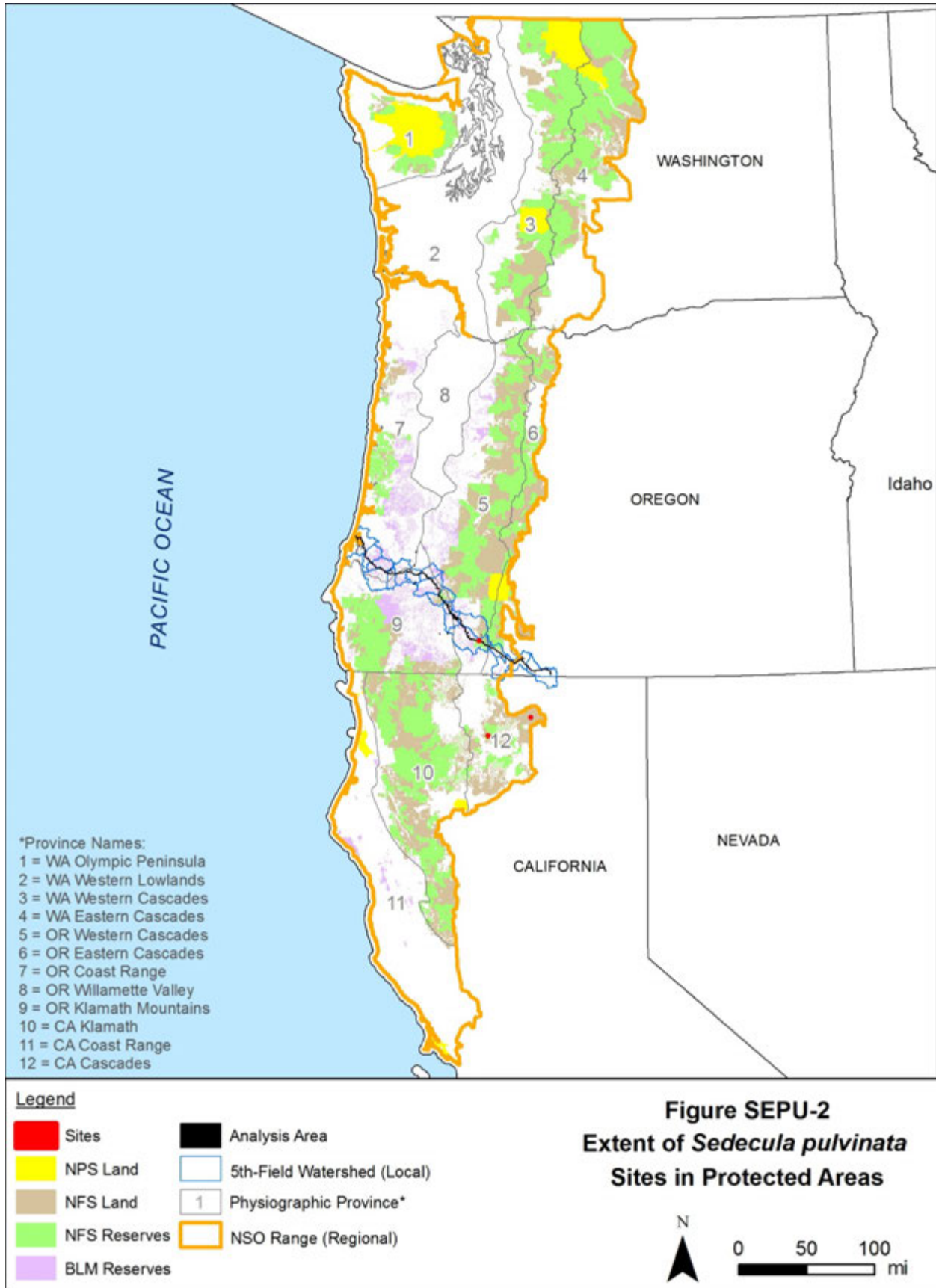
Two of the three known *S. pulvinata* sites are in LSOG coniferous forests. Coniferous forests above 4,500 feet msl in the Cascade Range in Oregon could provide habitat for *S. pulvinata* and support additional sites. Due to the extent of known sites, the amount of potential habitat on both NFS and BLM 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).

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.







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.

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)	-	-	-

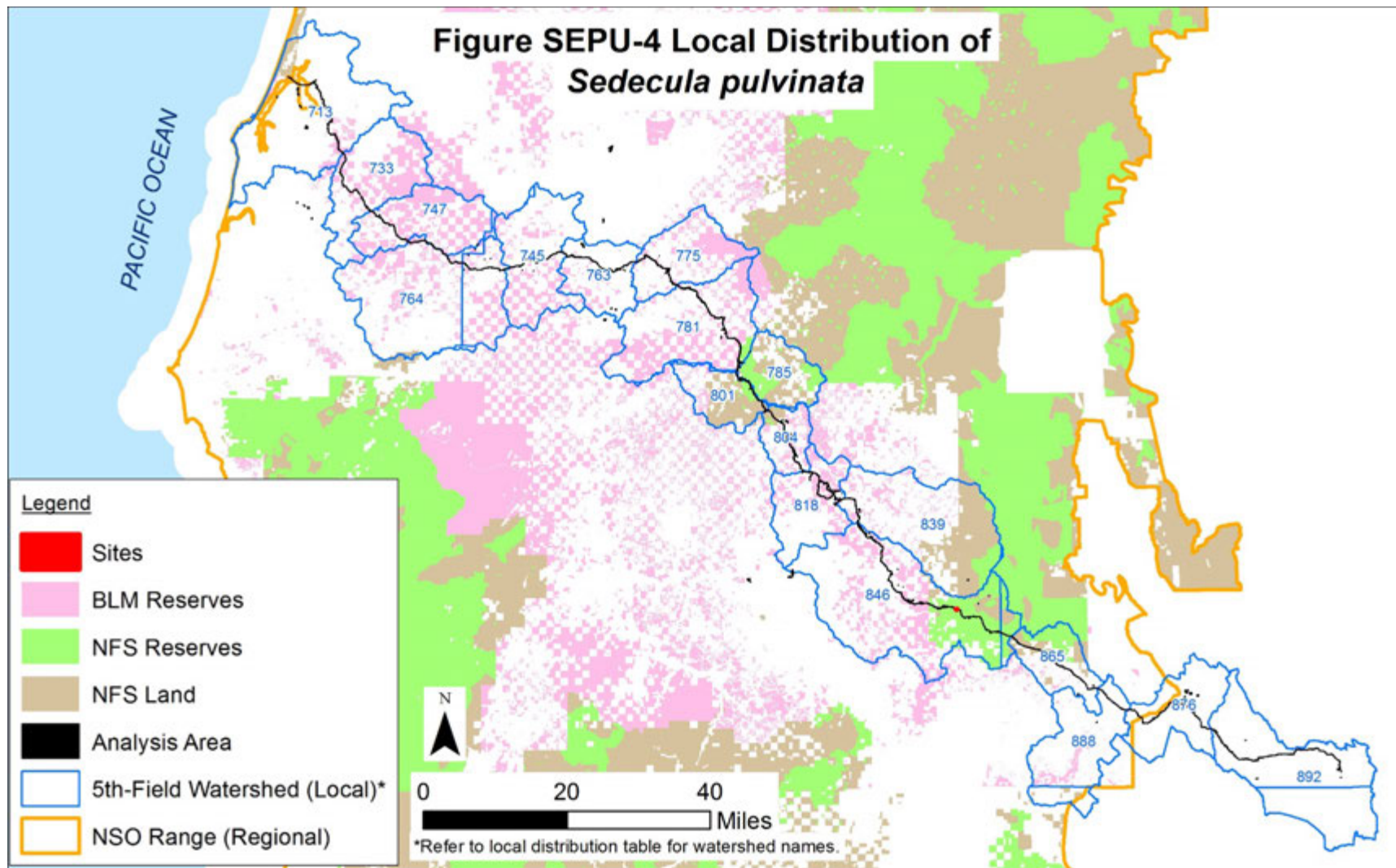
Data sources: Processed BLM and Forest Service GIS data, August 2, 2017; HUC5 Watershed layer, August 23, 2011
 Note: Number of sites in reserves may include sites that are only partially in reserves.

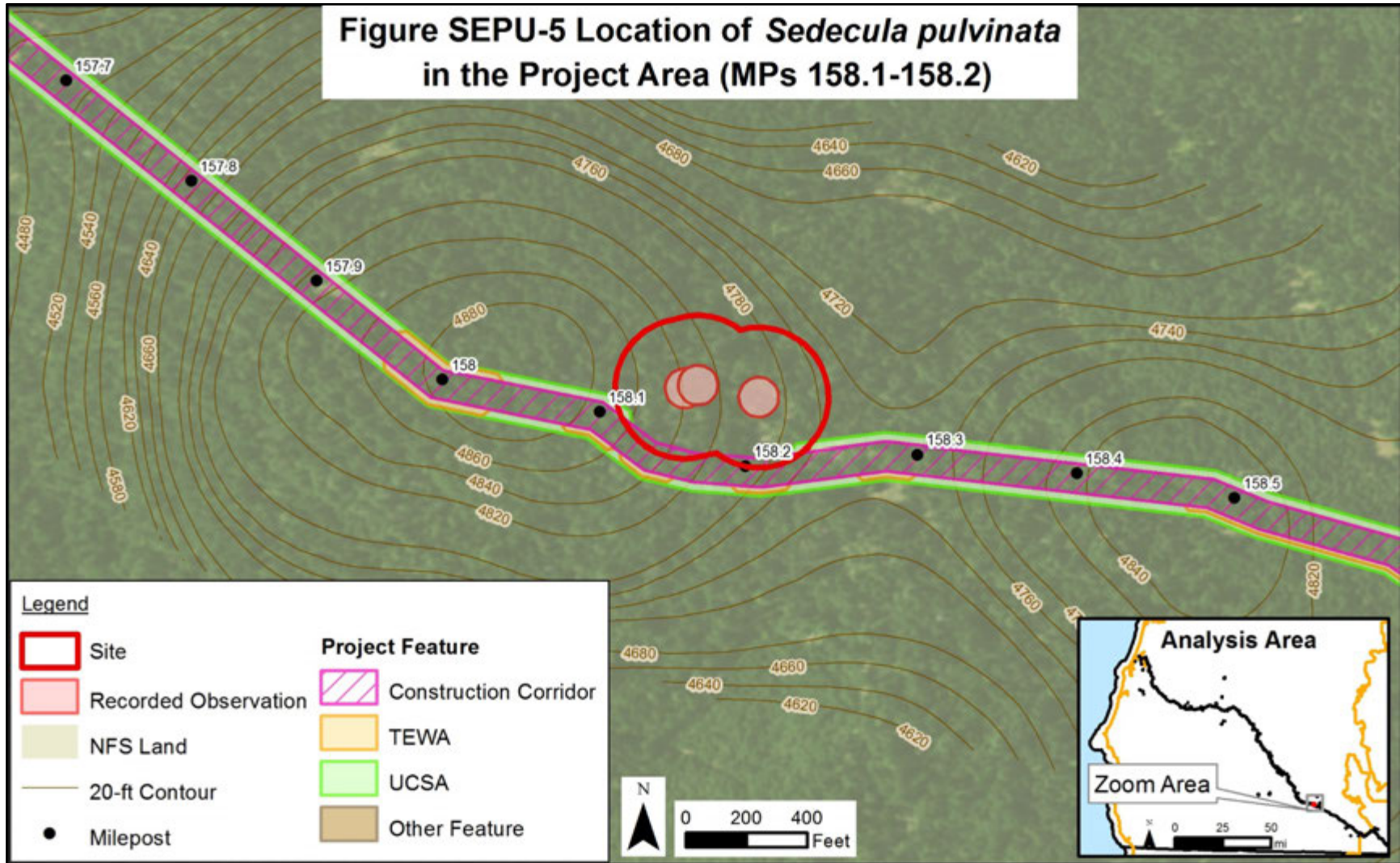
Coniferous forests above 4,500 feet msl encompass approximately 111,277 acres on BLM and NFS lands in the NSO range in the local area, with 64,604 acres in reserve land allocations (58 percent of the forests). Of this acreage, an estimated 33,179 acres are LSOG, including 21,364 acres in reserve land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





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 <i>Sedecula pulvinata</i> 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 240 acres of coniferous forests above 4,500 feet msl, including 72 acres of LSOG 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 131 acres (54 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, resulting in a permanent loss of 65 acres of habitat. 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 about 65 acres of coniferous forests above 4,500 feet msl, which represents 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 240 acres of LSOG coniferous forests above 4,500 feet msl (a negligible amount of the forests). An estimated 54 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 2001-2003 ASRs 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 <i>Sparassis crispa</i> 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 <i>Sparassis crispa</i> 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 <i>Sparassis crispa</i> 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) <u>a/</u>	-	-	-
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.			
<u>a/</u> 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.

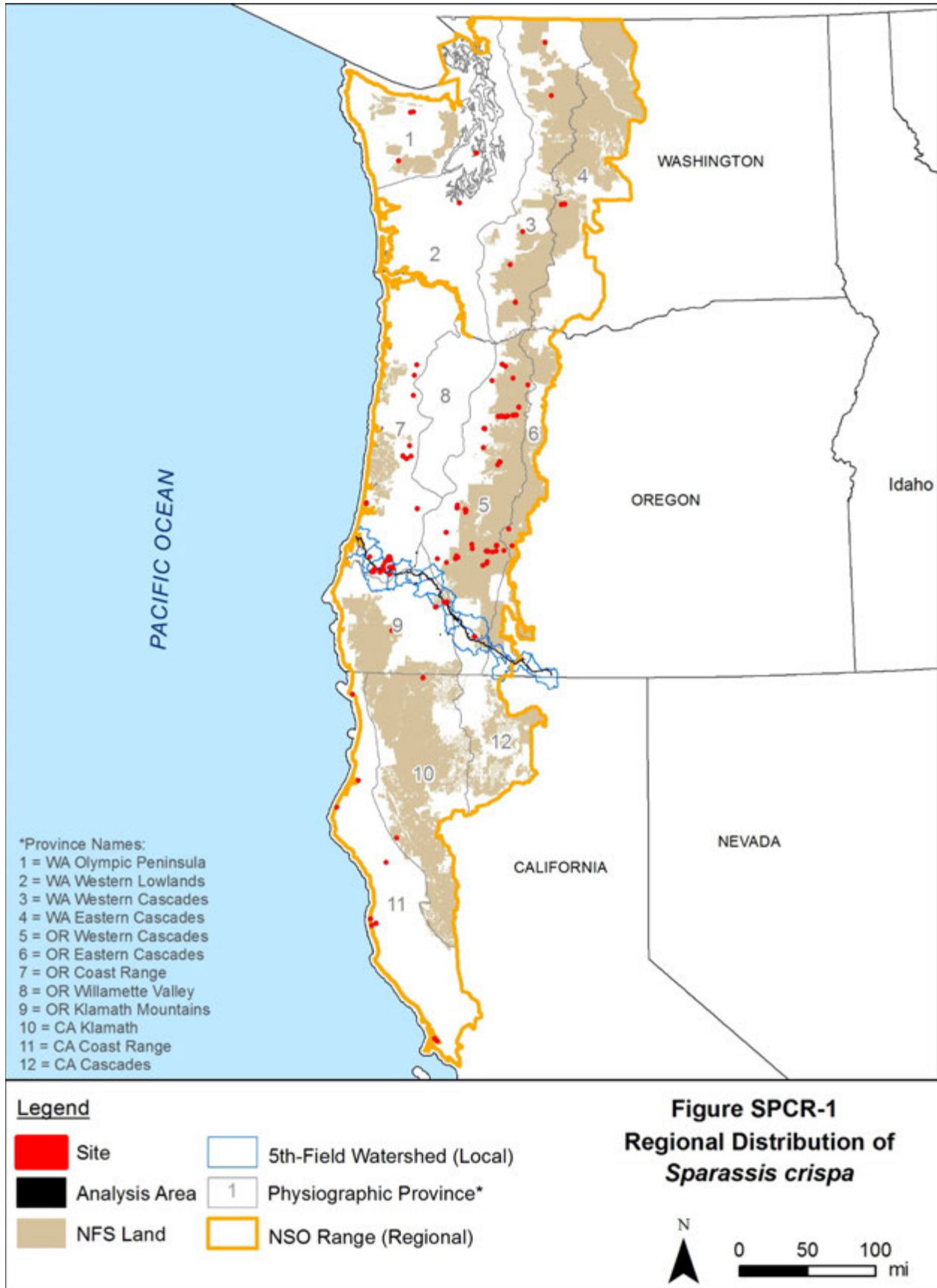
Twenty-one of 106 known sites are at least partially located on private, state, or other lands; four sites are on NPS lands (Mount Rainier and Olympic National Parks); 40 sites are at least partially located on BLM lands; and 51 sites are at least partially on NFS lands across the region. Sites included 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.

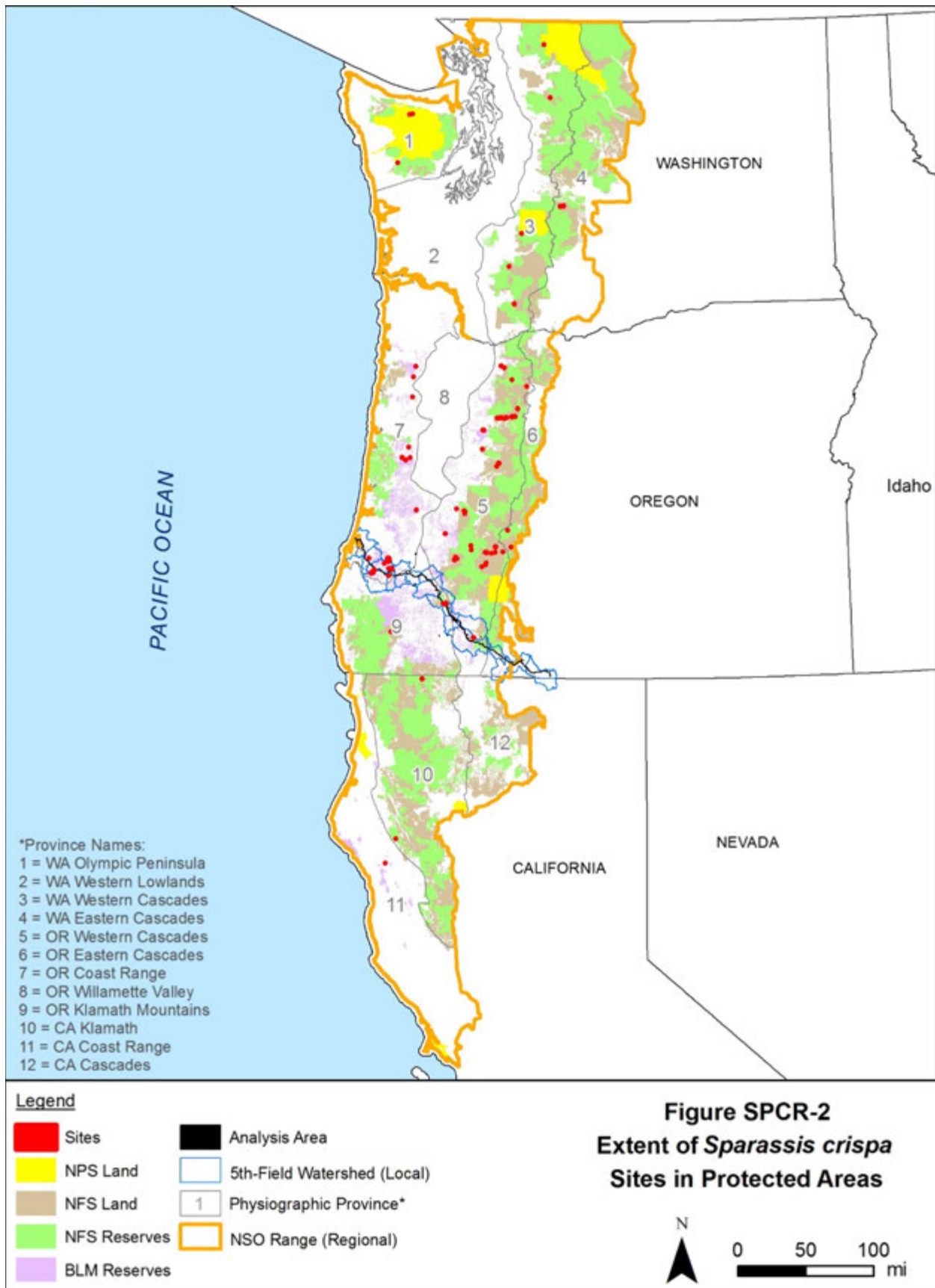
Across the NSO range, nine sites are at least partially located in reserve lands managed by the Forest Service, including eight in LSRs and one in a Congressionally Reserved area. This represents 18 percent of the total NFS-managed sites in the region. The remaining NFS sites on other land allocations 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.

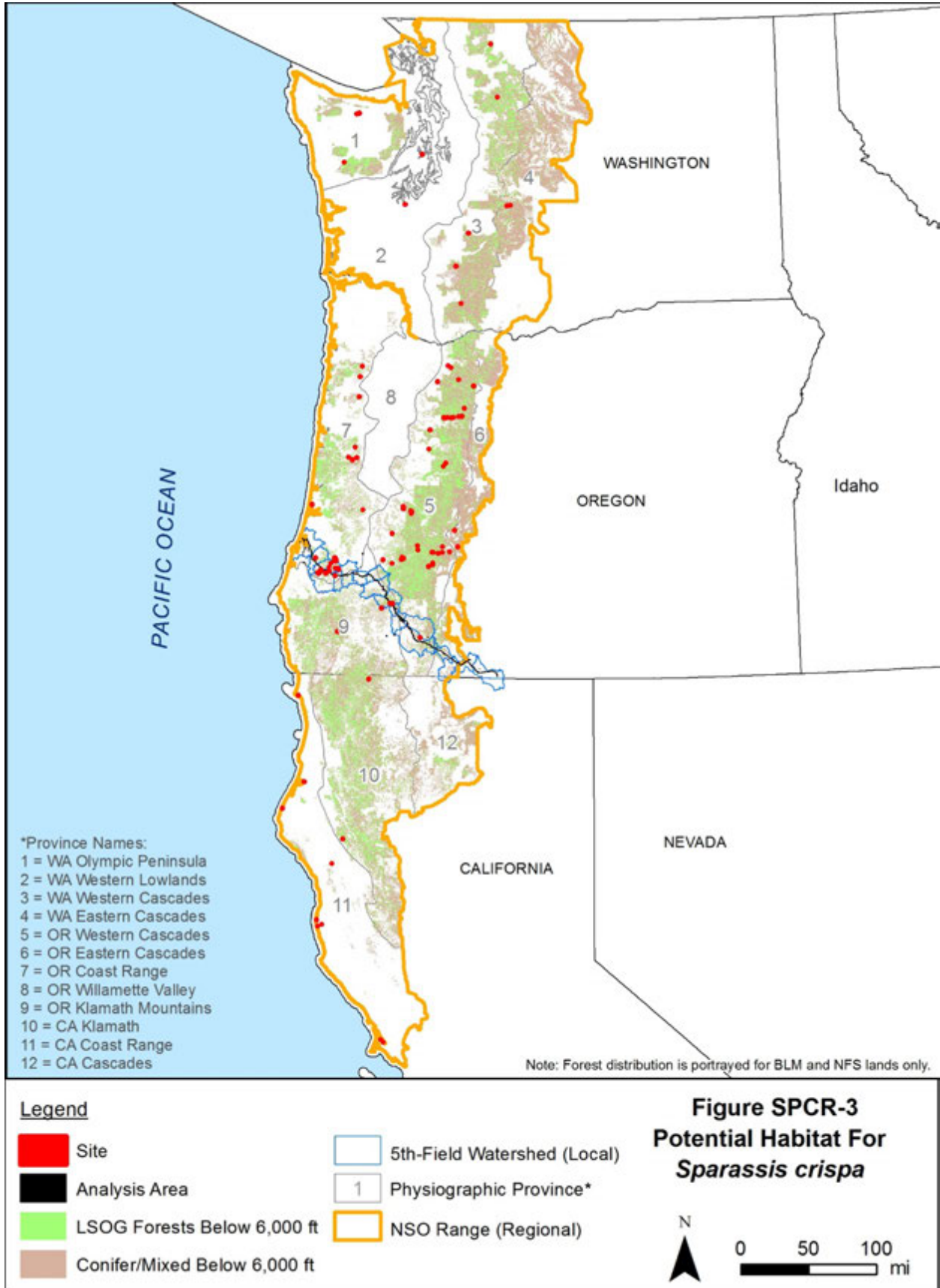
Sparassis crispa is more commonly found in LSOG forests based on available data (87 of 106 total sites are in LSOG), but it is also somewhat common in non-LSOG forests. Based on current site locations, the species is found in coniferous and mixed hardwood-coniferous forests below about 5,600 feet msl 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 <i>Sparassis crispa</i> 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.







Local Distribution

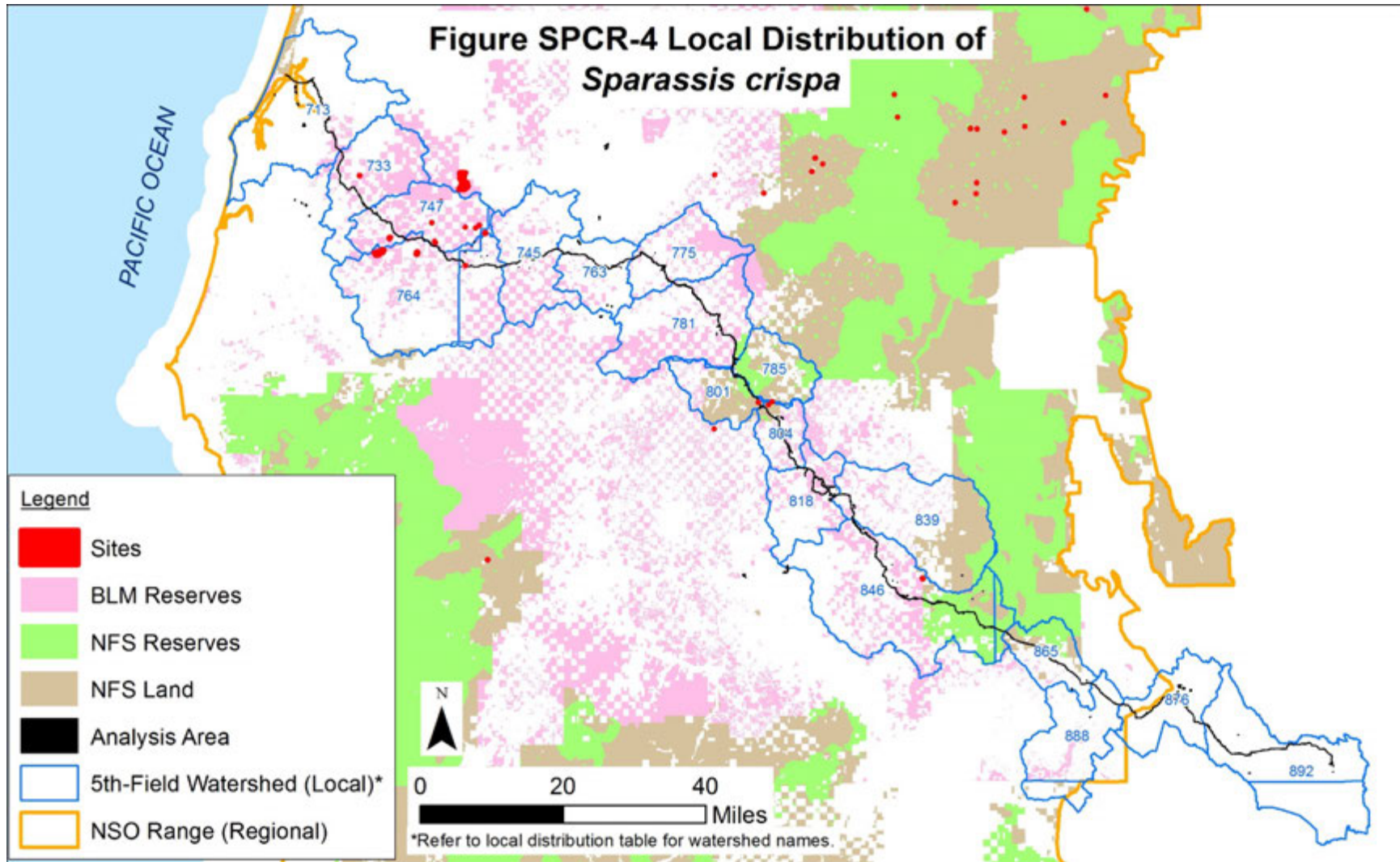
Within the local area, *S. crisper* is distributed across seven 5th-field watersheds that overlap the project area (see Table SPCR-5 and Figure SPCR-4). A large group of sites is located in the East Fork, Middle Fork Coquille River, and North Fork Coquille River watersheds in the Coast Range. A large 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.

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).



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 out 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 0.2 acre within the site (about 9 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.

Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	1	0.1 ac
Temporary Extra Work Area (TEWA)	1	0.1 ac
Uncleared Storage Area (UCSA)	1	0.01
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 0.1 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. Material storage within UCSAs would disturb about 0.01 acre 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 1,132 acres of coniferous and mixed hardwood-coniferous forests below 6,000 feet msl, including 244 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. crispera*, 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. crispera* 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. crispera* 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 crispera* would persist in the region without considering the site as part of the population.
- The PCGP Project would remove approximately 1,132 acres of coniferous and mixed hardwood-coniferous forests and 244 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. crispera* 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. crispera* 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 2001-2003 ASRs 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 2001 and 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 <i>Spathularia flavida</i> 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.	

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.

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

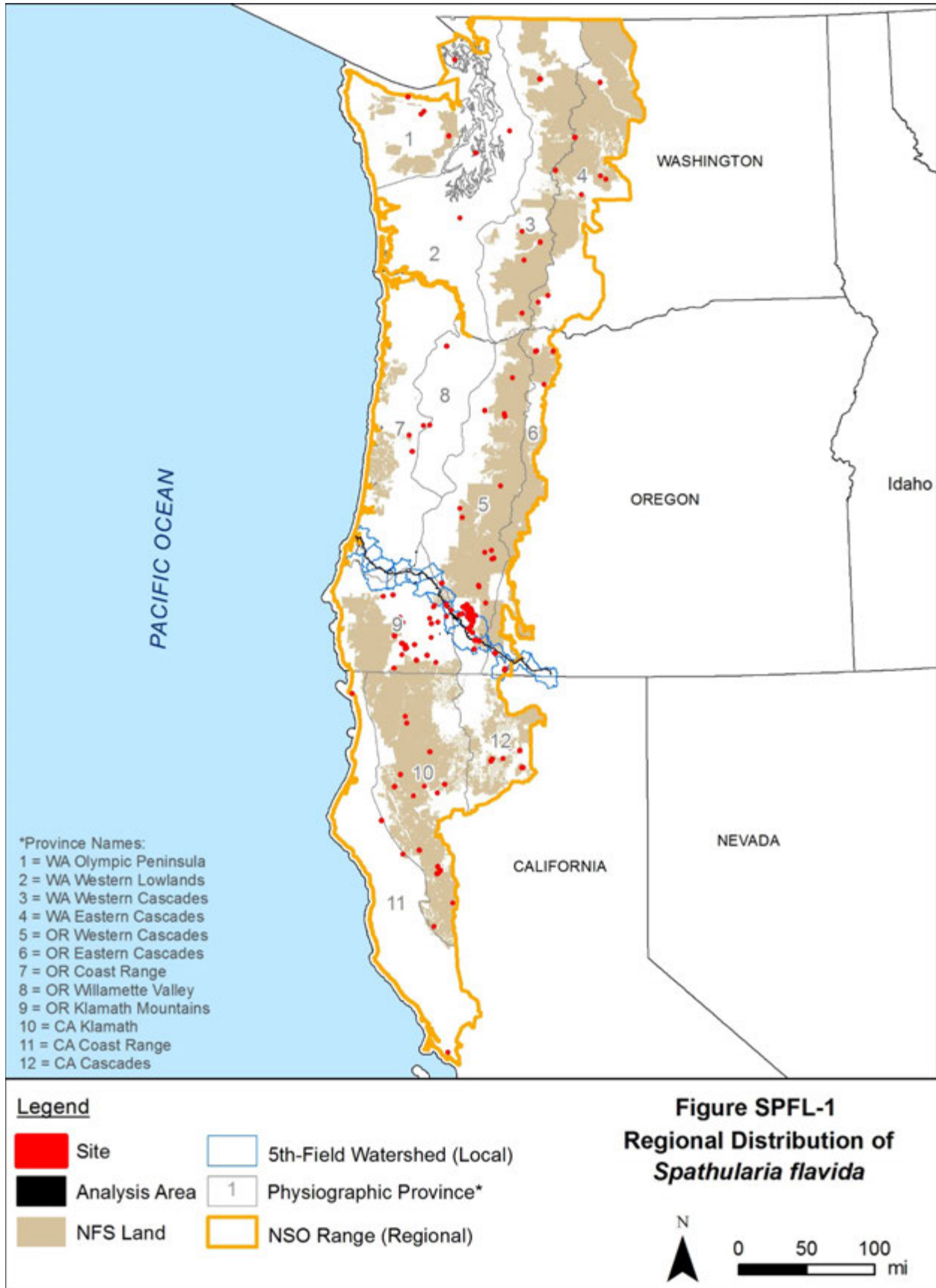
Extent of Forests That Could Provide Habitat for *Spathularia flavida* on NFS and BLM Lands ^{a/}

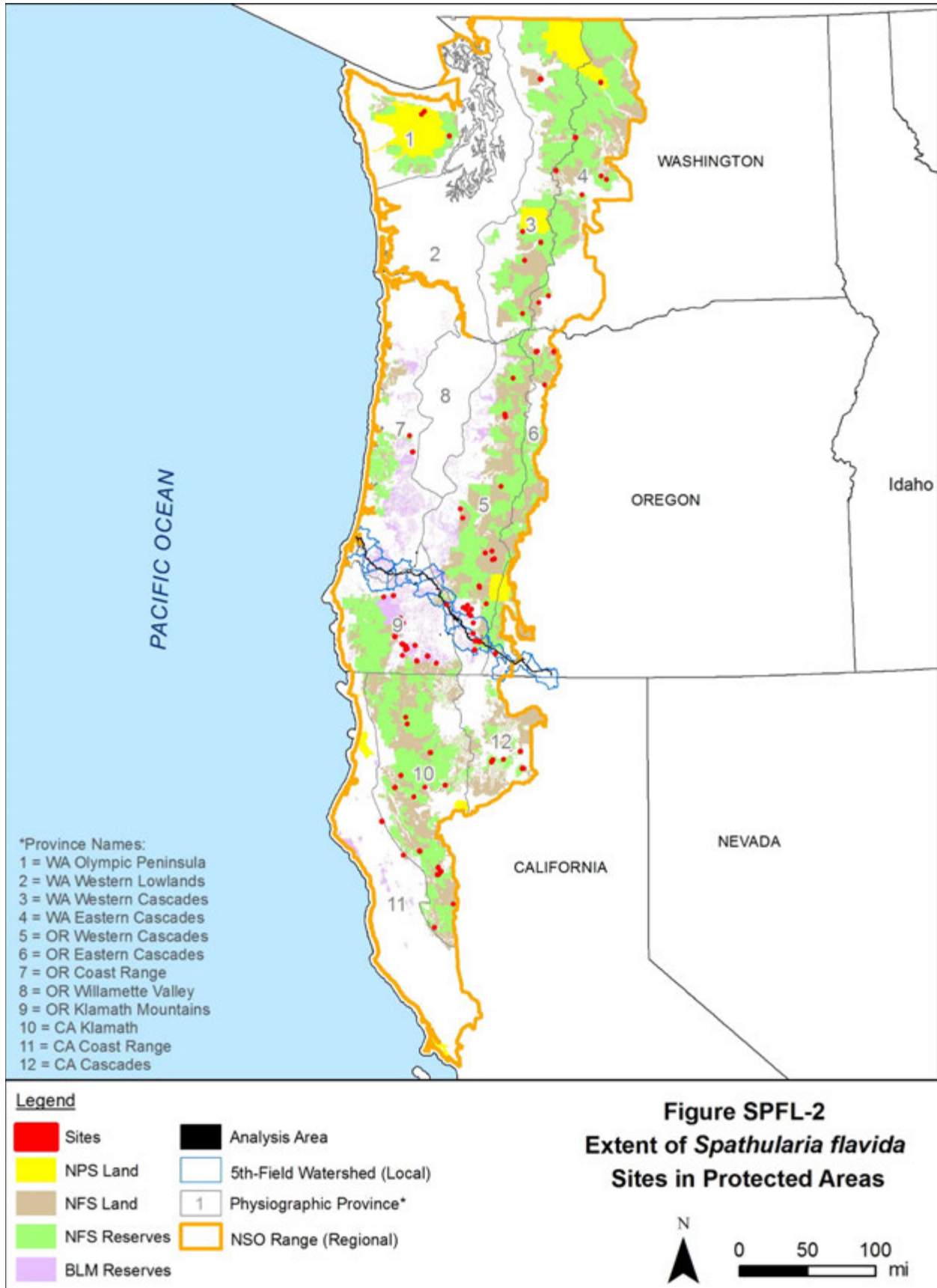
Location	All Forests below 6,000 feet		LSOG Forests below 6,000 feet	
	Total	Reserves	Total	Reserves
Regional Area	19,183,086	11,264,423	6,088,524	3,998,501
Local Area	608,824	403,947	184,099	135,653
Project Area	1,536	1,069	326	233

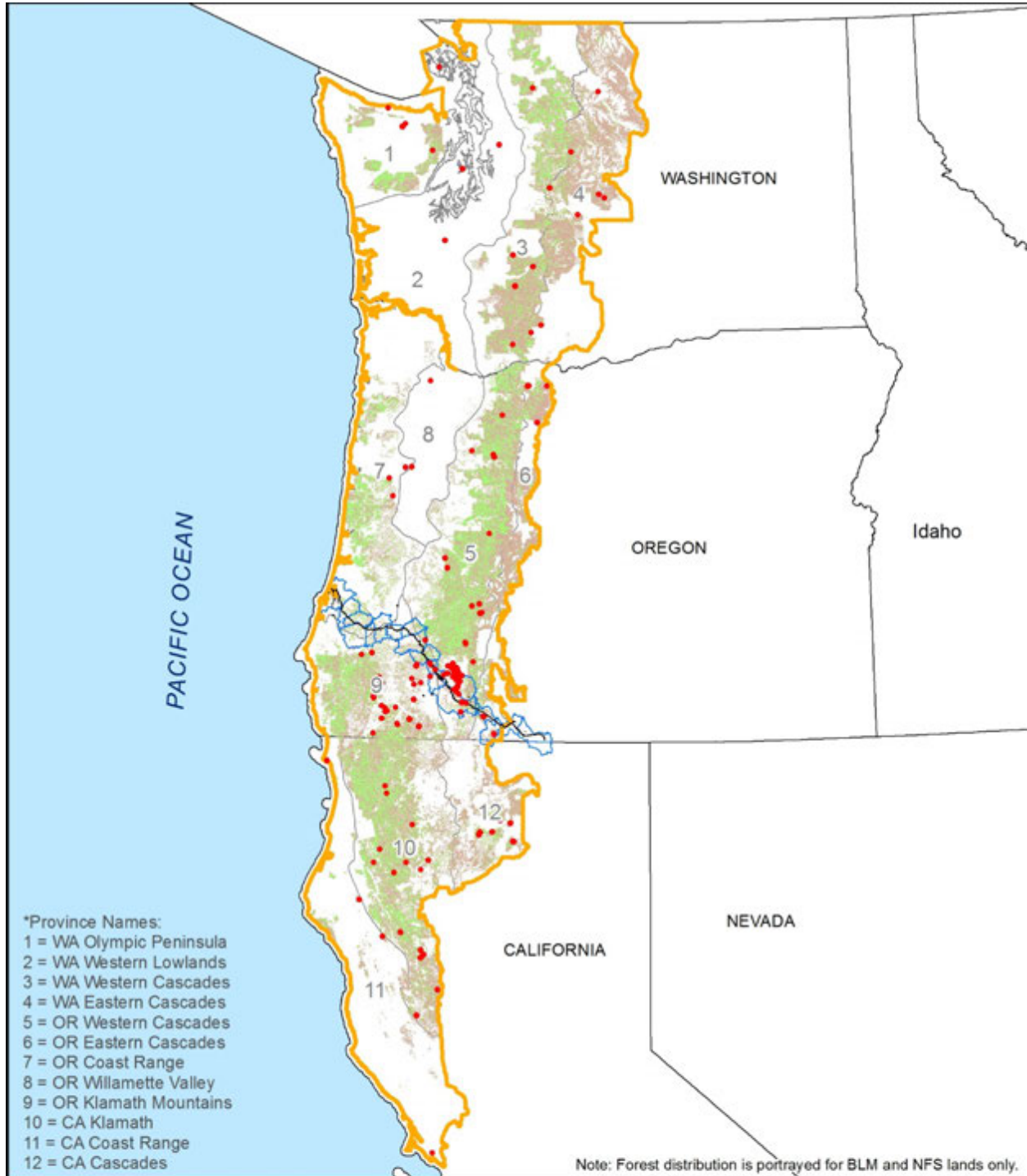
Data source: Gradient nearest neighbor vegetation data from Moeur et al. 2011

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.







Legend

- Site
- Analysis Area
- LSOG Forests Below 6,000 ft
- All Forests Below 6,000 ft
- 5th-Field Watershed (Local)
- 1 Physiographic Province*
- NSO Range (Regional)

Figure SPFL-3
Potential Habitat For
Spathularia flavida



Local Distribution

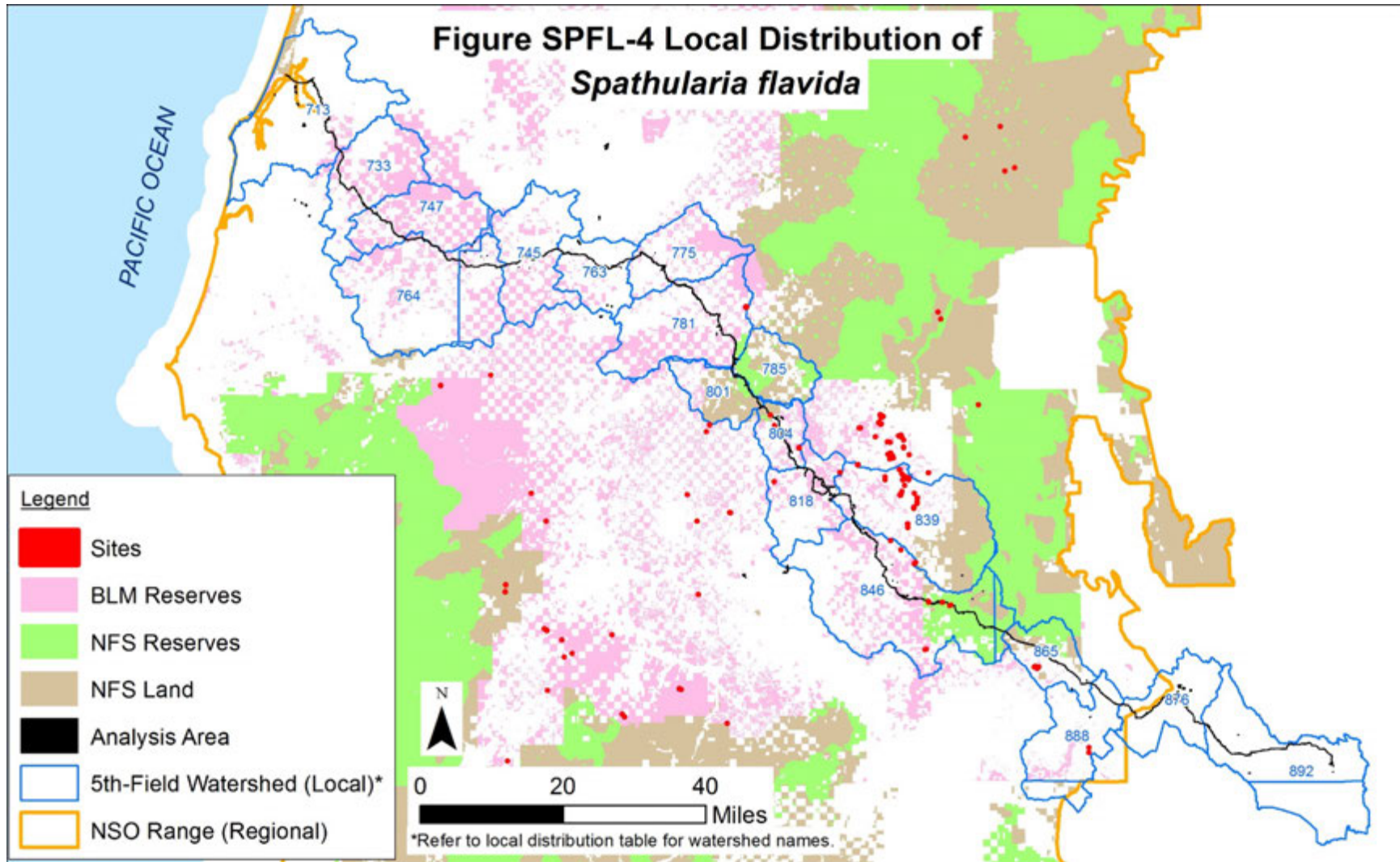
Within the local area, *S. flavida* is distributed across seven 5th-field watersheds that overlap the project area (see Figure SPFL-4 and Table SPFL-5.) The sites are scattered across the watersheds in the Klamath Mountains and Cascade Range in the eastern half of the local area. Many sites are located 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.

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).



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.

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 1,226 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl, including 246 acres 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 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 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 246 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 1,225 acres of coniferous, mixed hardwood-coniferous, and hardwood forests and 246 acres of LSOG 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 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 helvelloides*, 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 2001-2003 ASRs 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.

Number of <i>Tremiscus helvelloides</i> 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.

Distribution of <i>Tremiscus helvelloides</i> 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.

Distribution of <i>Tremiscus helvelloides</i> 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.

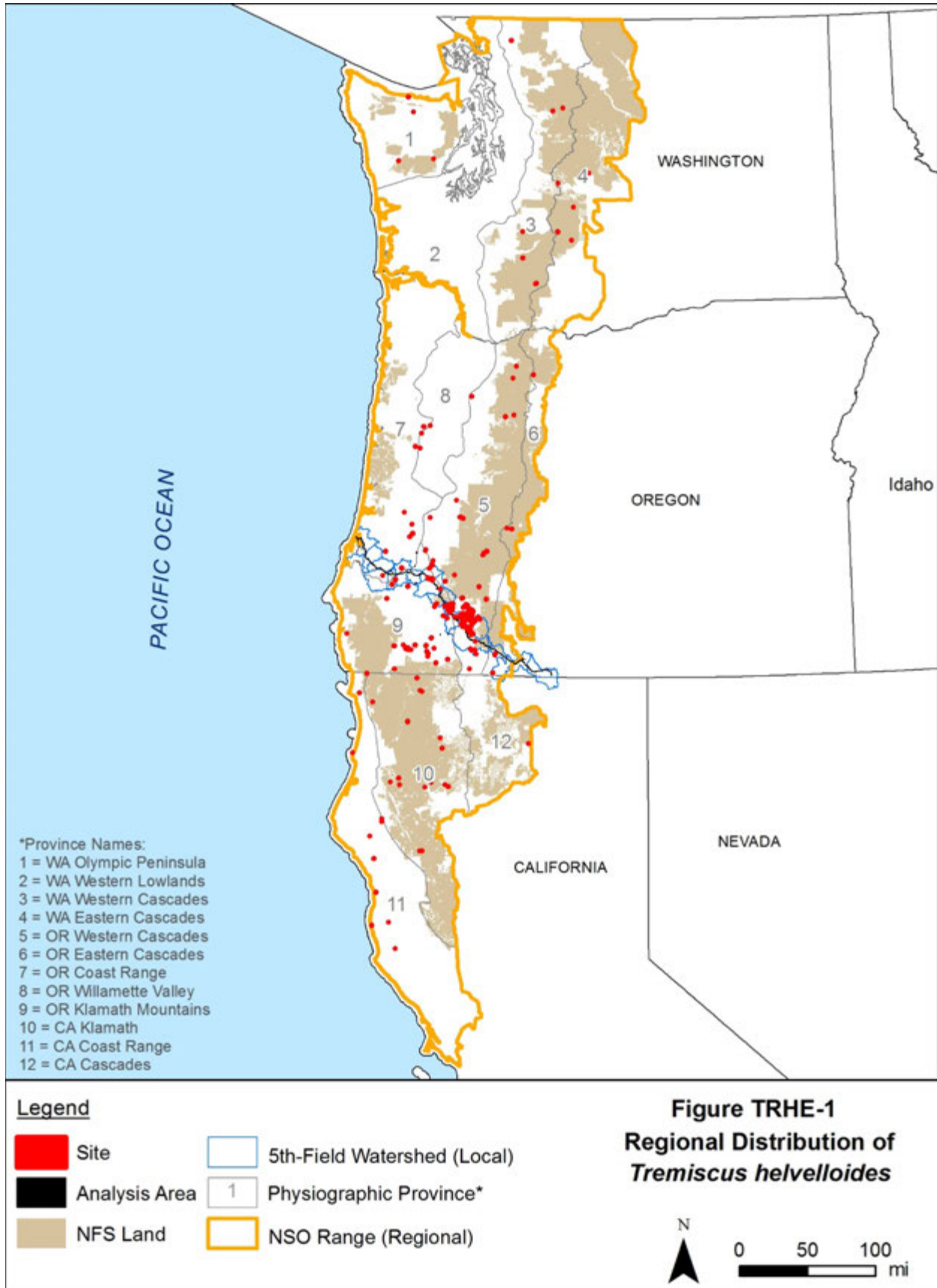
Across the NSO range, 34 sites are at least partially located in reserve lands managed by the Forest Service, including 22 in LSRs, two in Known Owl Activity Centers, and 11 in Congressionally Reserved areas. This represents 55 percent of the total NFS sites in the region. The remaining NFS sites on 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.

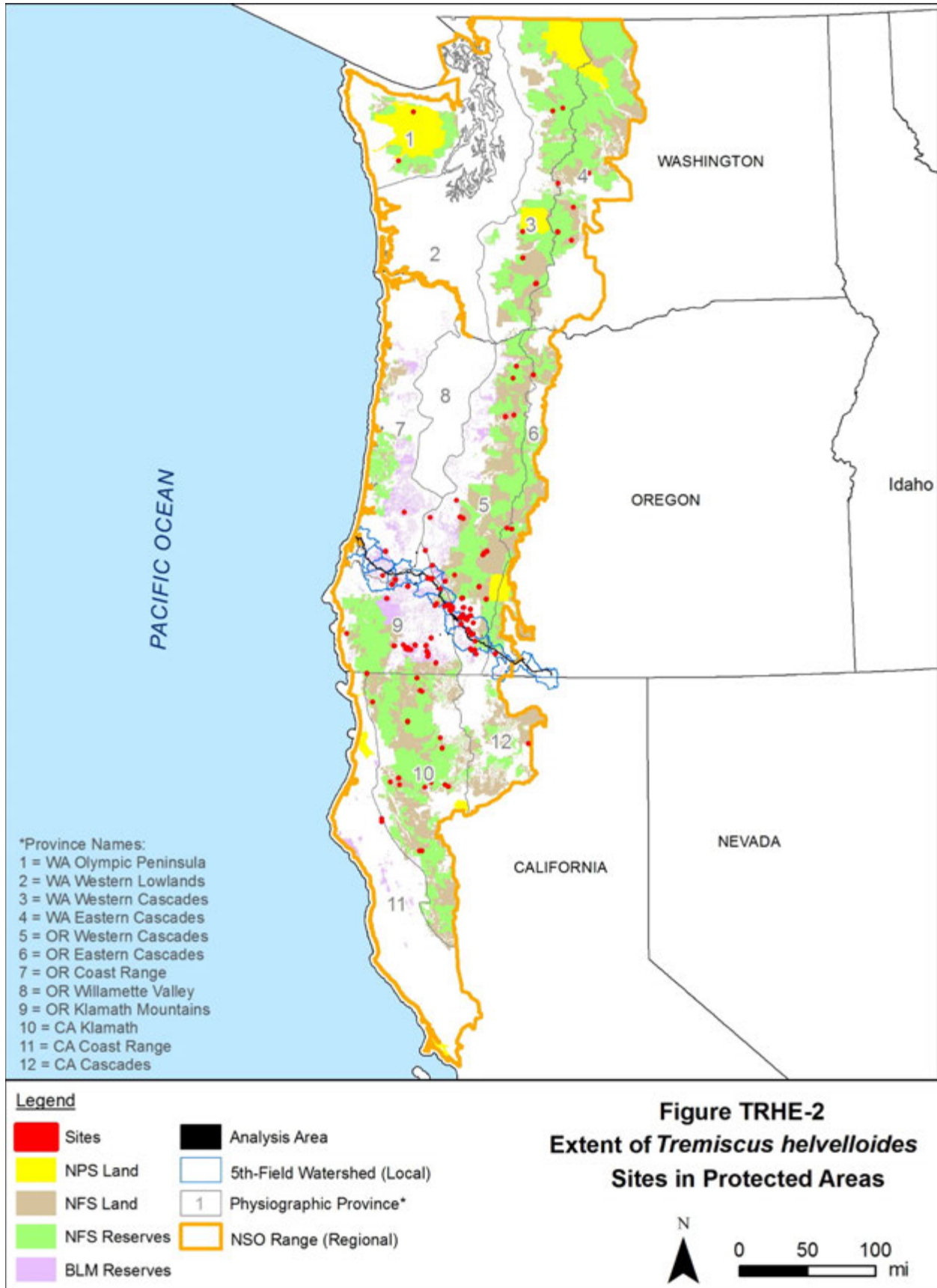
Tremiscus helvelloides is more commonly found in LSOG forests based on available data (262 of 318 total sites are in LSOG), but it is relatively common in non-LSOG forests and has also been found in younger forests along trail sides. Based on current site locations, the species is found in coniferous 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.

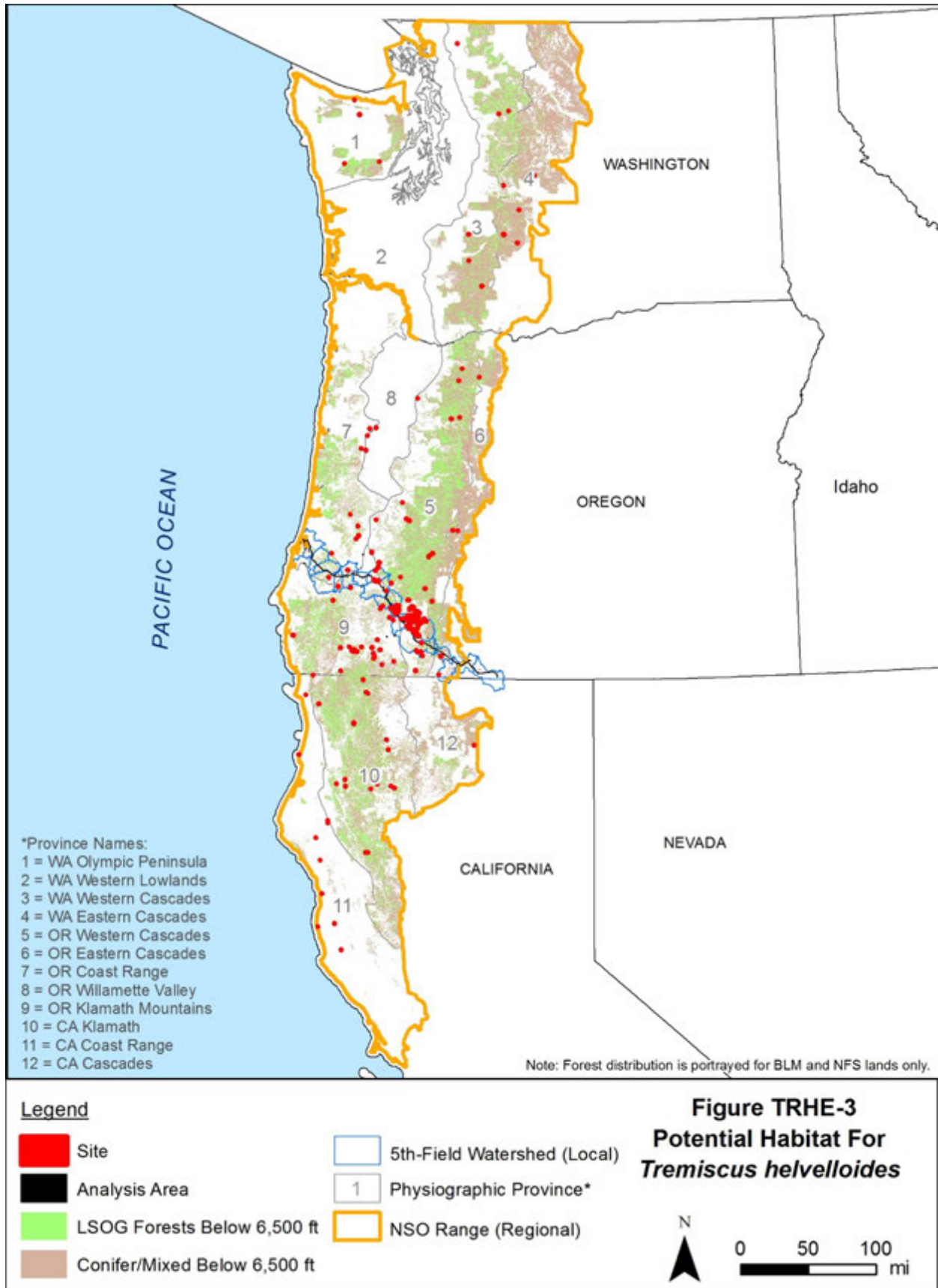
TABLE TRHE-4

Extent of Forests That Could Provide Habitat for <i>Tremiscus helvelloides</i> 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.







Local Distribution

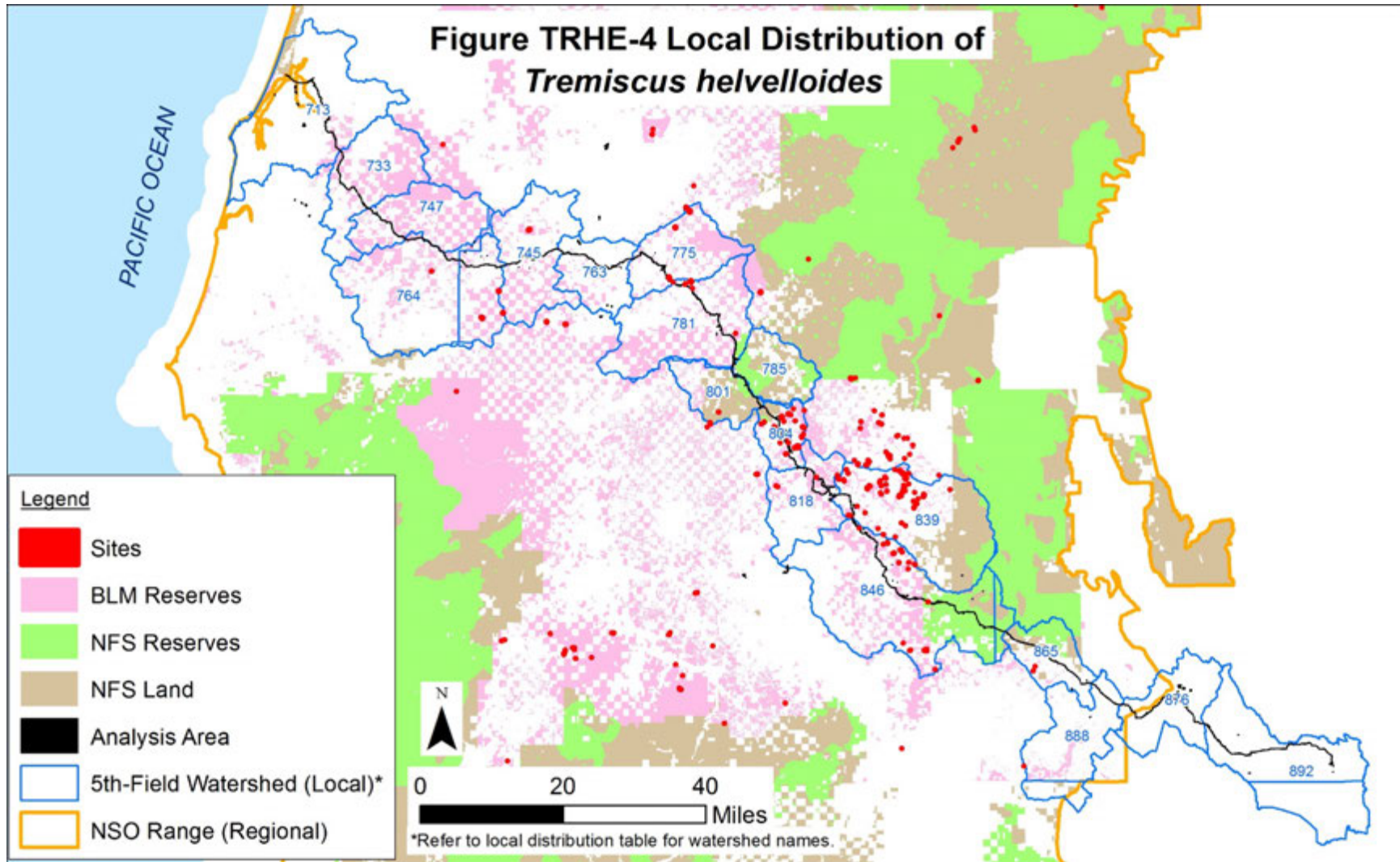
Within the local area, *T. helvelloides* is distributed across 10 5th-field watersheds that overlap the project area (see Table TRHE-5 and Figure TRHE-3). Some sites appear more scattered than others, while multiple clusters of sites are found in the Myrtle Creek, South Umpqua River, Big Butte Creek, 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.

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).



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

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 1,132 acres of coniferous and mixed hardwood-coniferous forests below 6,500 feet msl, including 244 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 1,132 acres of coniferous and mixed forests and 244 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.

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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 2001-2003 ASRs 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 <i>Chaenotheca subroscida</i> 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 <i>Chaenotheca subroscida</i> 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 <i>Chaenotheca subroscida</i> 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.

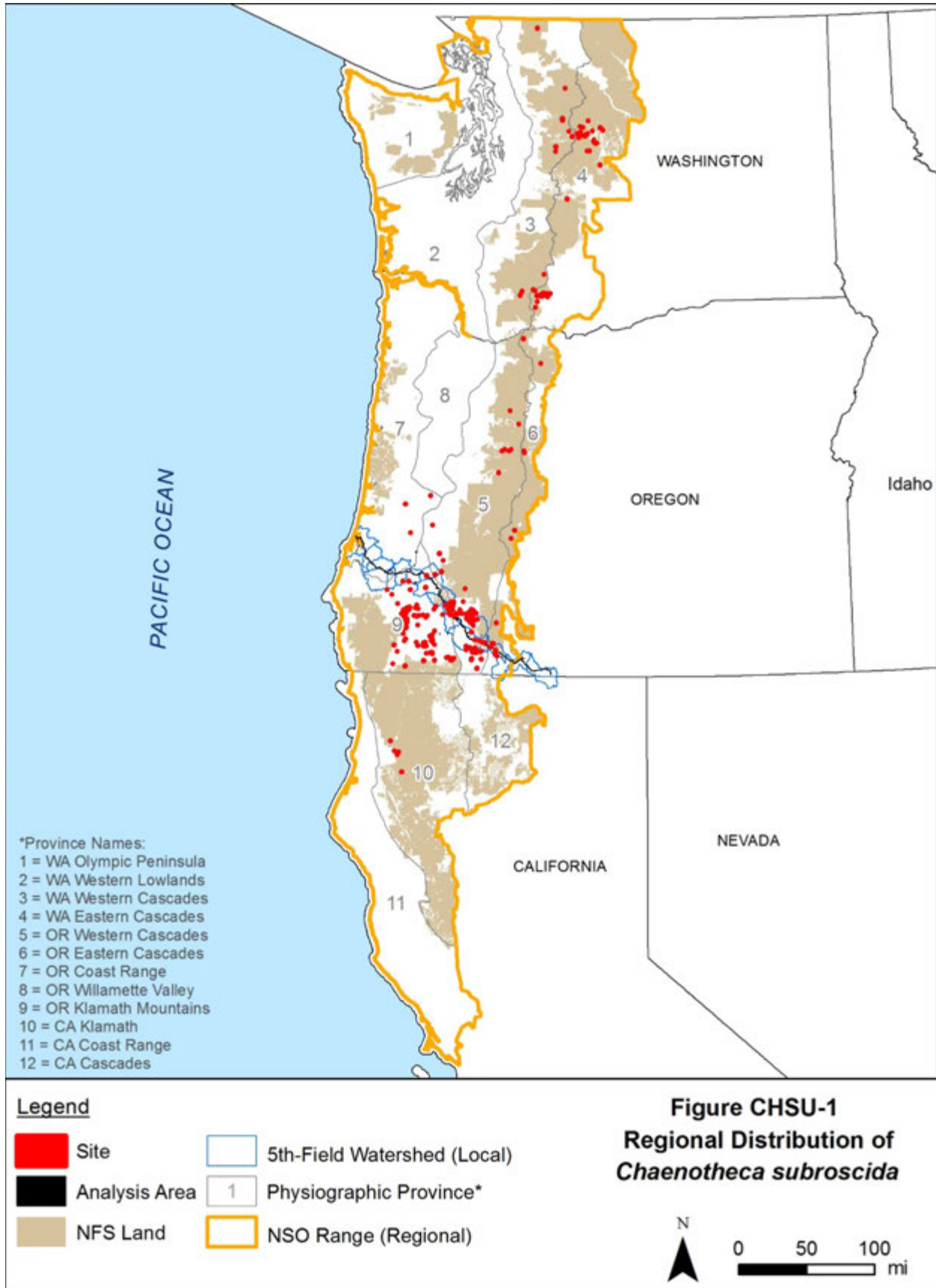
Across the NSO range, 73 sites are at least partially located in reserve lands managed by the Forest Service, including 55 in LSRs, two in Known Owl Activity Centers, and 18 in Congressionally Reserved areas (see Figure CHSU-2). This represents 66 percent of the total NFS sites in the region. The remaining 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.

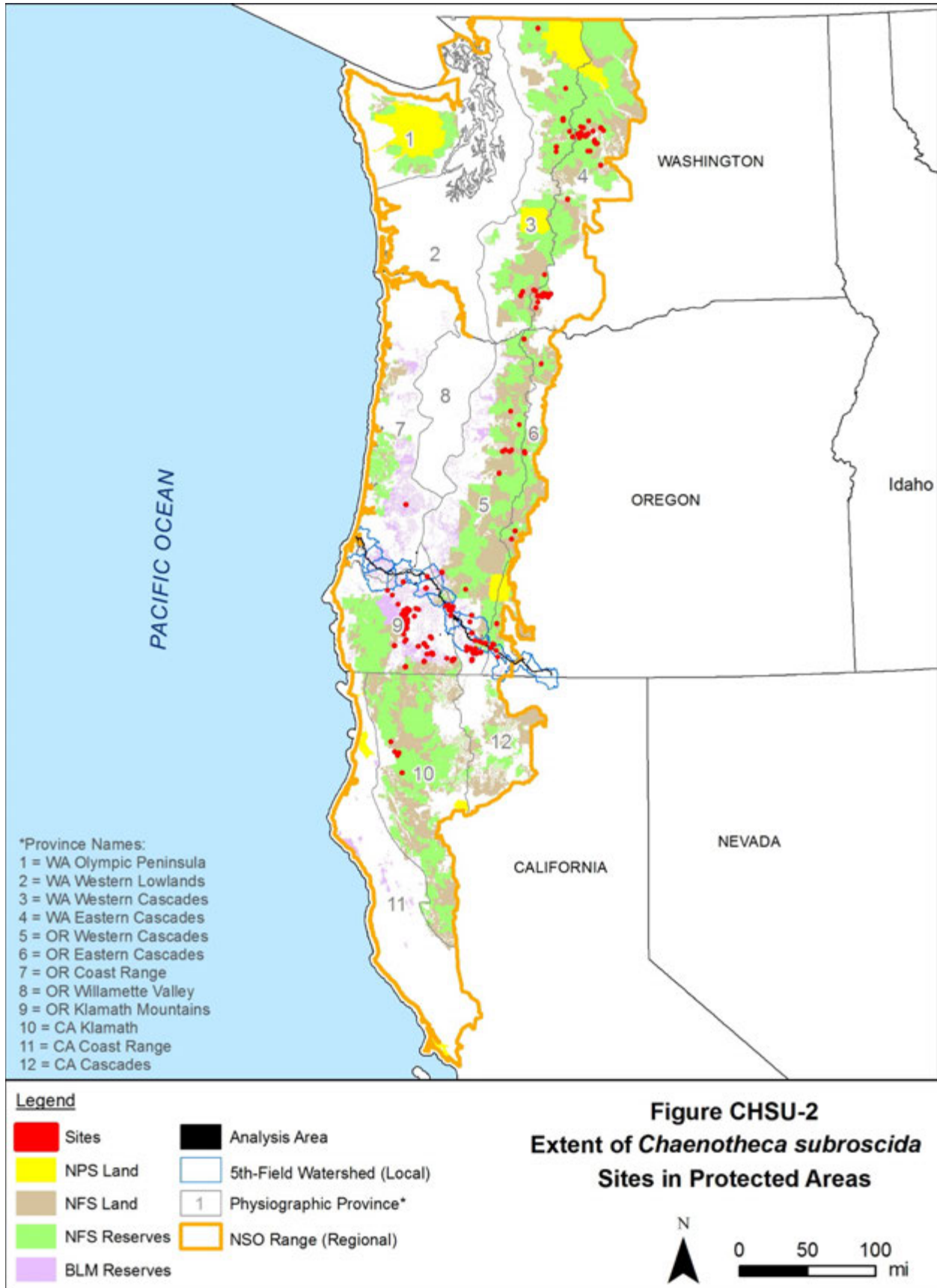
Chaenotheca subroscida is primarily found in LSOG forests based on available data (318 of 396 total sites are in LSOG), and the lichen is presumed to be restricted to certain subcomponents of LSOG forests based on available life history and habitat information. Based on current site locations, the species 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).

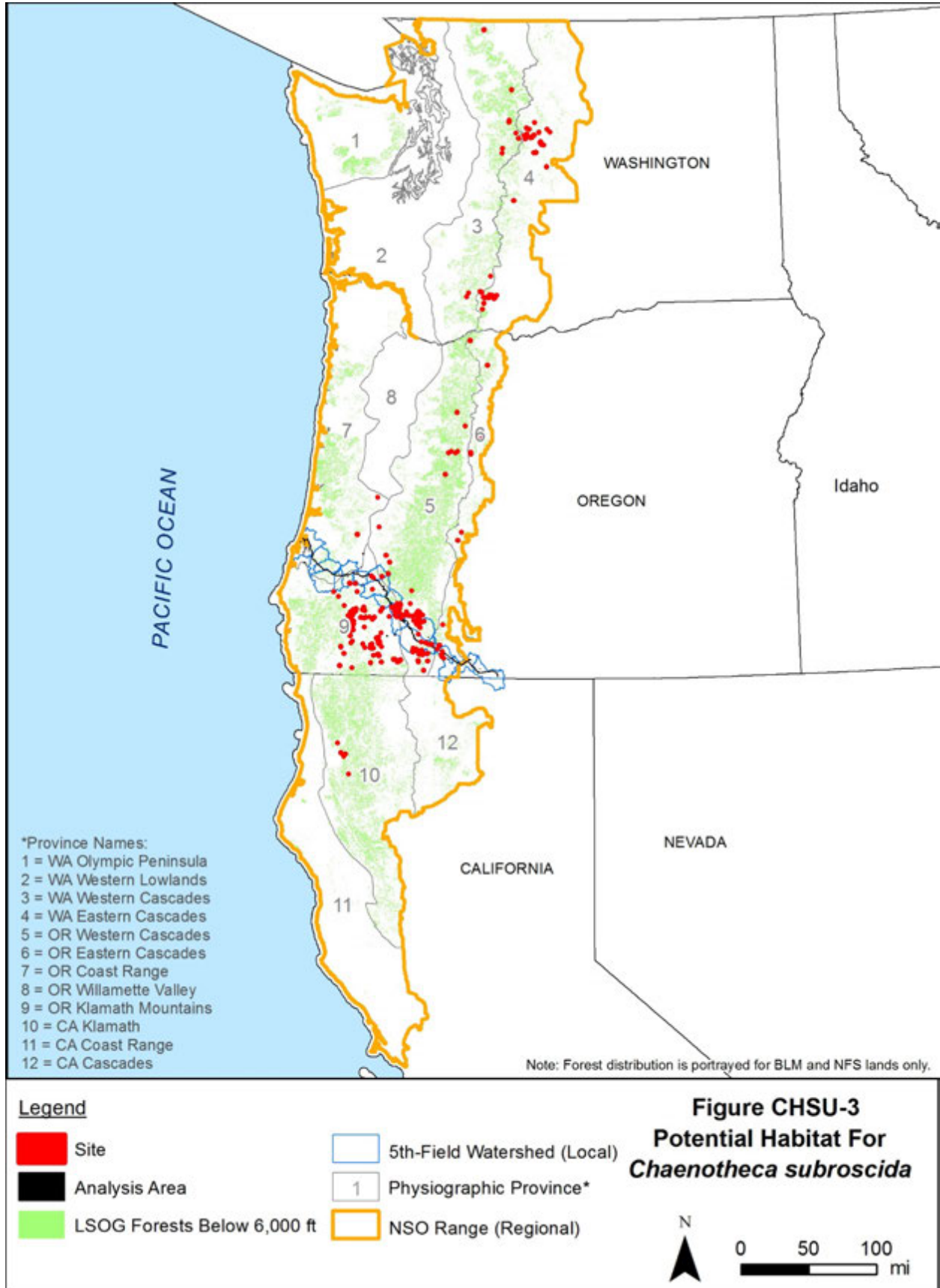
TABLE CHSU-4

Extent of Forests That Could Provide Habitat for <i>Chaenotheca subroscida</i> 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.







Local Distribution

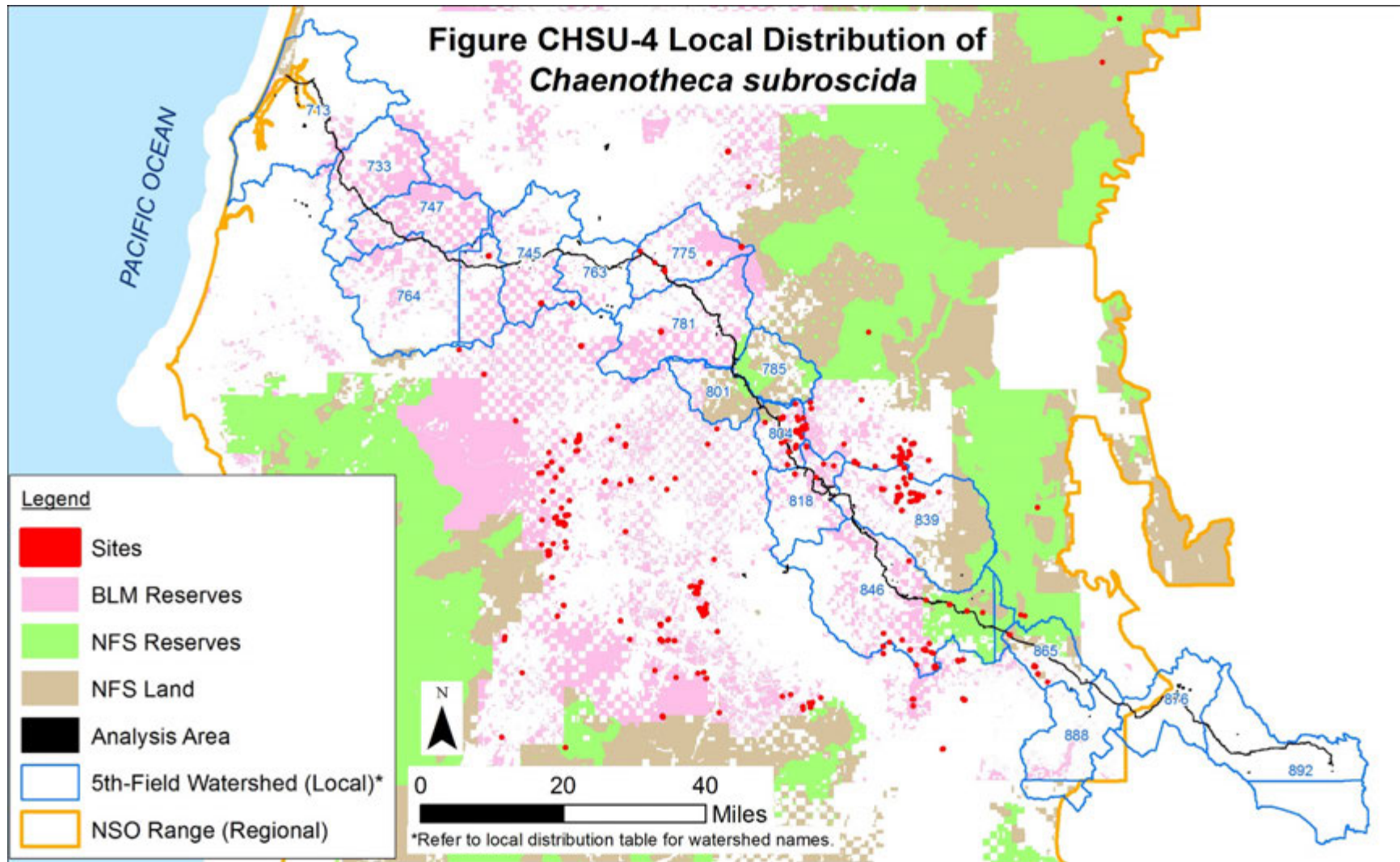
Within the local area, *C. subroscida* is distributed across nine 5th-field watersheds that overlap the project area (see Table CHSU-5 and Figure CHSU-3). The sites in Big Butte Creek, Little Butte Creek, and Trail Creek watersheds are more clustered than sites in the other watersheds. All of the sites 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.

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).



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 <i>Chaenotheca subroscida</i> 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 244 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 124 acres (about 51 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, resulting in a loss of 64 acres of LSOG coniferous and mixed hardwood-coniferous forests below 6,000 feet msl. 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 64 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 244 acres of LSOG coniferous and mixed forests below 6,000 feet msl (a negligible amount of the forests). An estimated 51 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 2001-2003 ASRs 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 concern; 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 <i>Leptogium teretiusculum</i> 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.	

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.

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.

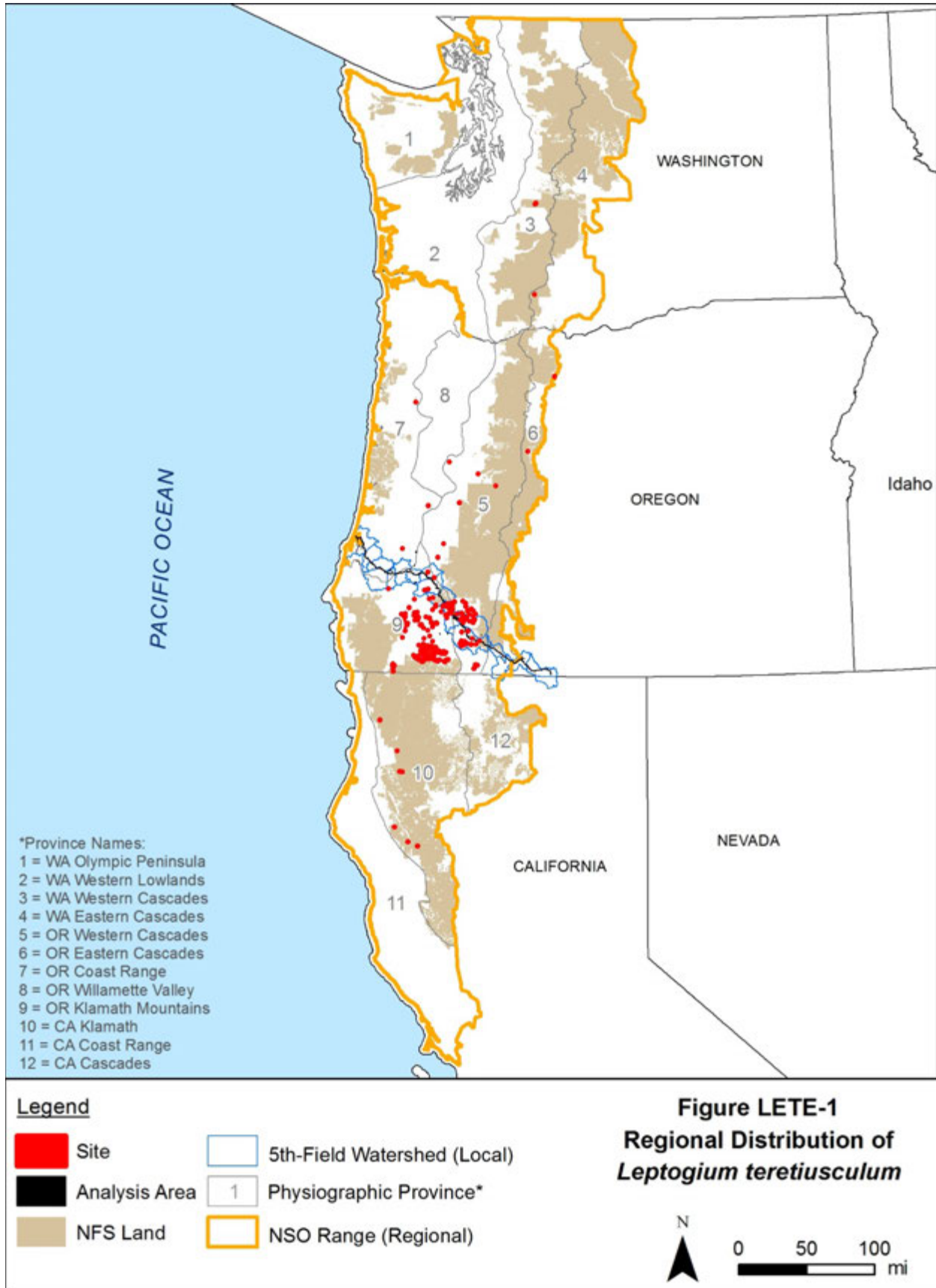
Across the NSO range, nine sites are at least partially located in reserve lands managed by the Forest Service, including eight sites in LSRs, and one site in a Congressionally Reserved area (see Figure LETE-2). These sites represent 56 percent of the total NFS-managed sites in the region. The remaining 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.

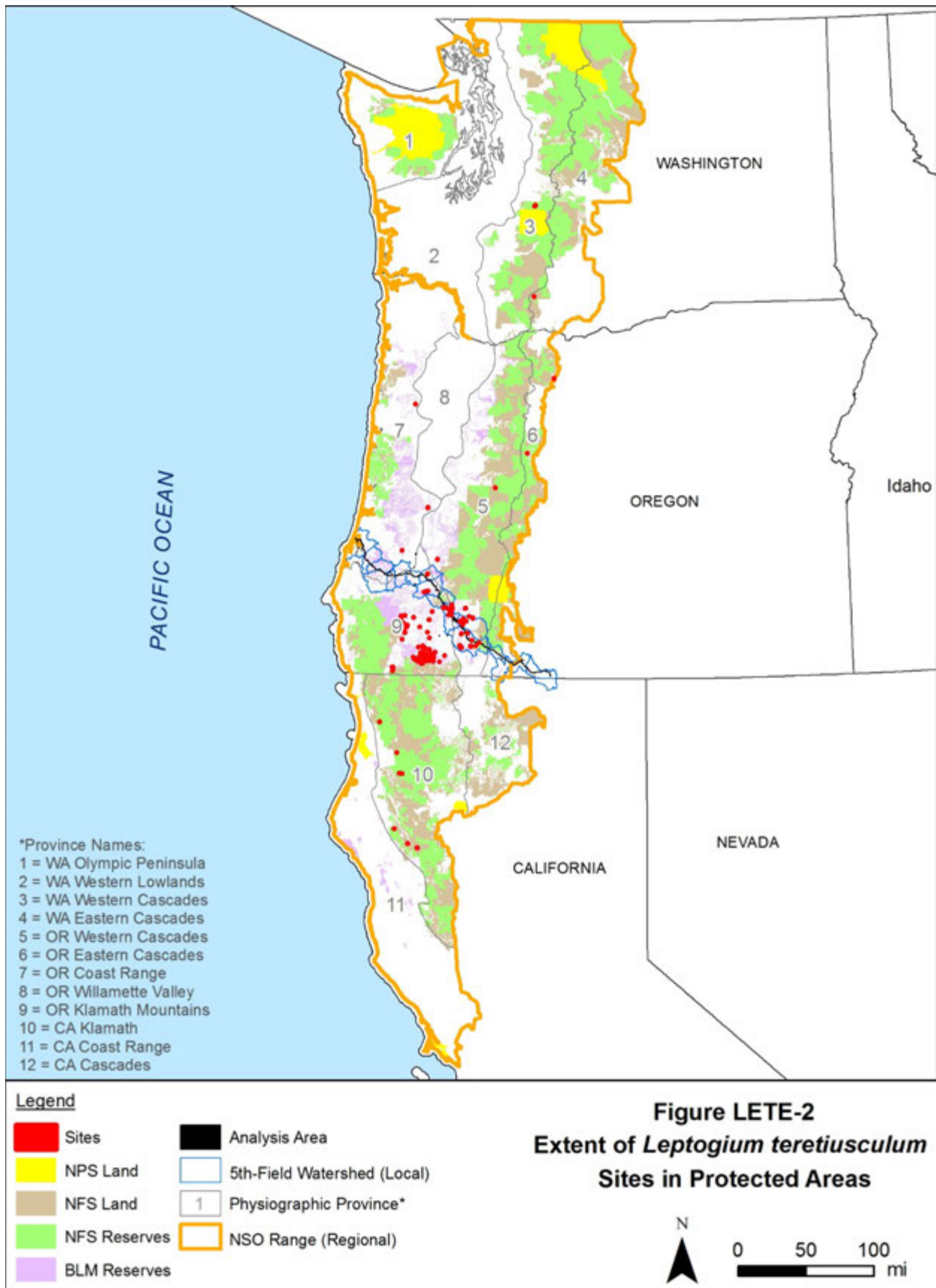
Leptogium teretiusculum is more commonly found in LSOG forests based on available data (187 of 267 total sites are in LSOG), but it is also found in non-LSOG forests and may be restricted to riparian or high humidity areas of coniferous, mixed-hardwood coniferous, and hardwood forests. Based on current 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.

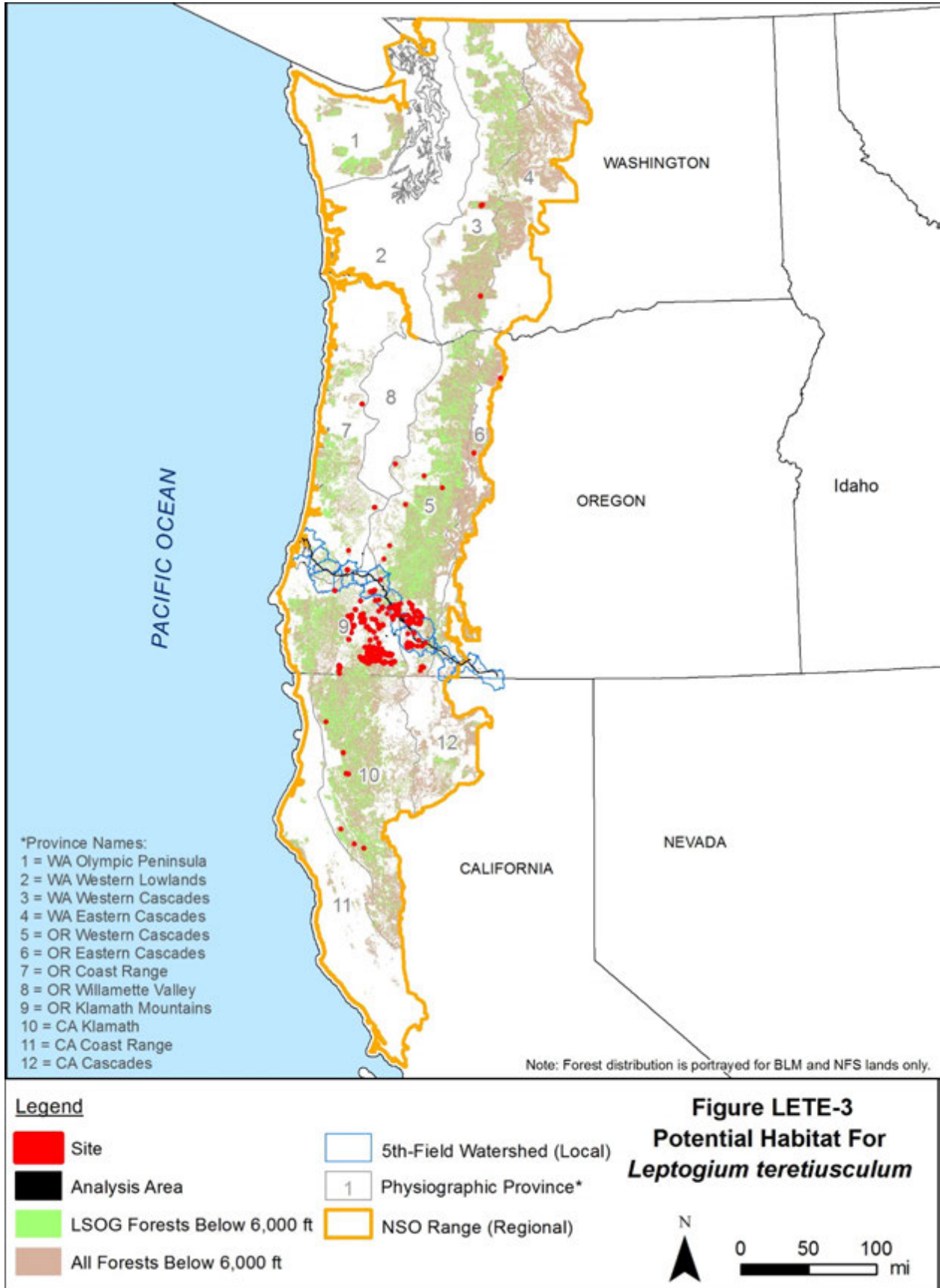
TABLE LETE-4

Extent of Forests That Could Provide Habitat for <i>Leptogium teretiusculum</i> 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.







Local Distribution

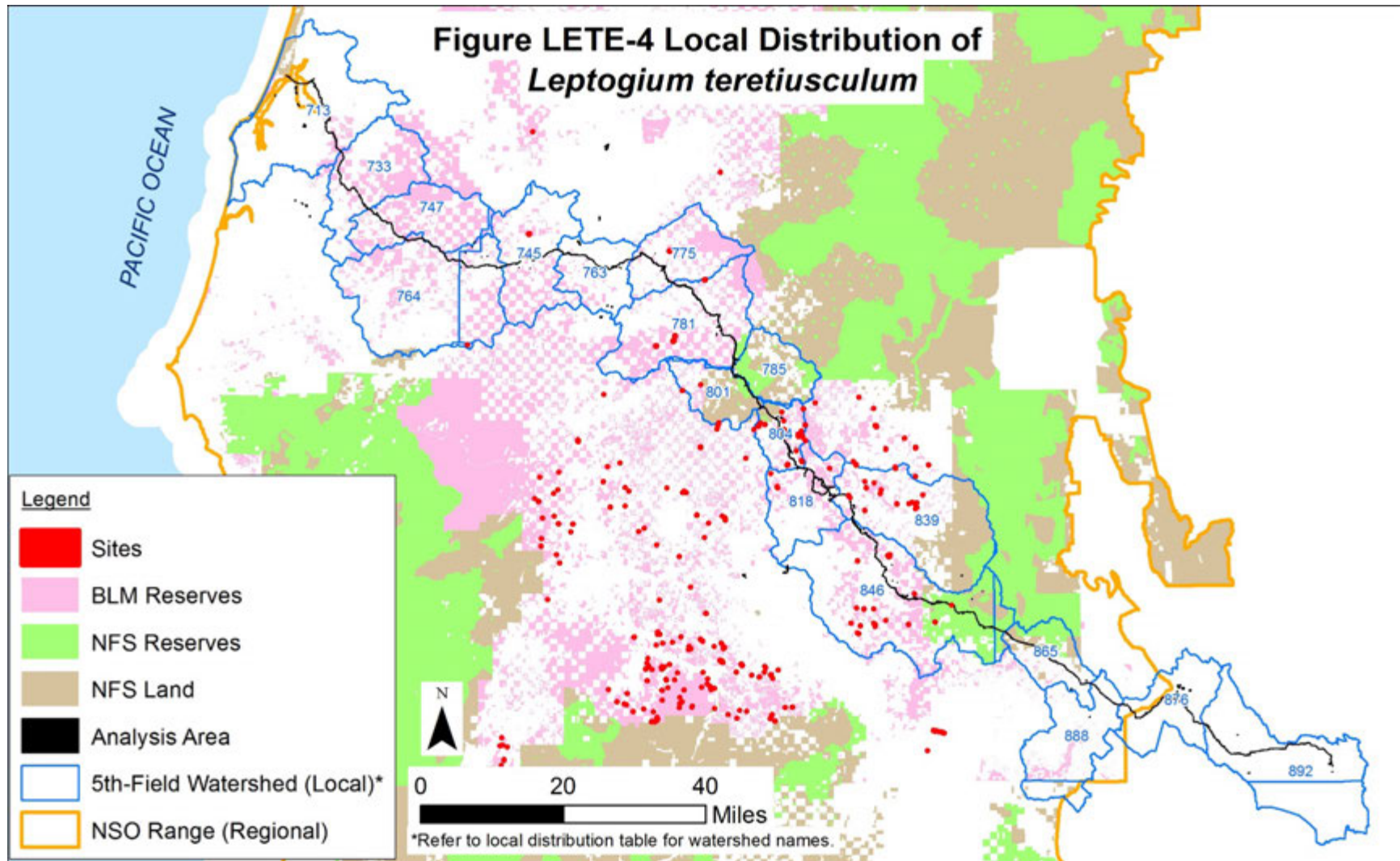
Within the local area, *L. teretiusculum* is distributed across nine 5th-field watersheds that overlap the project area (see Table LETE-5 and Figure LETE-4). The sites in Big Butte Creek, Little Butte Creek, and Trail Creek watersheds are more clustered than sites in the other watersheds. All of the 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.

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).



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 an 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 <i>Leptogium teretiusculum</i> 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 1,226 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl, including 246 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 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 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 teretiuscolum* 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 teretiuscolum* 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. teretiuscolum*.
- The PCGP Project would affect one of 16 NFS sites of *L. teretiuscolum*, 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. teretiuscolum* 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. teretiuscolum* 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 1,225 acres of coniferous, mixed hardwood-coniferous, and hardwood forests and 246 acres of LSOG 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 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 2001-2003 ASRs 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 sparse, *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 (Seever 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.

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.

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.

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.

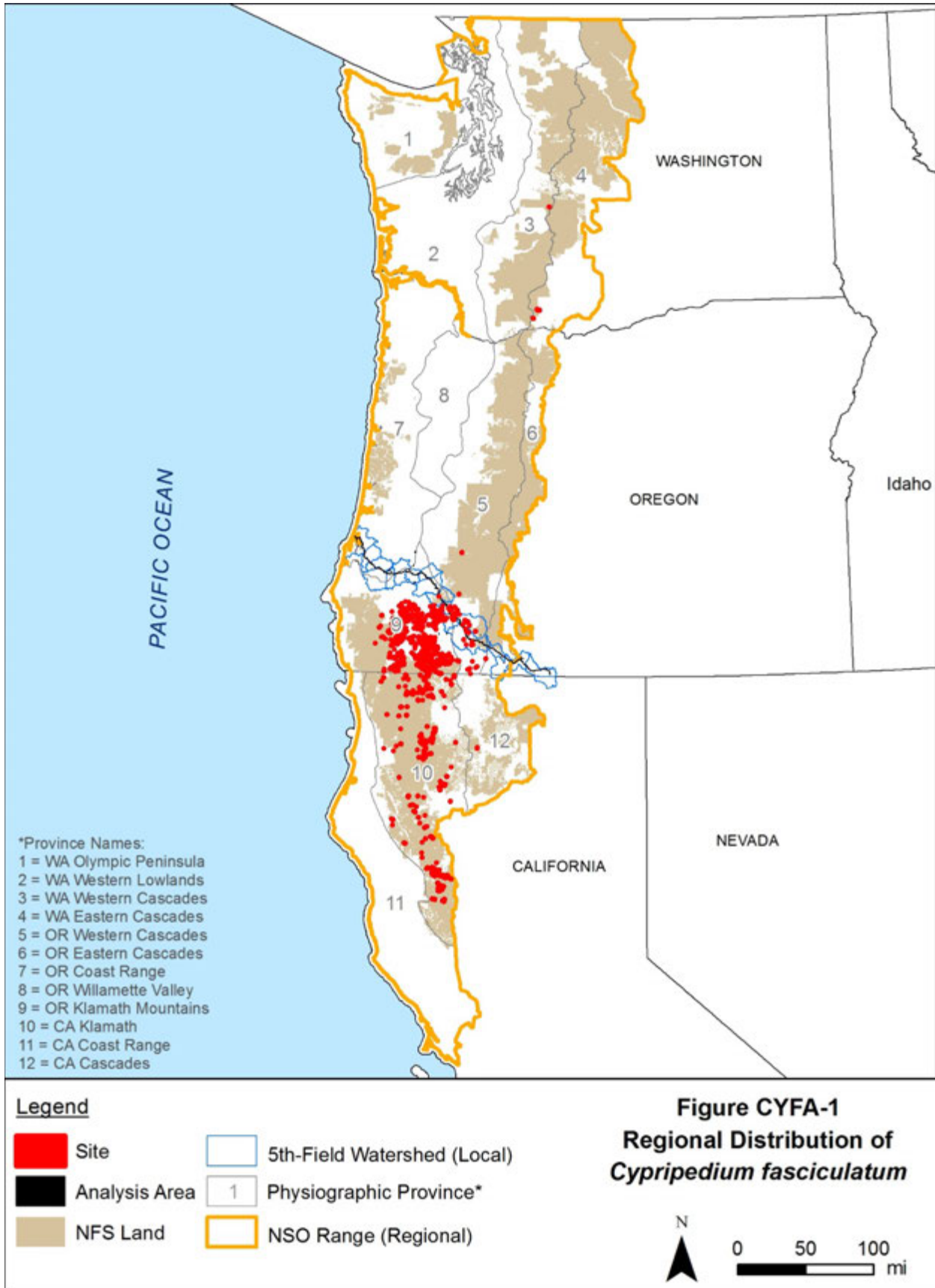
Of the 1,392 known sites in the region, 193 sites are at least partially located on private lands; 833 sites are at least partially on BLM lands, and 540 sites are at least partially on NFS lands across the region. Sites included on the National Forests that encompass the project area include 237 sites 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.

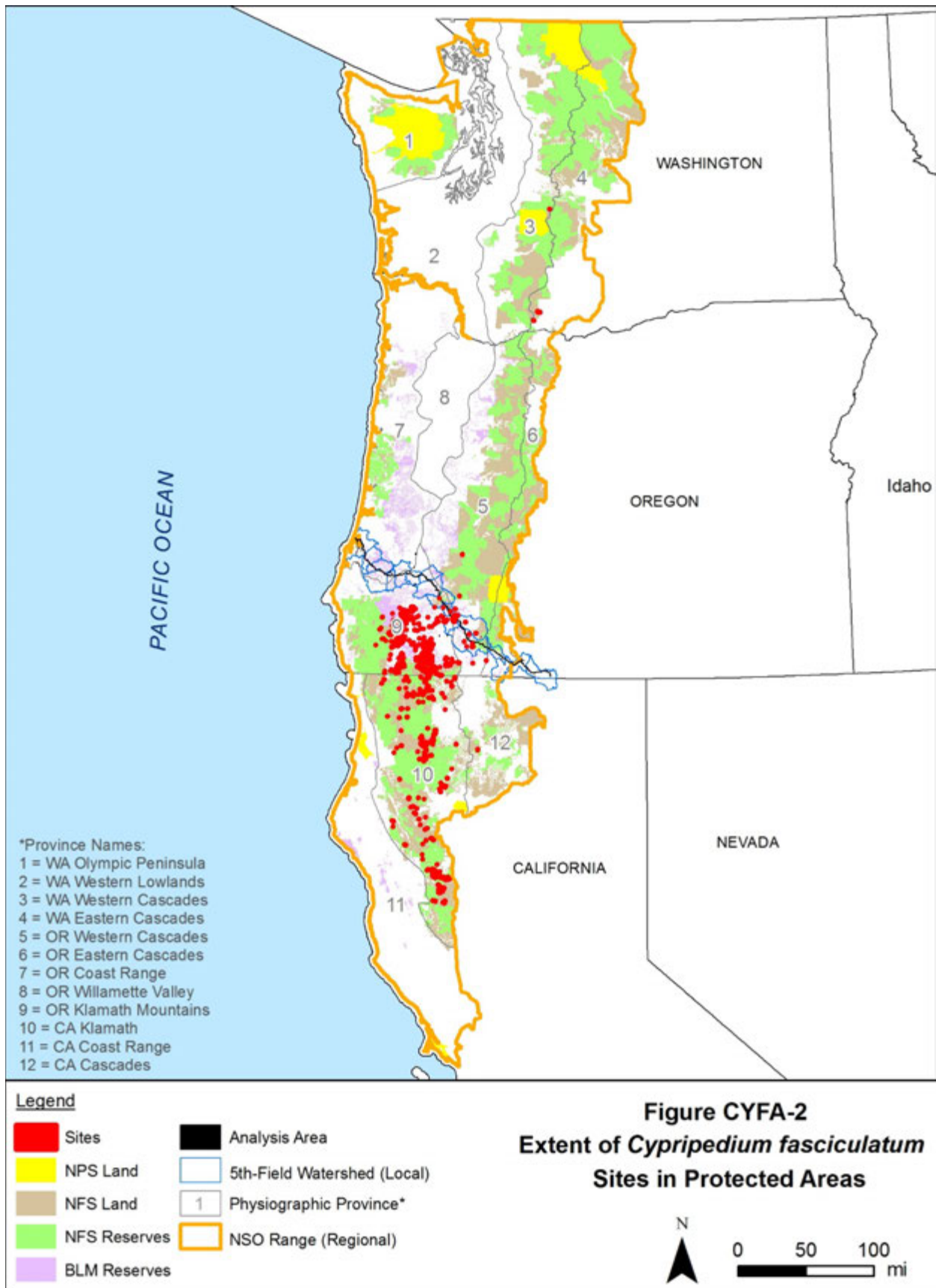
The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards and Guidelines and other land management plan components. Additionally, 451 sites are located entirely in BLM reserves across the region, which represents 54 percent of the total number of BLM-managed 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.

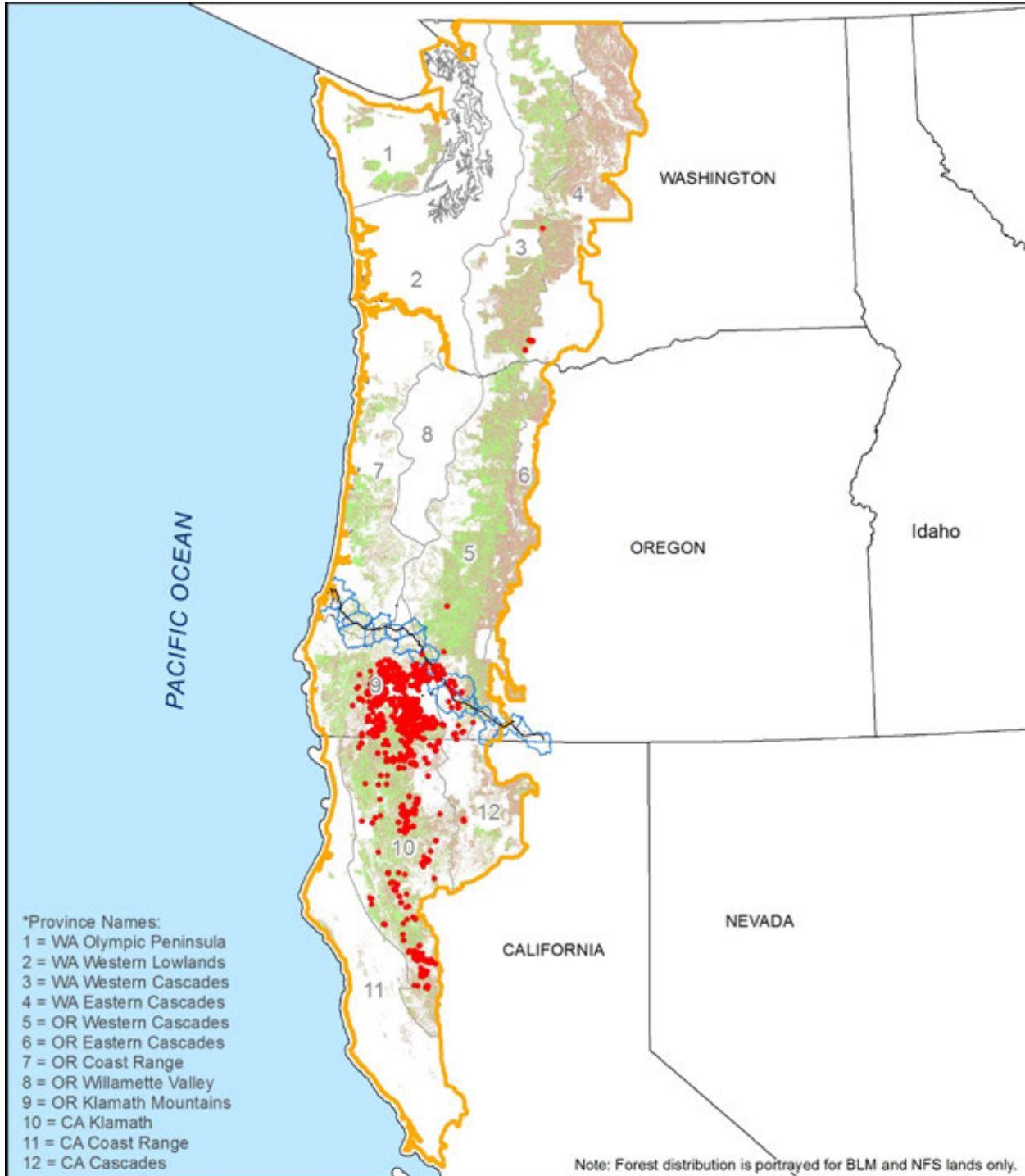
C. fasciculatum is more commonly found in LSOG forests based on available data (1,203 of 1,392 total sites are in LSOG), but it is also relatively common in non-LSOG forests and has been found in a variety of forest types. Based on current site locations, the species is found primarily in coniferous 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.

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 Moerur 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.







Legend

- Site
- Analysis Area
- LSOG Forests Below 7,000 ft
- Conifer/Mixed Below 7,000 ft
- 5th-Field Watershed (Local)
- 1 Physiographic Province*
- NSO Range (Regional)

Figure CYFA-3
Potential Habitat For
Cypripedium fasciculatum



Local Distribution

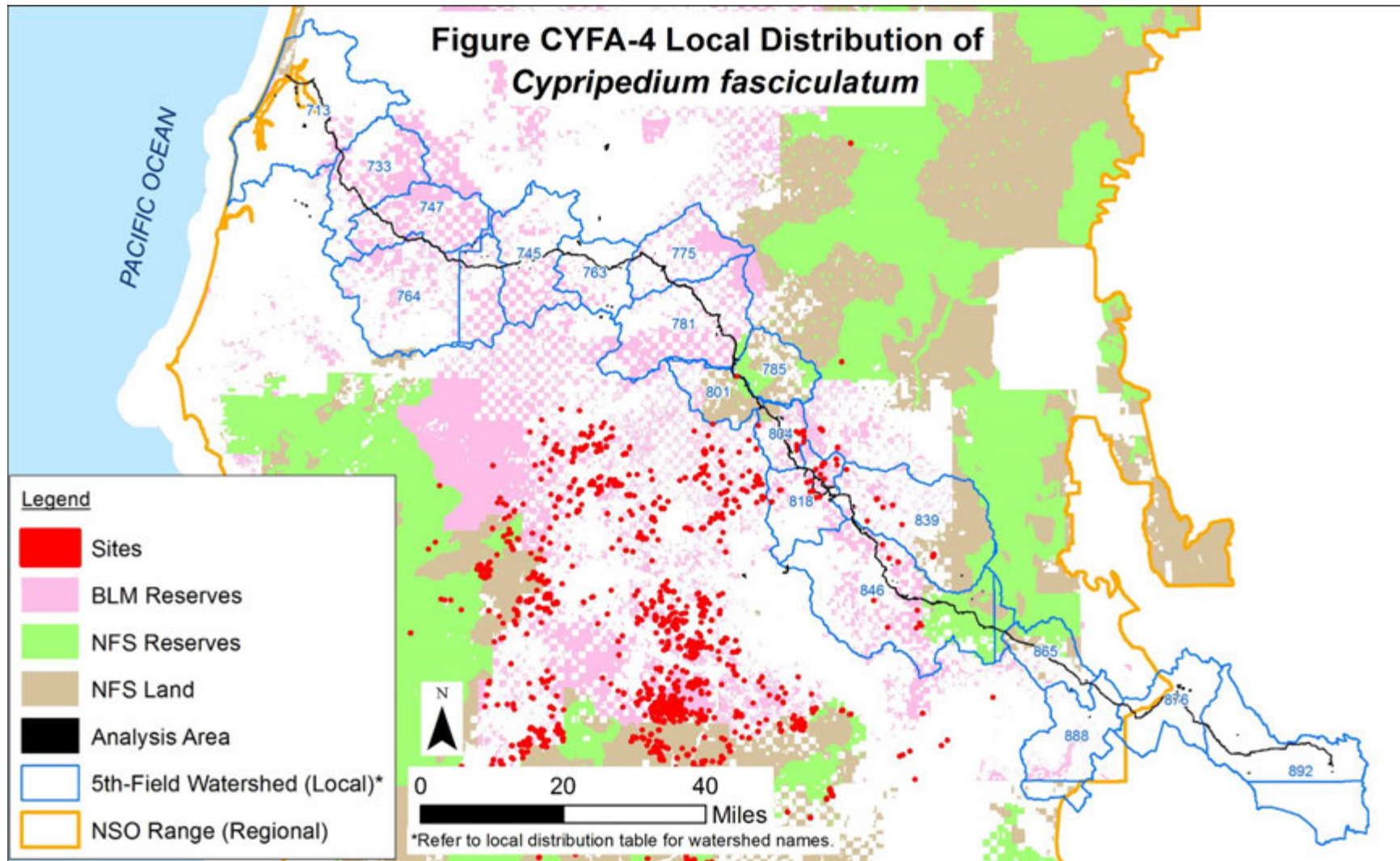
Within the local area, *C. fasciculatum* is distributed across five 5th-field watersheds that overlap the project area (see Table CYFA-5 and Figure CYFA-4). Sites in four of the watersheds are clustered and close to one another. Scattered sites are located in the Upper Cow Creek and Big Butte Creek watersheds. 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).

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.



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 <i>Cyripedium fasciculatum</i> 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 1,132 acres of coniferous and mixed hardwood-coniferous forests below 7,000 feet msl, including 244 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 1,132 acres of coniferous and mixed forests and 243 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.

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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 2001-2003 ASRs 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

Appendix F.5. Survey and Manage Species Persistence Evaluation

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 <i>Deroceras hesperium</i> 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 <i>Deroceras hesperium</i> 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 <i>Deroceras hesperium</i> 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.

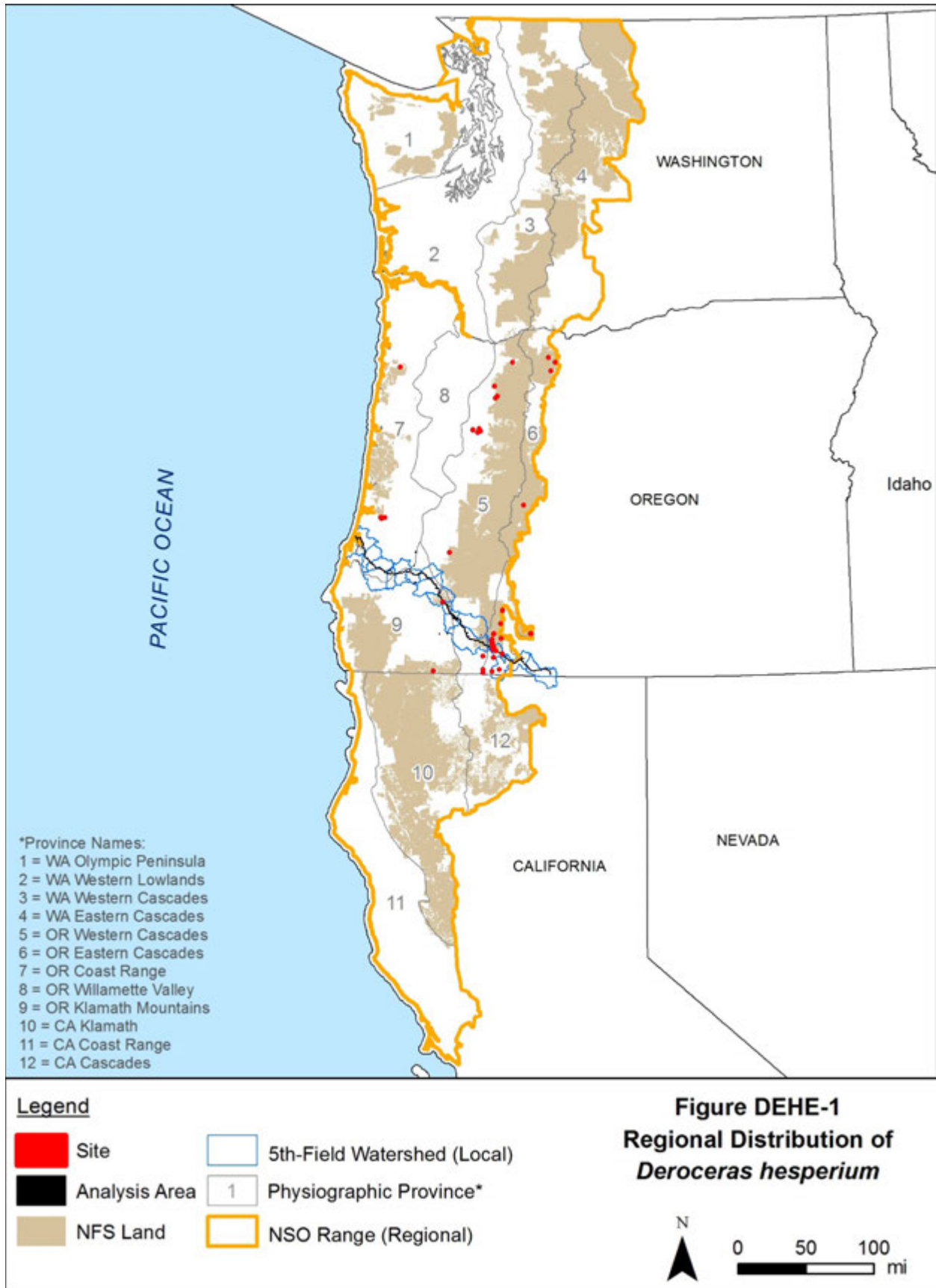
Across the NSO range, 13 sites are at least partially located in reserve lands managed by the Forest Service, including one in a Congressionally Reserved Area, six in LSRs, and eight in Riparian Reserves (see Figure DEHE-2). This represents 48 percent of the total Forest Service-managed sites in the 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.

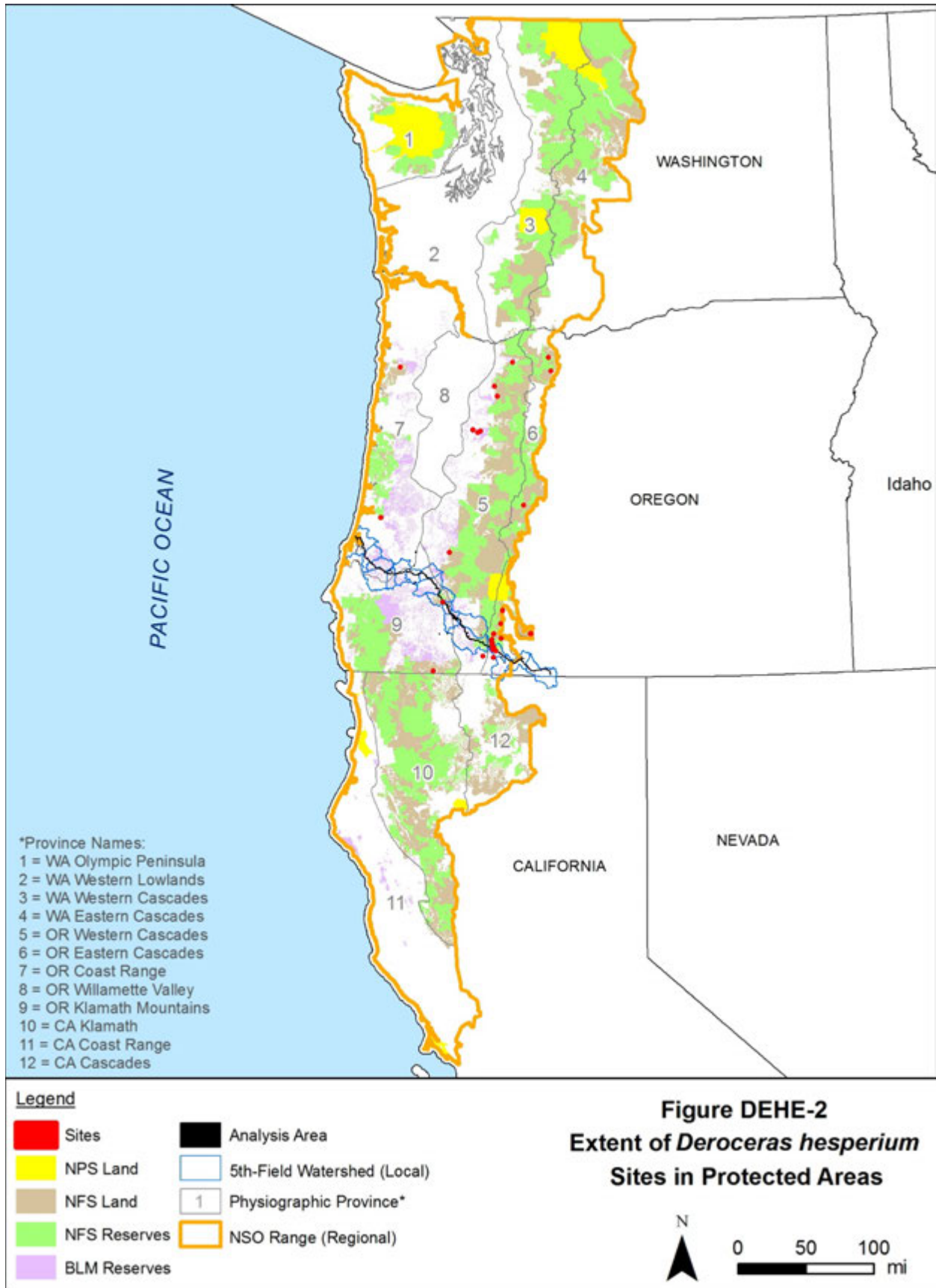
Deroceras hesperium is more common in LSOG forests based on available data (32 of 54 total sites are in LSOG) and may be restricted to moist conditions associated with riparian areas. Based on current site locations, the species is primarily found in coniferous, mixed hardwood-coniferous forests and 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.

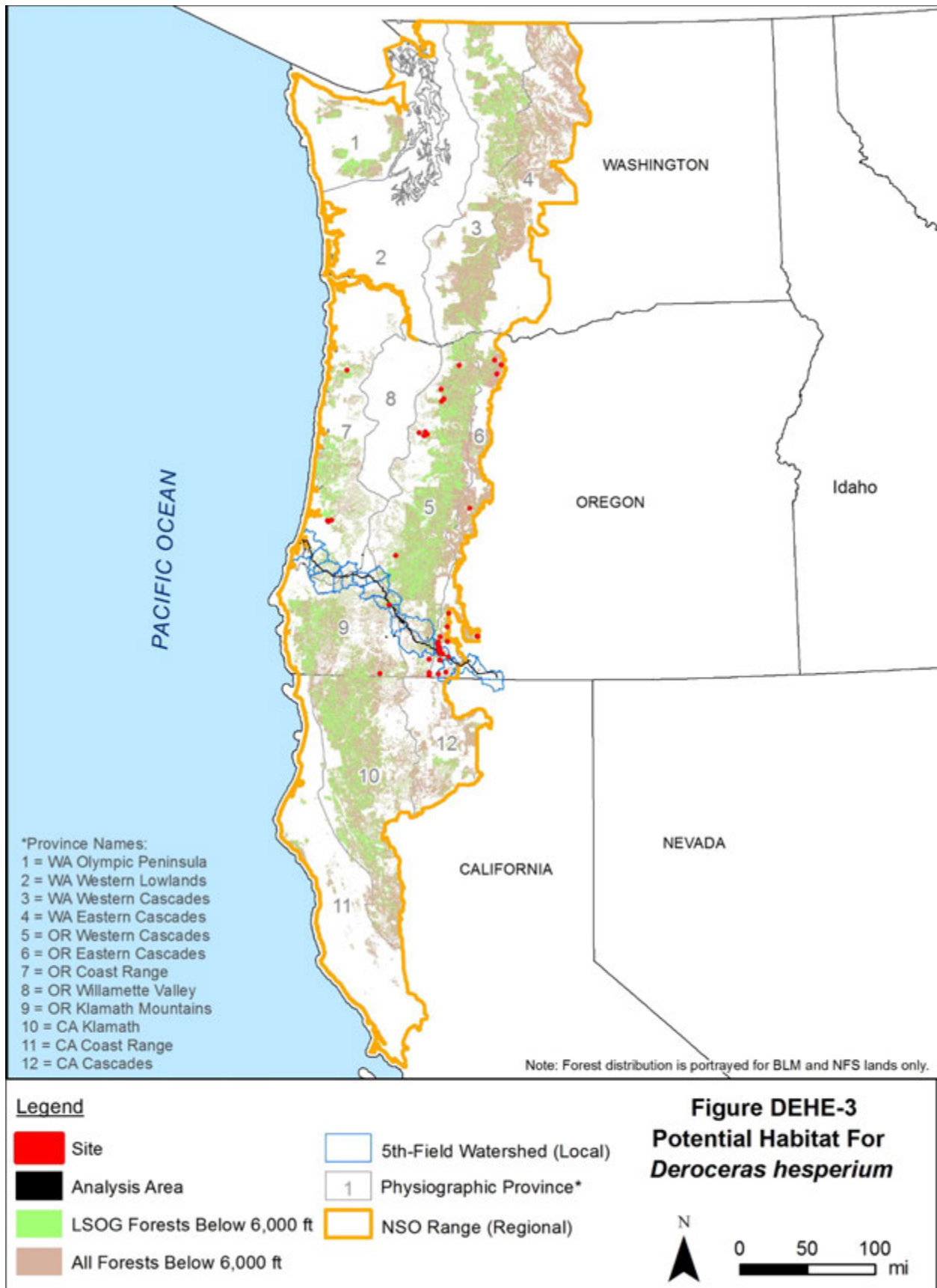
TABLE DEHE-4

Extent of Forests that Could Provide Habitat for <i>Deroceras hesperium</i> 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.







Local Distribution

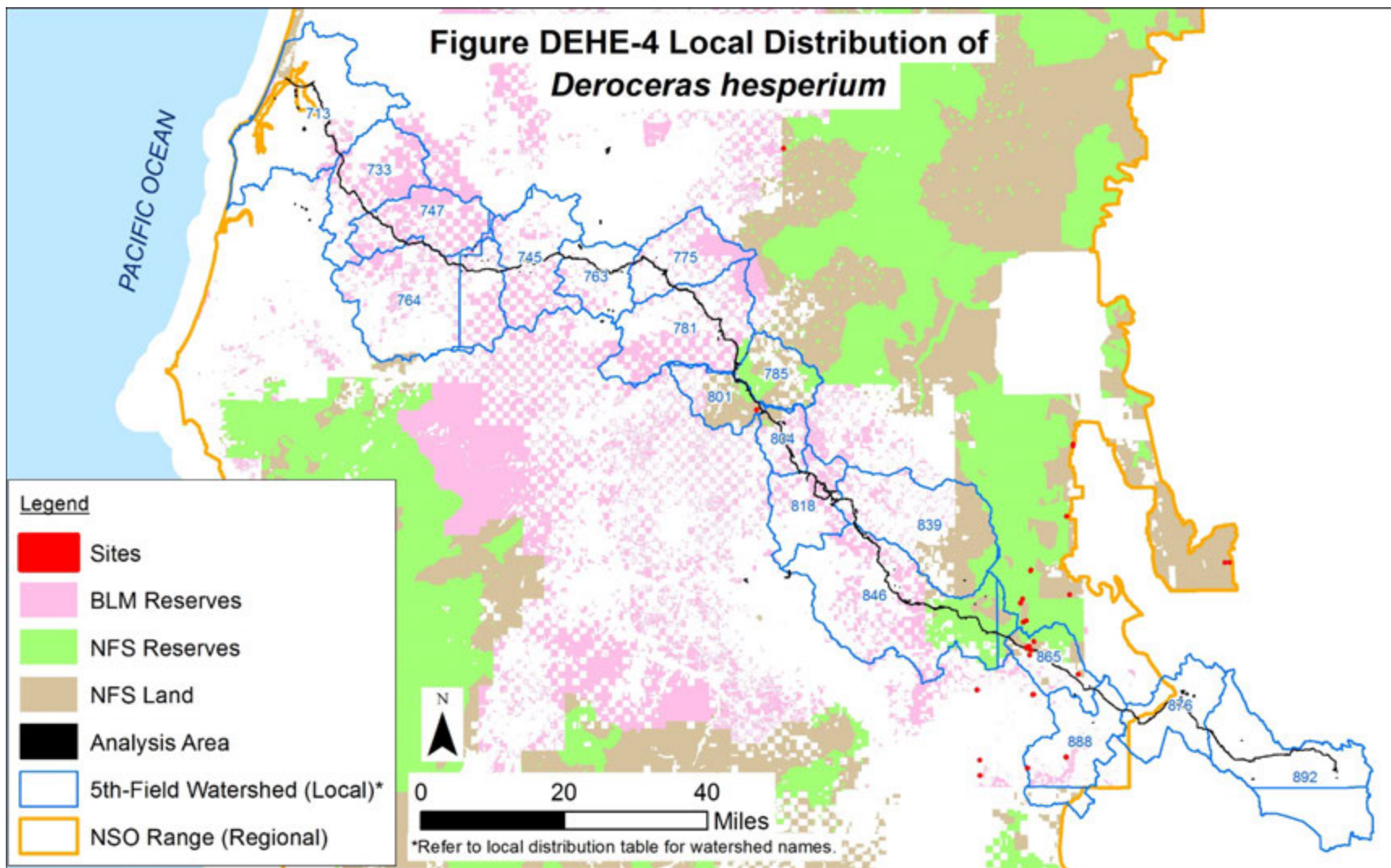
Within the local area, *D. hesperium* is found in three 5th-field watersheds (Klamath River-John C. Boyle Reservoir, Spencer Creek, and Upper Cow Creek) that overlap the project area (see Table DEHE-5 and Figure DEHE-4). The majority of the 14 local sites are in the eastern Cascade Range in the eastern 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).

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.



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

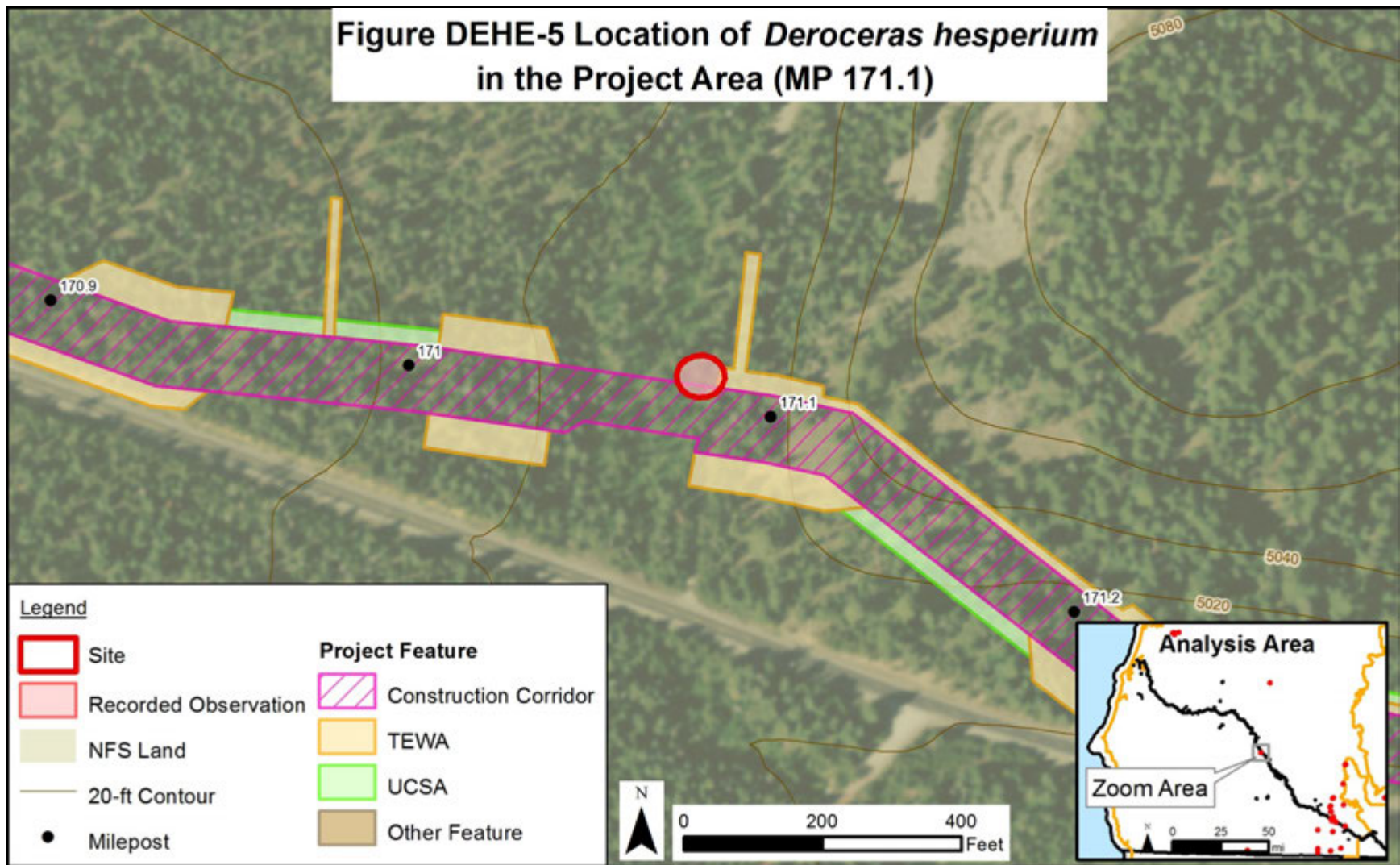
Analysis

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.

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).



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 1,225 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,000 feet msl, including 246 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 50 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 1,225 acres of coniferous, mixed hardwood-coniferous, and hardwood forests and 246 acres of LSOG 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 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 2001-2003 ASRs 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 rockslides, 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 <i>Monadenia chaceana</i> Sites (2017)	
Location*	Number of Sites
Regional Area	410
Local Area	160
Analysis Area (Project Area)	12 (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 MOCH-2			
Distribution of <i>Monadenia chaceana</i> across Federal, Private, and Other Lands			
Land Ownership	Regional Sites	Local Sites	Analysis Area Sites
Forest Service	258	81	7
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 <i>Monadenia chaceana</i> 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	6
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.

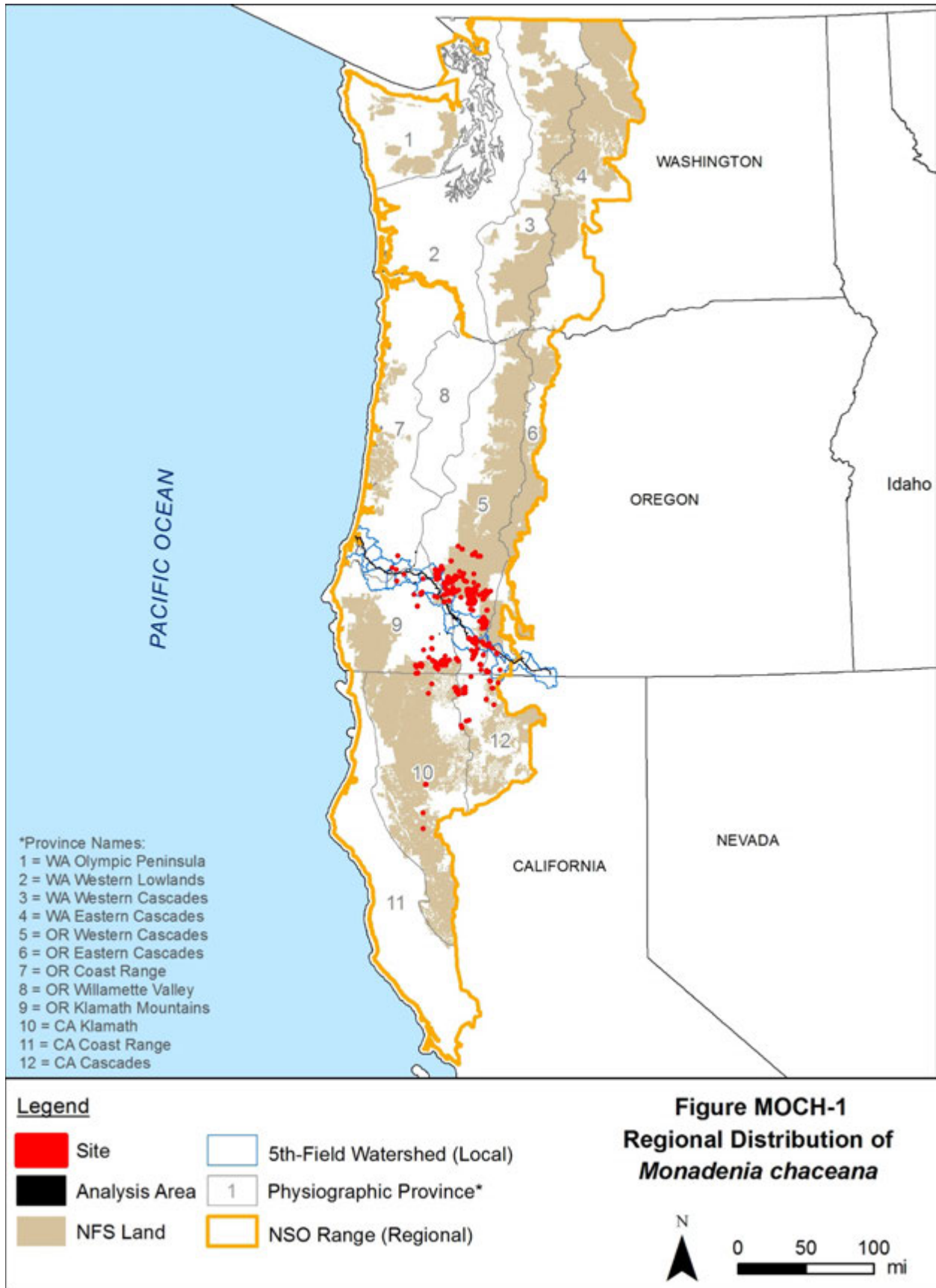
Across the NSO range, 54 sites are at least partially located on reserve lands managed by the Forest Service, including 44 in LSRs, six in Known Owl Activity Centers, five in Congressionally Reserved areas, and two in Riparian Reserves (see Figure MOCH-2). This represents 21 percent of the total Forest 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.

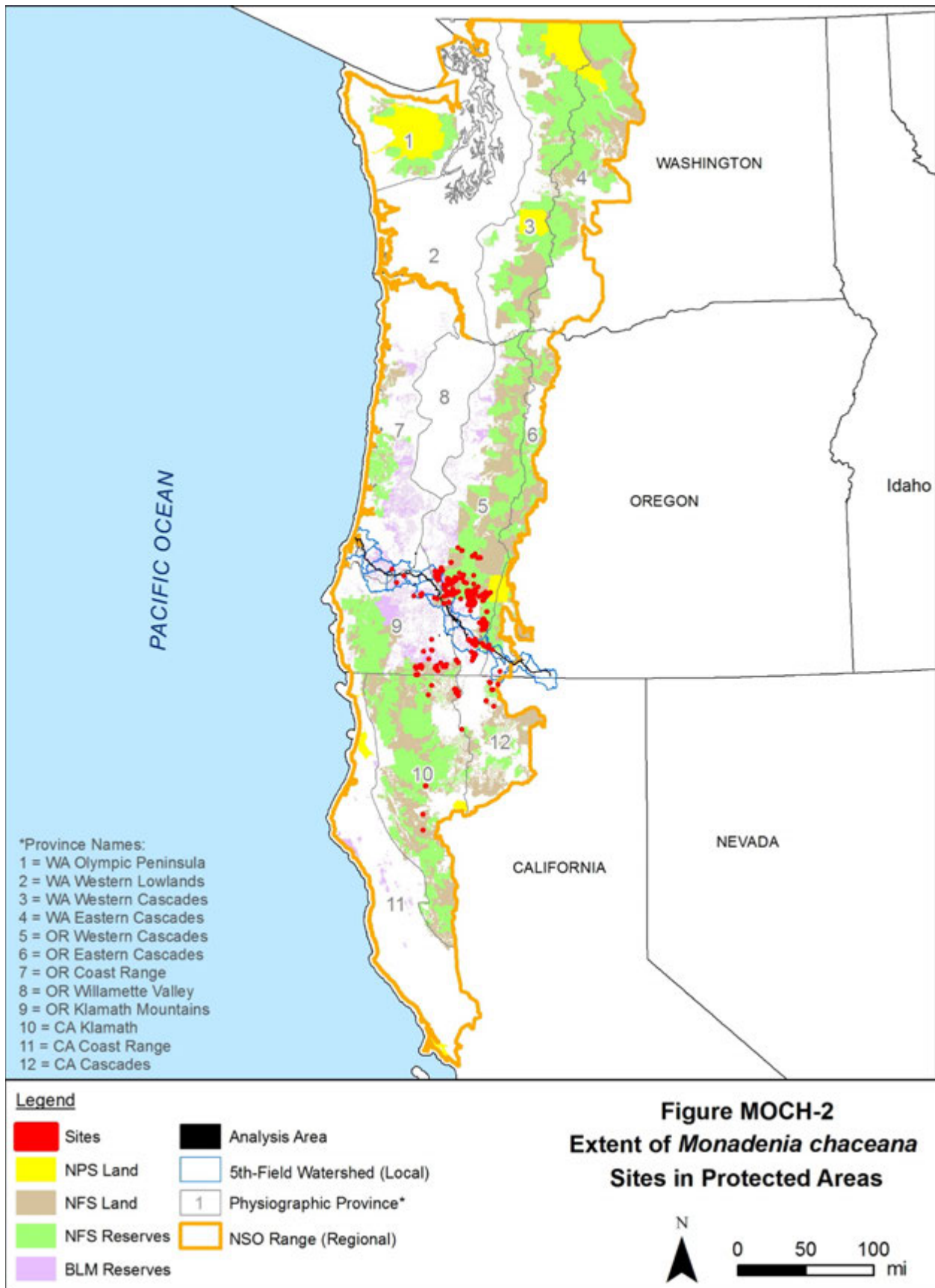
Monadenia chaceana is less common in LSOG forests based on available data (193 of 410 total sites are in LSOG) and is relatively common in non-LSOG forests. Based on current site locations, the species is found in coniferous, mixed hardwood-coniferous, and hardwood forests between about 1,500–6,300 feet 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.

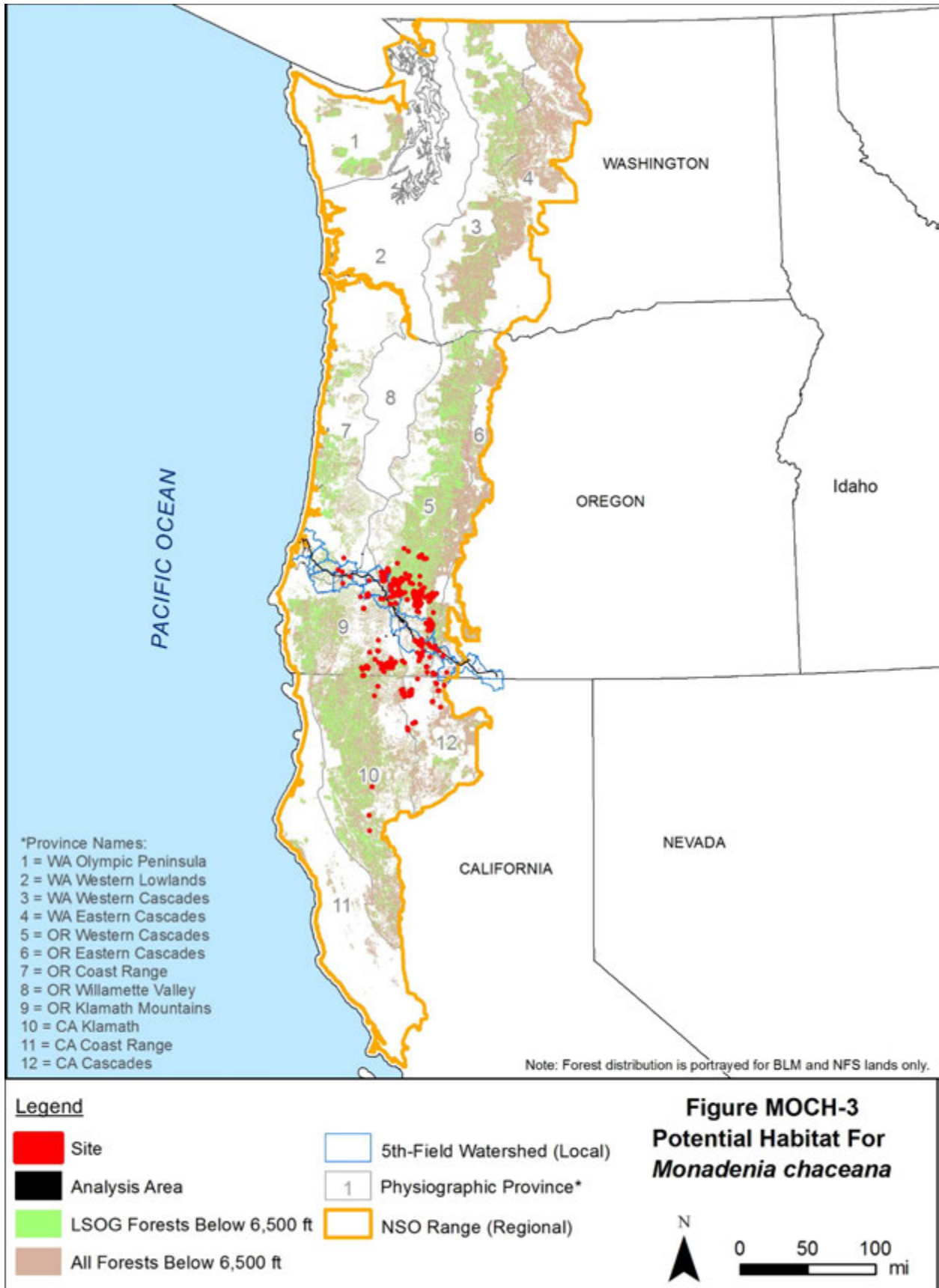
TABLE MOCH-4

Extent of Forests that Could Provide Habitat for <i>Monadenia chaceana</i> 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.







Local Distribution

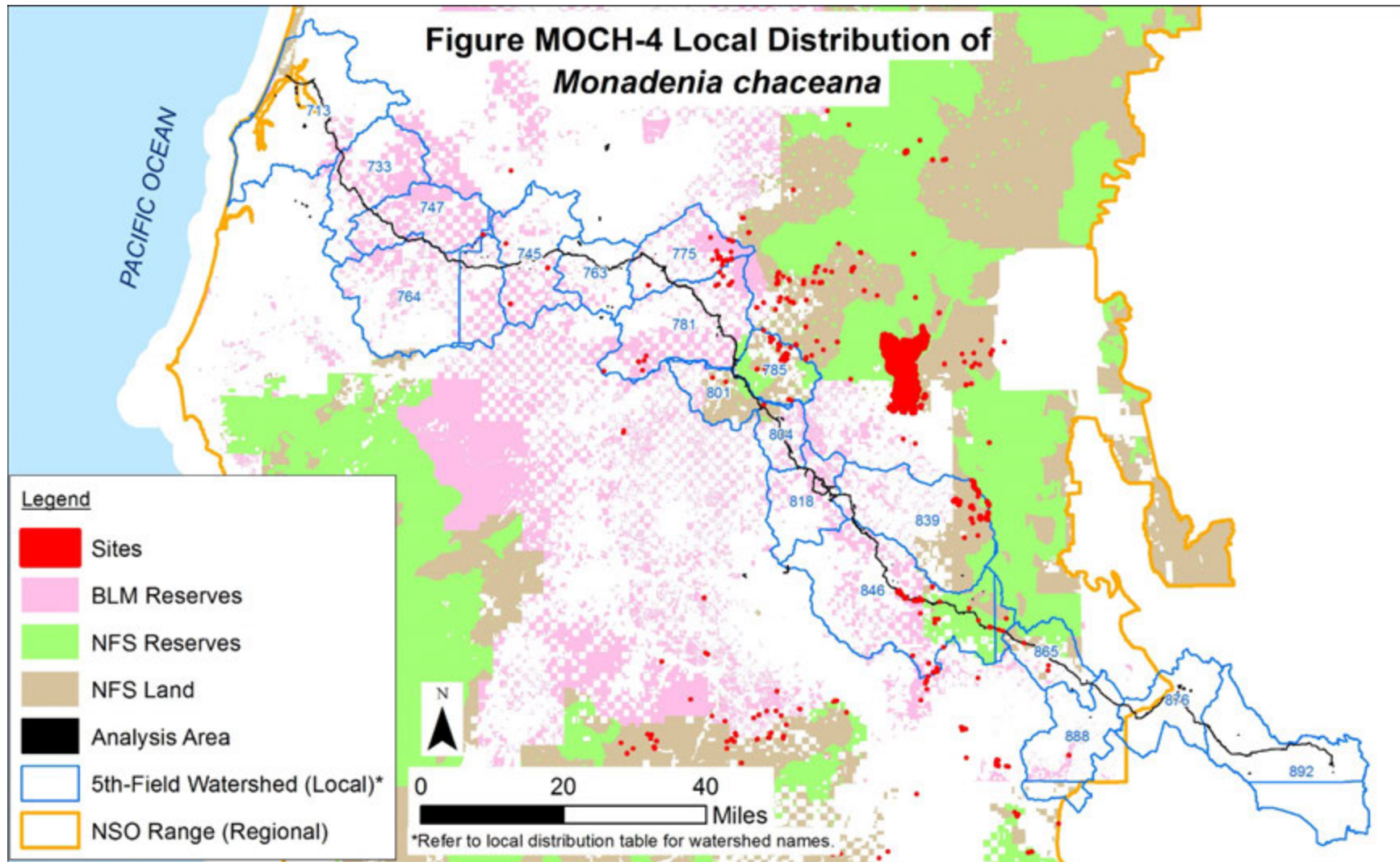
Within the local area, *M. chaceana* is distributed across 10 5th-field watersheds that overlap the project area (see Table MOCH-5 and Figure MOCH-4). The sites are scattered across the local area in the Coast Range, Klamath Mountains, and Cascade Range. Most sites appear clustered and near one another, 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).

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.



Analysis/Project Area Distribution

The analysis area contains 12 sites of *M. chaceana*, and the project area contains five sites. Seven 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 12 sites in the analysis area; the other observations are in sites outside the analysis area.

Project Impacts

Analysis

The PCGP Project would affect seven 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 12 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 0.2 acre within three sites (about 92 percent of the three sites), and four 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 0.2 acre of vegetation and soils within three 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 four 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 <i>Monadenia chaceana</i> Sites on NFS Lands in the Project Area		
Project Activity	Number of Sites Affected	Area of Disturbance within Sites
Construction Corridor	3	0.2 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 1,226 acres of coniferous, mixed hardwood-coniferous, and hardwood forests below 6,500 feet msl, including 246 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 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 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 seven sites on NFS lands as a result of the PCGP Project, 74 *M. chaceana* sites would remain on NFS lands in the local area, including 14 at least partially in reserves, and 251 sites, including 48 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 19 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 seven 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 12 sites in the analysis area, a moderate-high number of sites (251) would continue to be documented on NFS lands in the region with a somewhat wide distribution across Oregon and California. Many sites (74) 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 six sites in NFS reserves, and the percentage of sites in NFS reserves would decrease from 21 percent to 19 percent. Of the remaining sites, 44 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, 251 sites would remain on NFS lands across the region, and 74 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 seven 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 1,226 acres of all forests and 246 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 11.8 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 2001-2003 ASRs 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 no 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 <i>Arborimus longicaudus</i> 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 <i>Arborimus longicaudus</i> 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.			

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 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.

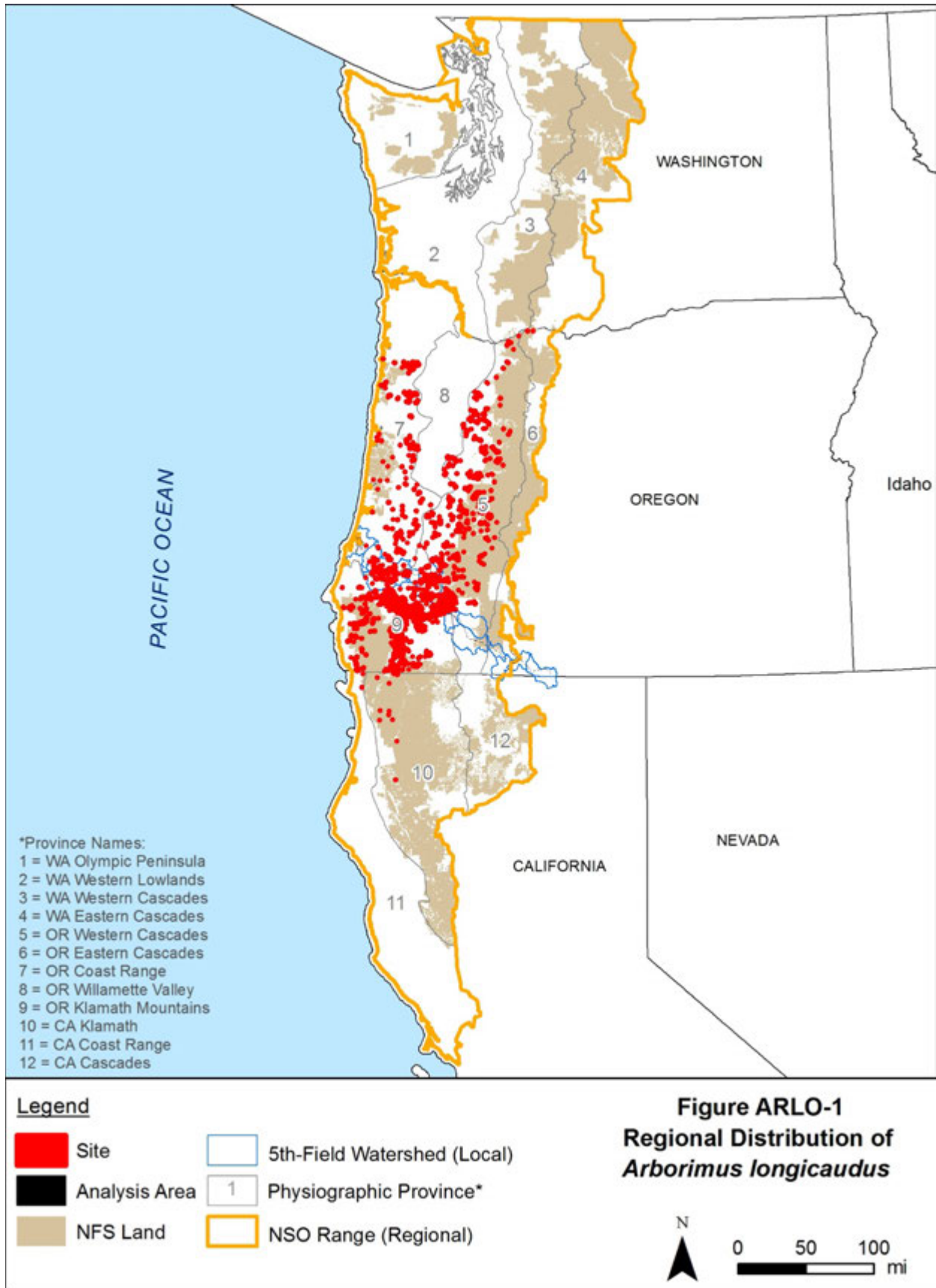
Arborimus longicaudus is primarily found in LSOG forests based on available data (4,499 of 4,946 total sites are in LSOG) and seems to prefer specific microclimates of LSOG forests, although it is occasionally found in younger forests. Based on current site locations, the species is primarily found in 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.

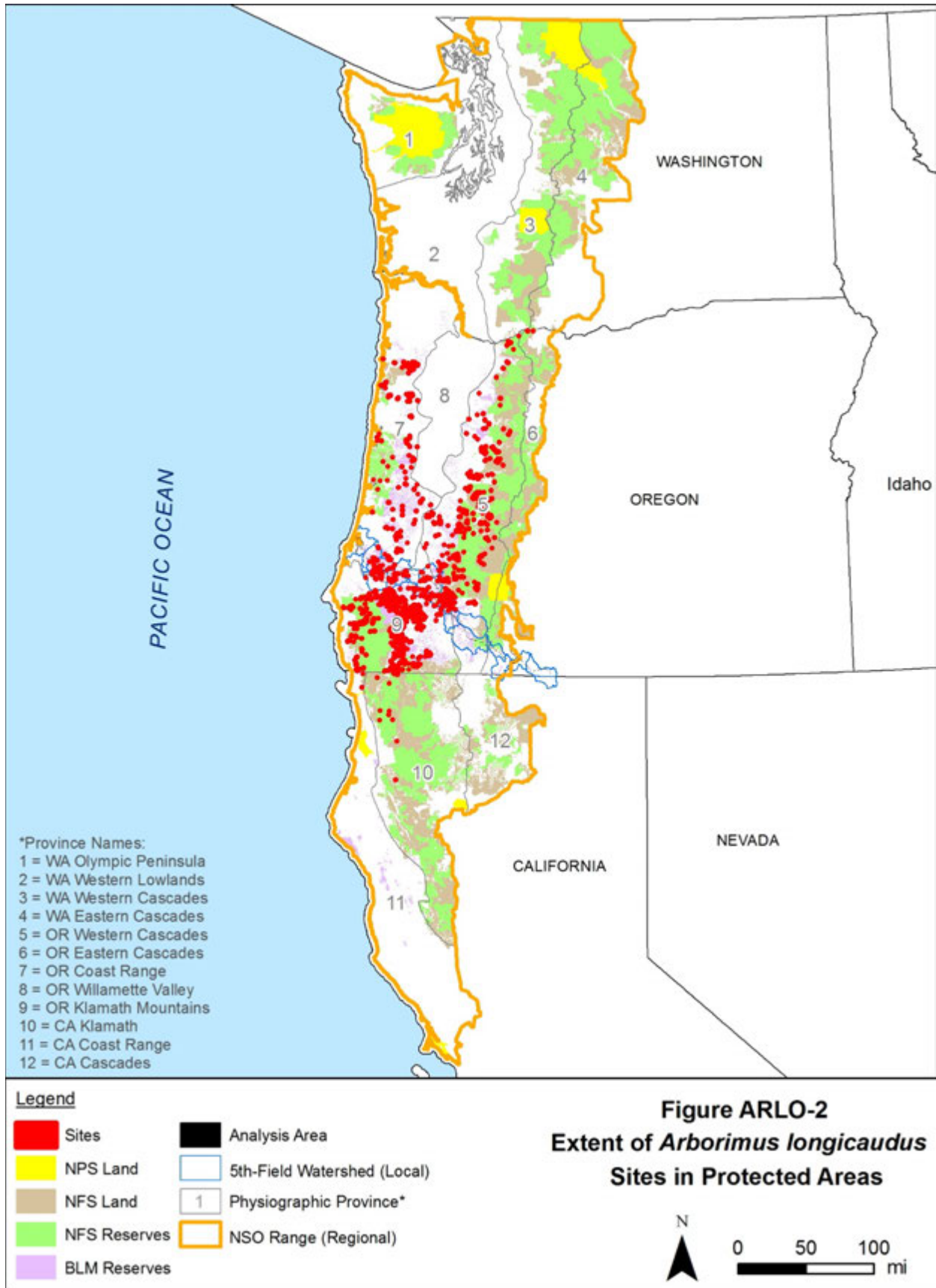
TABLE ARLO-4

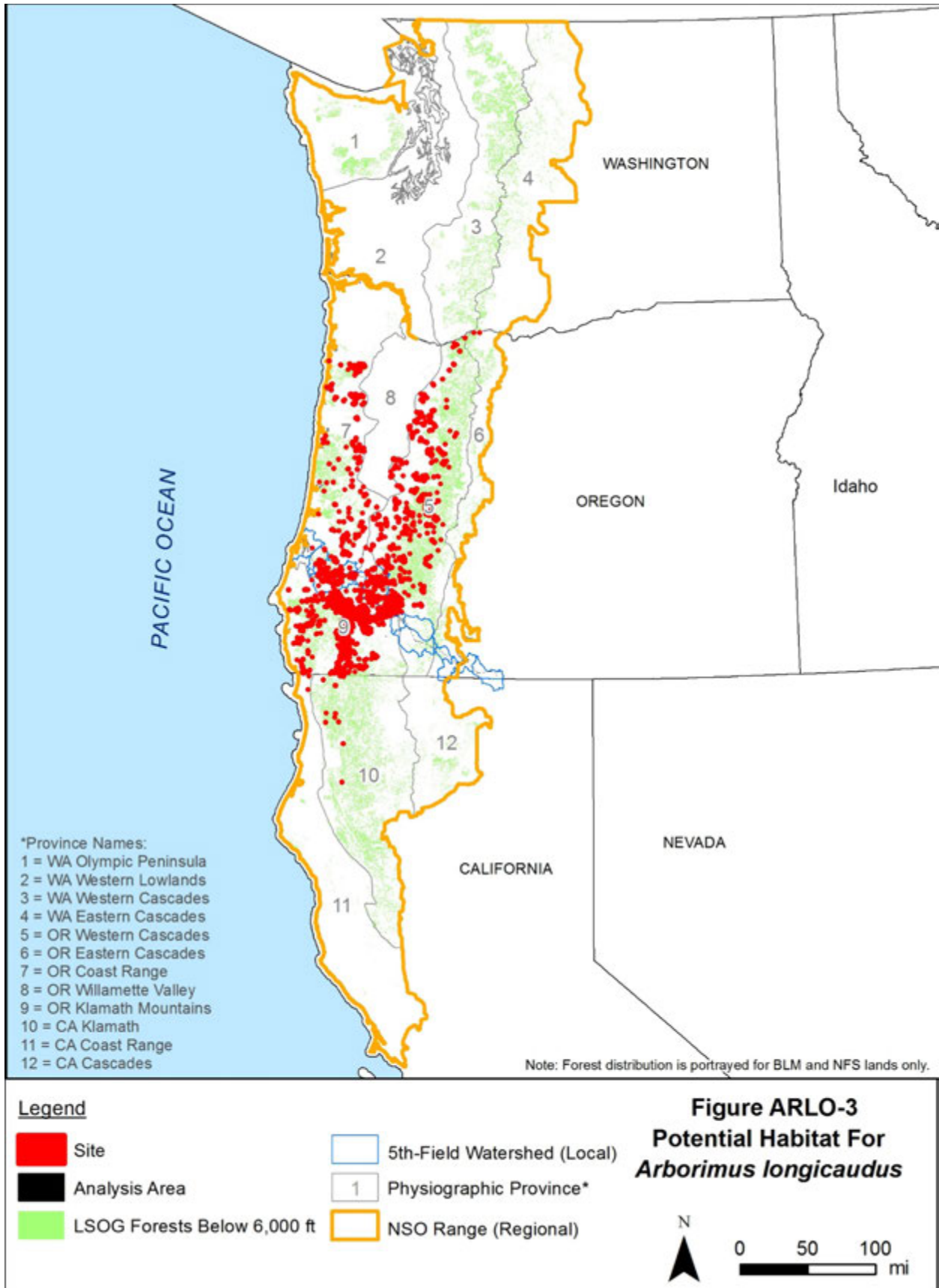
Extent of Forests that Could Provide Habitat for *Arborimus longicaudus* on BLM and NFS Lands*

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.







Local Distribution

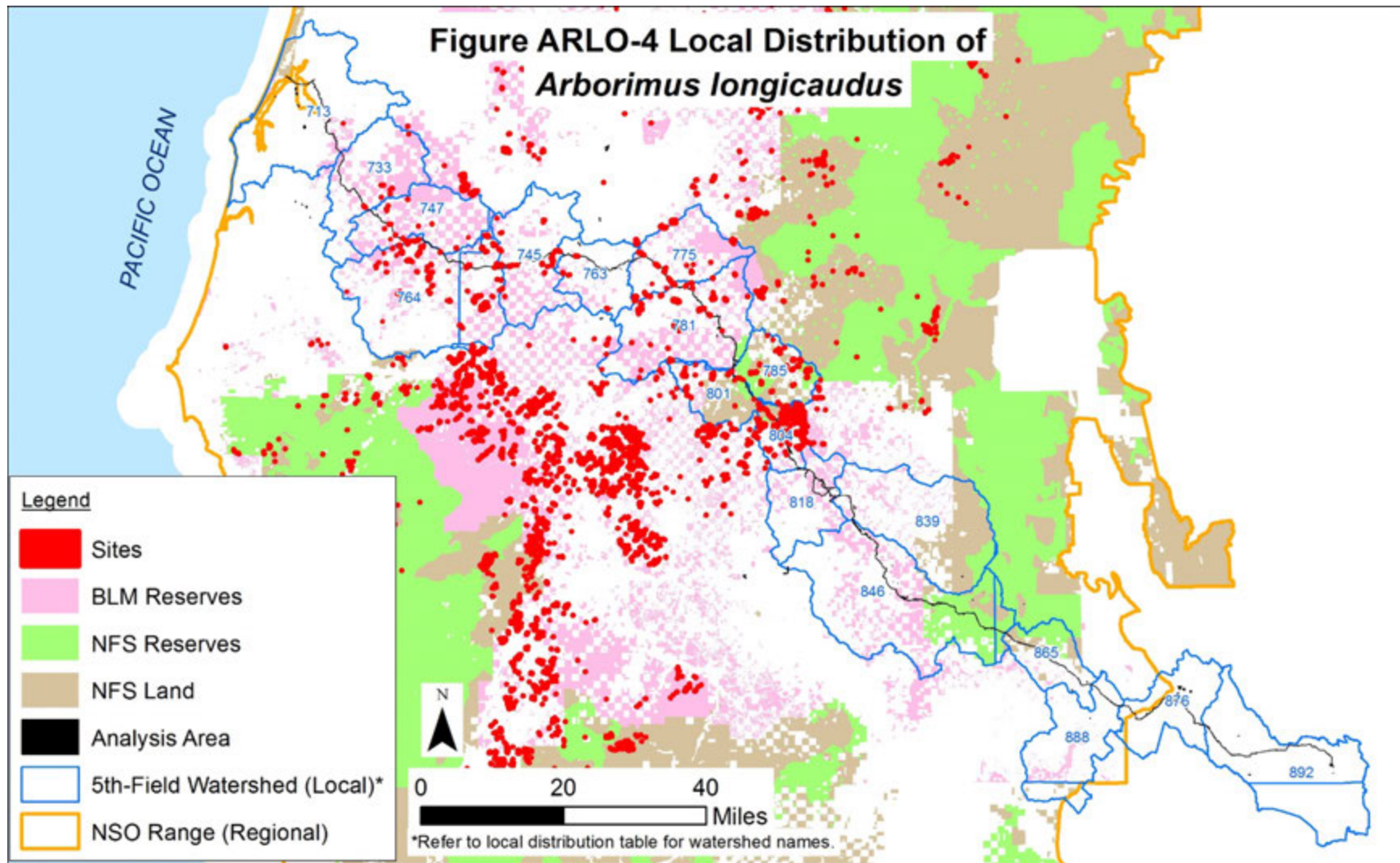
Within the local area, *A. longicaudus* is distributed across 12 5th-field watersheds that overlap the project area (see Table ARLO-5 and Figure ARLO-4). The sites are distributed across the western Cascade Range, Klamath Mountains, and Coast Range in the local area, with many clusters of sites. Many 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).

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.



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 47.6 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 8.5 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 6.5

acres of understory habitat in eight 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 <i>Arborimus longicaudus</i> 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	47.6 ac
Temporary Extra Work Area (TEWA)	20	8.5 ac
Uncleared Storage Area (UCSA)	8	6.5 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 244 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 124 acres (about 51 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 64 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 244 acres of LSOG coniferous and mixed forests below 6,000 feet msl (a negligible amount of the forests). An estimated 51 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 2001-2003 ASRs 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.

Location*	Number of Sites
Regional Area	177
Local Area	67
Analysis Area (Project Area)	7 (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.

Appendix F.5. Survey and Manage Species Persistence Evaluation

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.

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

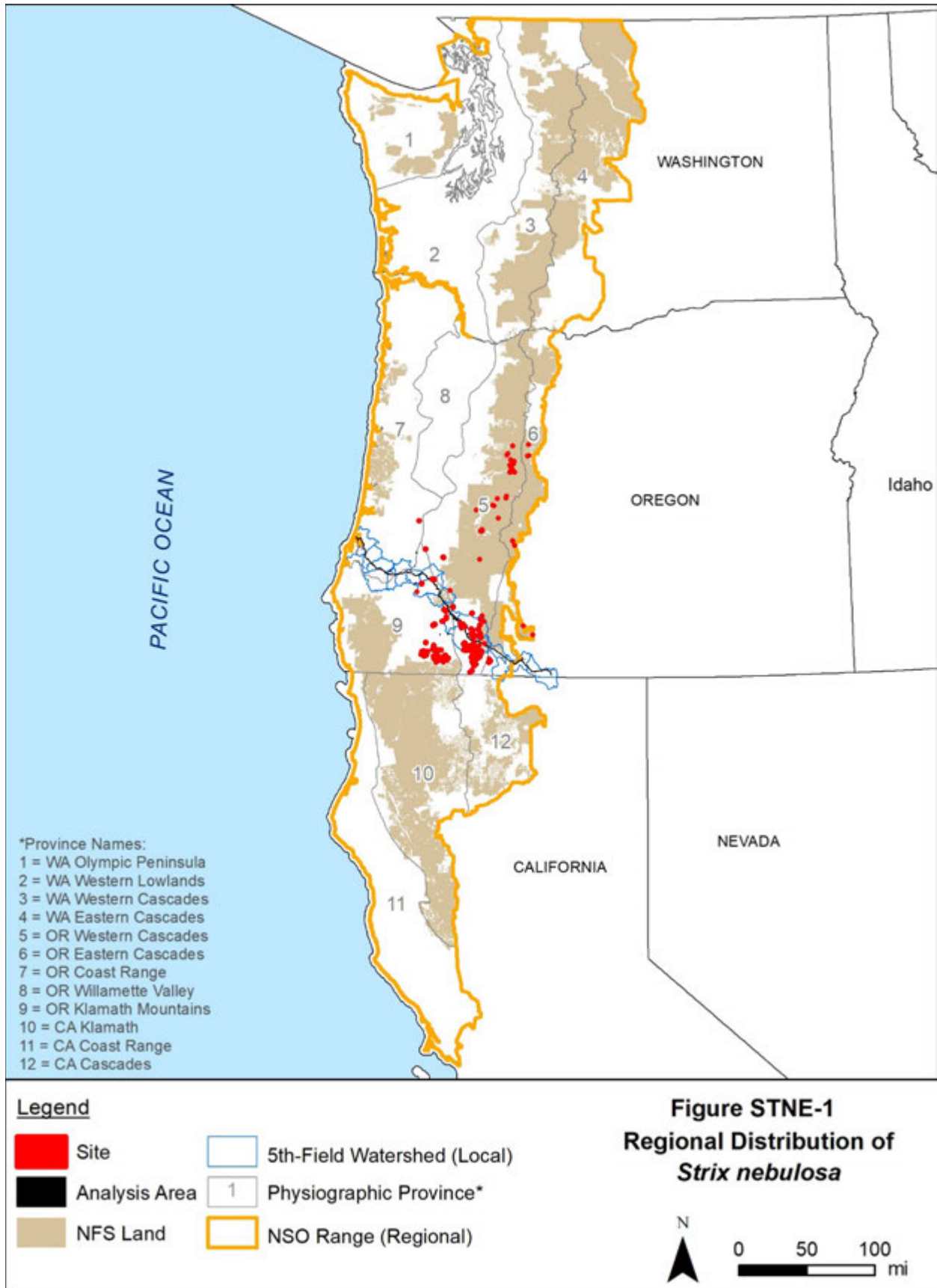
Forest. The remaining 30 sites on NFS lands are on the Deschutes and Willamette National Forests.

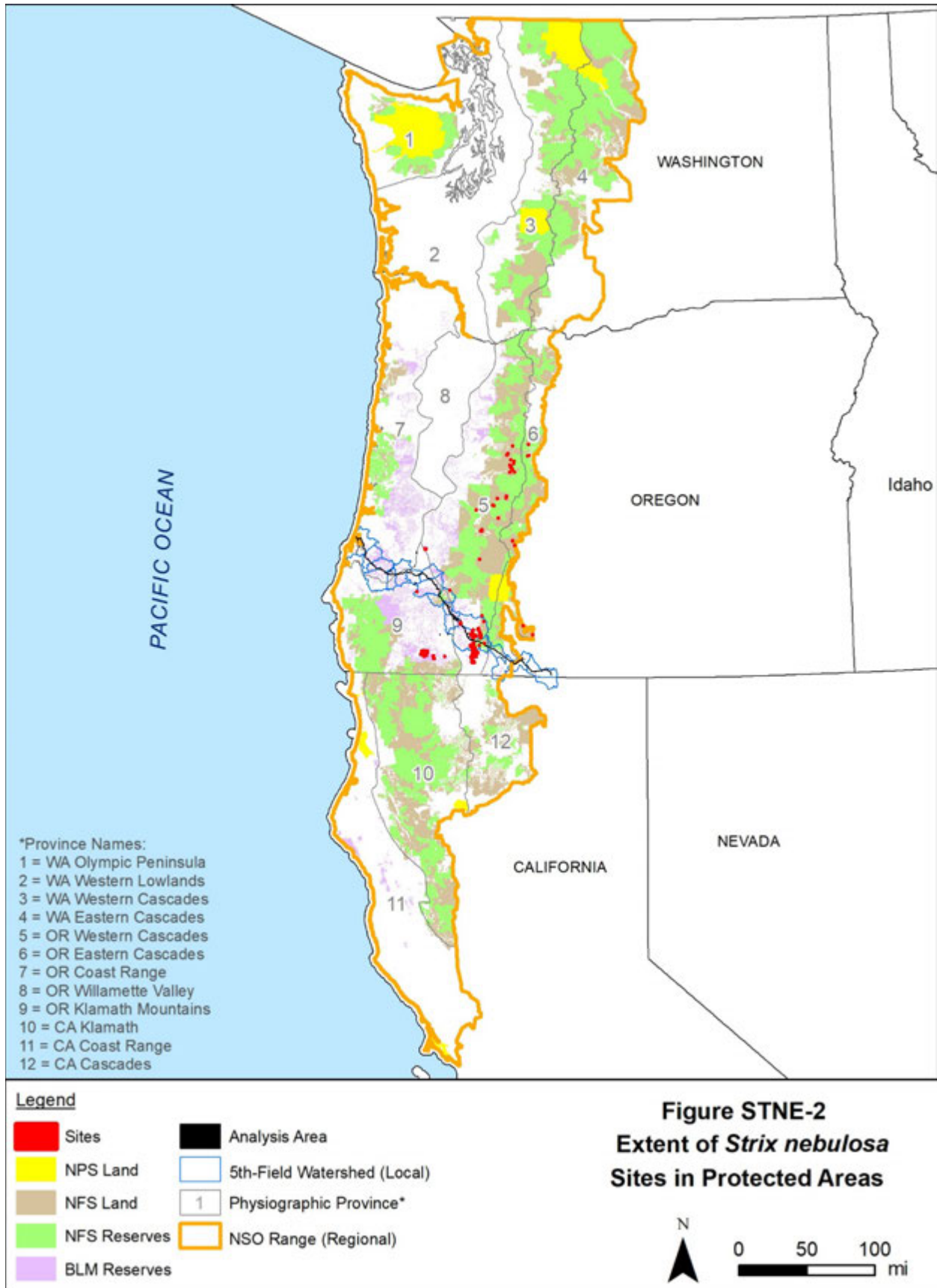
Across the NSO range, six sites are at least partially located in LSRs managed by the Forest Service (see Figure STNE-2). These sites represent 12 percent of the total NFS sites in the region. The remaining NFS sites on other land allocations receive some level of protection through the S&M Standards 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.

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.







Local Distribution

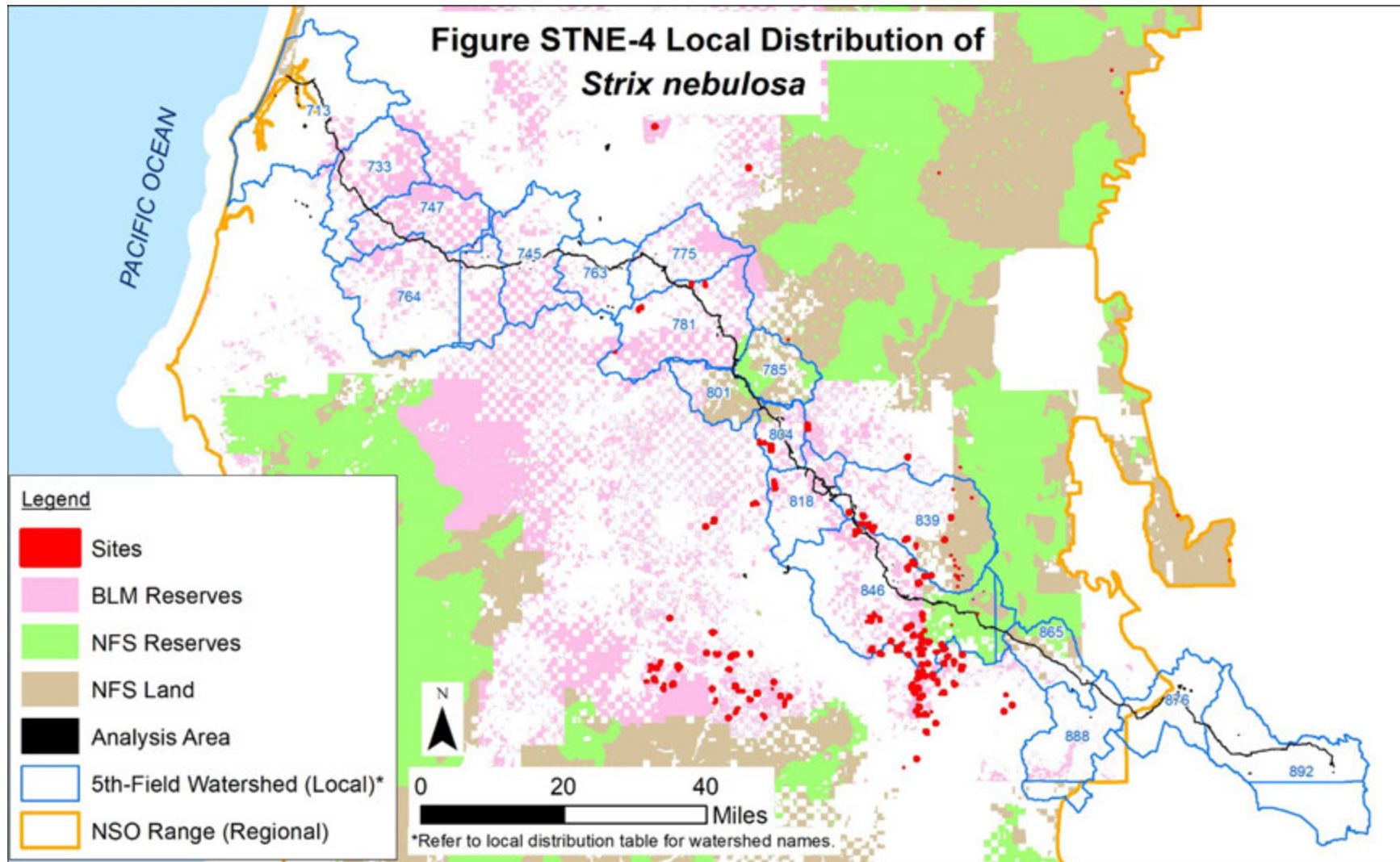
Within the local area, *S. nebulosa* is distributed across six 5th-field watersheds that overlap the project area (see Table STNE-5 and Figure STNE-4). The sites are primarily in the Cascade Range as part of the larger group of regional sites, with a few clustered sites in the Klamath Mountains. Many 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).

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.



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 1,128 acres of coniferous and mixed hardwood-coniferous forests, including 241 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 1,128 acres of coniferous and mixed hardwood-coniferous forests and 241 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 single *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?
<i>Fungi</i>		
<i>Acanthophysium farlowii</i>	B	No
<i>Albatrellus avellaneus</i>	B	No
<i>Albatrellus caeruleoporus</i>	B	No
<i>Albatrellus ellisii</i>	B	Yes
<i>Albatrellus flettii</i> (WA and CA)	B	No
<i>Alpova alexsmithii</i>	B	No
<i>Alpova olivaceotinctus</i>	B	No
<i>Arcangeliella camphorata</i>	B	No
<i>Arcangeliella crassa</i>	B	Yes
<i>Arcangeliella lactarioides</i>	B	No
<i>Asterophora lycoperdoides</i>	B	No
<i>Asterophora parasitica</i>	B	No
<i>Baeospora myriadophylla</i>	B	No
<i>Balsamia nigrens</i>	B	No
<i>Boletus haematinus</i>	B	No
<i>Boletus pulcherrimus</i>	B	Yes
<i>Bondarzewia mesenterica</i> (WA and CA)	B	No
<i>Bridgeoporus nobilissimus</i>	A	No
<i>Cantharellus subalbidus</i> (WA and CA)	D	No
<i>Catathelasma ventricosa</i>	B	No
<i>Chalciporus piperatus</i>	D	No
<i>Chamonixia caespitosa</i>	B	No
<i>Choiromyces alveolatus</i>	B	Yes
<i>Choiromyces venosus</i>	B	No
<i>Chroogomphus loculatus</i>	B	No
<i>Chrysomphalina grossula</i>	B	No
<i>Clavariadelphus ligula</i>	B	No
<i>Clavariadelphus occidentalis</i>	B	Yes
<i>Clavariadelphus sachalinensis</i>	B	Yes
<i>Clavariadelphus subfastigiatus</i>	B	No
<i>Clavariadelphus truncatus</i> (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)	B¹	Yes
<i>Clavulina castanopes</i> var. <i>lignicola</i>	B	No
<i>Clitocybe senilis</i>	B	No
<i>Clitocybe subditopoda</i>	B	No
Collybia bakerensis	F	Yes
Collybia racemosa	B	Yes
<i>Cordyceps ophioglossoides</i>	B	No
<i>Cortinarius barlowensis</i>	B	No
<i>Cortinarius boulderensis</i>	B	No
<i>Cortinarius cyanites</i>	B	No
<i>Cortinarius depauperatus</i>	B	No
Cortinarius magnivelatus	B	Yes
Cortinarius olympianus	B	Yes
Cortinarius verrucisporus	B	Yes
<i>Cortinarius speciosissimus</i>	B	No
<i>Cortinarius tabularis</i>	B	No
<i>Cortinarius umidicola</i>	B	No
<i>Cortinarius valgus</i>	B	No
<i>Cortinarius variipes</i>	B	No
<i>Cortinarius verrucisporus</i>	B	No
<i>Cortinarius wiebeae</i>	B	No
<i>Craterellus tubaeiformis</i> (WA, CA)	D ¹	No
Cudonia monticola	B	Yes
<i>Cyphellostereum laeve</i>	B	No
<i>Dermocybe humboldtensis</i>	B	No
<i>Destuntzia fusca</i>	B	No
<i>Destuntzia rubra</i>	B	No
<i>Dichostereum boreale</i>	B	No
<i>Elaphomyces anthracinus</i>	B	No
<i>Elaphomyces subviscidus</i>	B	No
<i>Endogone acrogena</i>	B	No
<i>Endogone oregonensis</i>	B	No

Table A-1. 2003 Survey and Manage Species List		
Species	Category	Evaluated in Document?
<i>Entoloma nitidum</i>	B	No
<i>Fayodia bisphaerigera</i>	B	No
<i>Fevansia aurantiaca</i>	B	No
<i>Galerina atkinsoniana</i>	B¹	Yes
<i>Galerina cerina</i>	B	No
<i>Galerina heterocystis</i>	E	No
<i>Galerina sphagnicola</i>	E	No
<i>Gastroboletus imbellus</i>	B	No
<i>Gastroboletus ruber</i>	B	No
<i>Gastroboletus subalpinus</i>	B	Yes
<i>Gastroboletus turbinatus</i>	B	No
<i>Gastroboletus vividus</i>	B	No
<i>Gastrosuillus amaranthii</i>	E	No
<i>Gastrosuillus umbrinus</i>	B	No
<i>Gautieria magnicellaris</i>	B	No
<i>Gautieria otthii</i>	B	No
<i>Gelatinodiscus flavidus</i>	B	No
<i>Glomus radiatum</i>	B	No
<i>Gomphus bonarii</i>	B	No
<i>Gomphus clavatus</i>	F	Yes
<i>Gomphus floccosus</i>	F ¹	No
<i>Gomphus kauffmanii</i>	E	Yes
<i>Gymnomyces abietis</i>	B	Yes
<i>Gymnomyces nondistincta</i>	B	No
<i>Gymnopilus punctifolius</i> (CA)	B	No
<i>Gyromitra californica</i>	B	No
<i>Hebeloma olympianum</i>	B	No
<i>Helvella crassitunicata</i>	B	No
<i>Helvella elastica</i>	B	No
<i>Helvella maculata</i>	B	No
<i>Hydnotrya inordinata</i>	B	No
<i>Hydnotrya subnix</i>	B	No

Table A-1. 2003 Survey and Manage Species List		
Species	Category	Evaluated in Document?
<i>Hydropus marginellus</i>	B	No
<i>Hygrophorus caeruleus</i>	B	Yes
<i>Hygrophorus karstenii</i>	B	No
<i>Hygrophorus vernalis</i>	B	No
<i>Hypomyces luteovirens</i>	B	No
<i>Leucogaster citrinus</i>	B	No
<i>Leucogaster microsporus</i>	B	No
<i>Macowanites chlorinosmus</i>	B	No
<i>Macowanites lymanensis</i>	B	No
<i>Macowanites mollis</i>	B	No
<i>Marasmius applanatipes</i>	B	No
<i>Martellia fragrans</i>	B	No
<i>Martellia idahoensis</i>	B	No
<i>Mycena hudsoniana</i>	B	No
<i>Mycena overholtsii</i>	D	Yes
<i>Mycena quinaultensis</i>	B	No
<i>Mycena tenax</i>	B	No
<i>Mythicomyces corneipes</i>	B	No
<i>Neolentinus adhaerens</i>	B	No
<i>Neolentinus kauffmanii</i>	B	No
<i>Nivatogastrium nubigenum</i>	B	No
<i>Octaviania cyanescens</i>	B	No
<i>Octaviania macrospora</i>	B	No
<i>Octavianina papyracea</i>	B	No
<i>Otidea leporina</i>	D	No
<i>Otidea smithii</i>	B	No
<i>Phaeocollybia attenuata</i>	D	No
<i>Phaeocollybia californica</i>	B	No
<i>Phaeocollybia dissiliens</i>	B	No
<i>Phaeocollybia fallax</i>	D	No
<i>Phaeocollybia gregaria</i>	B	No
<i>Phaeocollybia kauffmanii</i>	D	No

Species	Category	Evaluated in Document?
<i>Phaeocollybia olivacea</i>	B ¹	No
<i>Phaeocollybia oregonensis</i>	B	No
<i>Phaeocollybia piceae</i>	B	No
<i>Phaeocollybia pseudofestiva</i>	B	No
<i>Phaeocollybia scatesiae</i>	B	No
<i>Phaeocollybia sipei</i>	B	No
<i>Phaeocollybia spadicea</i>	B	No
<i>Phellodon atratus</i>	B	No
<i>Pholiota albivelata</i>	B	No
<i>Podostroma alutaceum</i>	B	No
<i>Polyozellus multiplex</i>	B	Yes
<i>Pseudaleuria quinaultiana</i>	B	No
<i>Ramaria abietina</i>	B	No
<i>Ramaria amyloidea</i>	B	No
<i>Ramaria araiospora</i>	B	Yes
<i>Ramaria aurantiiscescens</i>	B	No
<i>Ramaria botryis</i> var. <i>aurantiiramosa</i>	B	No
<i>Ramaria celerivirescens</i>	B	No
<i>Ramaria claviramulata</i>	B	No
<i>Ramaria concolor</i> f. <i>marrii</i>	B	No
<i>Ramaria concolor</i> f. <i>tsugina</i>	B	No
<i>Ramaria conjunctipes</i> var. <i>sparsiramosa</i>	B	No
<i>Ramaria coulterae</i>	B	Yes
<i>Ramaria cyaneigranosa</i>	B	No
<i>Ramaria gelatiniaurantia</i>	B	No
<i>Ramaria gracilis</i>	B	No
<i>Ramaria hilaris</i> var. <i>olympiana</i>	B	No
<i>Ramaria largentii</i>	B	No
<i>Ramaria lorithamnus</i>	B	No
<i>Ramaria maculatipes</i>	B	No
<i>Ramaria rainierensis</i>	B	No
<i>Ramaria rubella</i> var. <i>blanda</i>	B	No

Table A-1. 2003 Survey and Manage Species List		
Species	Category	Evaluated in Document?
<i>Ramaria rubribrunnescens</i>	B	No
<i>Ramaria rubrievanescens</i>	B	Yes
<i>Ramaria rubripermanens</i> (OR)	D	Yes
<i>Ramaria rubripermanens</i> (WA and CA)	B	No
<i>Ramaria spinulosa</i> var. <i>diminutiva</i>	B	No
<i>Ramaria stuntzii</i>	B	No
<i>Ramaria suecica</i>	B	No
<i>Ramaria thiersii</i>	B	No
<i>Ramaria verlotensis</i>	B	No
<i>Rhizopogon abietis</i>	B	No
<i>Rhizopogon atroviolaceus</i>	B	No
<i>Rhizopogon brunneiniger</i>	B	No
<i>Rhizopogon chamaleontinus</i>	B	No
<i>Rhizopogon ellipsosporus</i>	B	No
<i>Rhizopogon evadens</i> var. <i>subalpinus</i>	B	No
<i>Rhizopogon exiguus</i>	B	No
<i>Rhizopogon flavofibrillosus</i>	B	No
<i>Rhizopogon inquinatus</i>	B	No
<i>Rhizopogon truncatus</i>	D	Yes
<i>Rhodocybe speciosa</i>	B	No
<i>Rickenella swartzii</i>	B	No
<i>Russula mustelina</i>	B	No
<i>Sarcodon fuscoindicus</i>	B	Yes
<i>Sedecula pulvinata</i>	B	Yes
<i>Sowerbyella rhenana</i>	B	No
<i>Sparassis crispa</i>	D	Yes
<i>Spathularia flavida</i>	B	Yes
<i>Stagnicola perplexa</i>	B	No
<i>Thaxterogaster pavelekii</i>	B	No
<i>Tremiscus helvelloides</i>	D	Yes
<i>Tricholoma venenatum</i>	B	No
<i>Tricholomopsis fulvescens</i>	B	No

Table A-1. 2003 Survey and Manage Species List		
Species	Category	Evaluated in Document?
<i>Tuber asa</i>	B	No
<i>Tuber pacificum</i>	B	No
<i>Tylopilus porphyrosporus</i>	D	No
Lichens		
<i>Bryoria pseudocapillaris</i>	A	No
<i>Bryoria spiralis</i>	A	No
<i>Bryoria subcana</i>	B	No
<i>Buellia oidalea</i>	E	No
<i>Calicium abietinum</i>	B	No
<i>Calicium adpersum</i>	E	No
<i>Cetrelia cetrarioides</i>	E	No
<i>Chaenotheca chrysocephala</i>	B	No
<i>Chaenotheca ferruginea</i>	B	No
<i>Chaenotheca furfuracea</i>	F ¹	No
<i>Chaenotheca subroscida</i>	E	Yes
<i>Chaenothecopsis pusilla</i>	E	No
<i>Cladonia norvegica</i>	B ¹	No
<i>Collema nigrescens</i> (WA and OR, outside OR Klamath)	F	No
<i>Dendroscopula intricatum</i> (CA)	E	No
<i>Dendroscopula intricatum</i> (OR outside of Coos, Curry, Douglas, Josephine, and Jackson Counties; WA)	A	No
<i>Dermatocarpon luridum</i>	E	No
<i>Fuscopannaria (Pannaria) saubinetii</i>	E	No
<i>Heterodermia sitchensis</i>	E	No
<i>Hypogymnia duplicata</i>	C	No
<i>Hypogymnia vittata</i>	E	No
<i>Hypotrachyna revoluta</i>	E	No
<i>Leptogium burnetiae</i> var. <i>hirsutum</i>	E	No
<i>Leptogium cyanescens</i>	A	No
<i>Leptogium rivale</i>	E	No
<i>Leptogium teretiusculum</i>	E	Yes
<i>Lobaria linata</i> var. <i>tenuoir</i> (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?
<i>Lobaria oregana</i> (CA)	A	No
<i>Microcalicium arenarium</i>	B	No
<i>Nephroma bellum</i> (OR; Klamath, Willamette Valley, Eastern Cascades; WA; Western Cascades outside GPNF, Eastern Cascades, Olympic Peninsula)	E	No
<i>Nephroma bellum</i> (OR; Western Cascades, Coast; WA; Western Cascades within GPNF)	F ¹	No
<i>Nephroma isidiosum</i>	E	No
<i>Nephroma occultum</i>	B ¹	No
<i>Niebla cephalota</i>	A	No
<i>Pannaria rubiginosa</i>	E	No
<i>Peltigera pacifica</i>	E	No
<i>Platismatia lacunosa</i> (except OR CR)	E	No
<i>Pseudocyphellaria perpetua</i> (sp. 1)	A	No
<i>Pseudocyphellaria rainierensis</i>	A	No
<i>Stenocybe clavata</i>	E	No
<i>Teloschistes flavicans</i>	A	No
<i>Tholurna dissimilis</i> (south of the Columbia River)	B	No
<i>Usnea hesperina</i>	E	No
<i>Usnea longissima</i> (Curry, Josephine, and Jackson Counties, OR; CA)	A	No
<i>Usnea longissima</i> (Outside Curry, Josephine, and Jackson Counties, OR; WA)	F	No
Mosses and Liverworts		
<i>Brotherella roellii</i>	E	No
<i>Buxbaumia viridis</i> (CA)	E	No
<i>Diplophyllum plicatum</i>	B	No
<i>Herbertus aduncus</i>	E	No
<i>Iwatsukiella leucotricha</i>	B	No
<i>Kurzia makinoana</i>	B	No
<i>Marsupella emarginata</i> var. <i>aquatica</i>	B	No
<i>Orthodontium gracile</i>	B	No
<i>Ptilidium californicum</i> (CA)	A	No
<i>Racomitrium aquaticum</i>	E	No

Table A-1. 2003 Survey and Manage Species List		
Species	Category	Evaluated in Document?
<i>Rhizomnium nudum</i> (OR)	B	No
<i>Schistostega pennata</i>	A	No
<i>Tetraphis geniculata</i>	A	No
<i>Tritomaria exsectiformis</i>	B	No
<i>Tritomaria quinquedentata</i>	B	No
Vascular Plants		
<i>Arceuthobium tsugense mertensiana</i> (WA)	F	No
<i>Bensoniella oregana</i> (CA)	A	No
<i>Botrychium minganense</i> (OR and CA)	A	No
<i>Botrychium montanum</i>	A	No
<i>Coptis asplenifolia</i>	A	No
<i>Coptis trifolia</i>	A	No
<i>Corydalis aquae-gelidae</i>	A	No
<i>Cypripedium fasciculatum</i> (WA outside the Eastern Cascades; OR; CA)	C	Yes
<i>Cypripedium montanum</i> (Except WA Eastern Cascades)	C	No
<i>Eucephalus vialis</i>	A	No
<i>Galium kamtschaticum</i> (WA Western Cascades (south of Snoqualmie Pass), Olympic Peninsula, and Eastern Cascades; OR Western Cascades)	A	No
<i>Platanthera orbiculata</i> var. <i>orbiculata</i>	C	No
Mollusks		
<i>Ancotrema voyanum</i>	E ^{1,3,4}	No
<i>Cryptomastix devia</i>	A	No
<i>Cryptomastix hendersoni</i>	A	No
<i>Deroceras hesperium</i>	B⁴	Yes
<i>Fluminicola</i> n. sp. 3	A ³	No
<i>Fluminicola</i> n. sp. 11	A ³	No
<i>Fluminicola</i> n. sp. 14	A	No
<i>Fluminicola</i> n. sp. 15	A	No
<i>Fluminicola</i> n. sp. 16	A	No
<i>Fluminicola</i> n. sp. 17	A	No
<i>Fluminicola</i> n. sp. 18	A	No

Table A-1. 2003 Survey and Manage Species List		
Species	Category	Evaluated in Document?
<i>Fluminicola n. sp. 19</i>	A ³	No
<i>Fluminicola n. sp. 20</i>	A ³	No
<i>Fluminicola seminalis</i>	A ³	No
<i>Helminthoglypta talmadgei</i>	D ²	No
<i>Hemphillia burringtoni</i>	E	No
<i>Hemphillia glandulosa</i> (WA Western Cascades)	E	No
<i>Hemphillia malonei</i> (WA)	C	No
<i>Hemphillia pantherina</i>	B ⁴	No
<i>Juga (o) n. sp. 2</i>	A	No
<i>Juga (o) n. sp. 3</i>	A	No
<i>Lyogyrus n. sp. 1</i>	A	No
<i>Lyogyrus n. sp. 2</i>	A	No
<i>Lyogyrus n. sp. 3</i>	A	No
<i>Megomphix hempilli</i> (outside of OR Coast)	A ¹	No
<i>Monadenia chaceana</i>	B⁴	Yes
<i>Monadenia fidelis minor</i>	A	No
<i>Monadenia troglodytes troglodytes</i>	A	No
<i>Monadenia troglodytes wintu</i>	A	No
<i>Oreohelix n. sp.</i>	A	No
<i>Pristiloma arcticum crateris</i>	A ³	No
<i>Prophysaon coeruleum</i> (CA and WA)	A	No
<i>Trilobopsis roperi</i>	A	No
<i>Trilobopsis tehamana</i>	A	No
<i>Vertigo n. sp.</i>	A	No
<i>Vespericola pressleyi</i>	A	No
<i>Vespericola shasta</i>	A	No
<i>Vorticifex n. sp. 1</i>	E	No
Vertebrates		
<i>Arborimus longicaudus</i>	C	Yes
<i>Hydromantes shastae</i>	A	No
<i>Plethodon larselli</i>	A	No
<i>Plethodon stormi</i> (North Range)	D ²	No

Table A-1. 2003 Survey and Manage Species List

Species	Category	Evaluated in Document?
<i>Plethodon stormi</i> (South Range)	A	No
<i>Plethodon vandykei</i> (Cascade population)	A	No
<i>Strix nebulosa</i>	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
<p>Source: Survey and Manage Species List, 2003 Annual Species Review Modifications of the 2001 Record of Decision</p> <p>Notes:</p> <p>¹These species are special consideration species and are assigned the category under the 2001 species list.</p> <p>² Although Pre-Disturbance Surveys are deemed practical for this species, continuing pre-disturbance surveys is not necessary in order to meet management objectives.</p> <p>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."</p> <p>⁴ Based upon direction contained in the ROD, equivalent-effort pre-disturbance surveys are required for these mollusk species.</p>		

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 Regulations¹).

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.

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	5 th 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

Appendix F.5. Survey and Manage Species Persistence Evaluation

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 Intensity 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

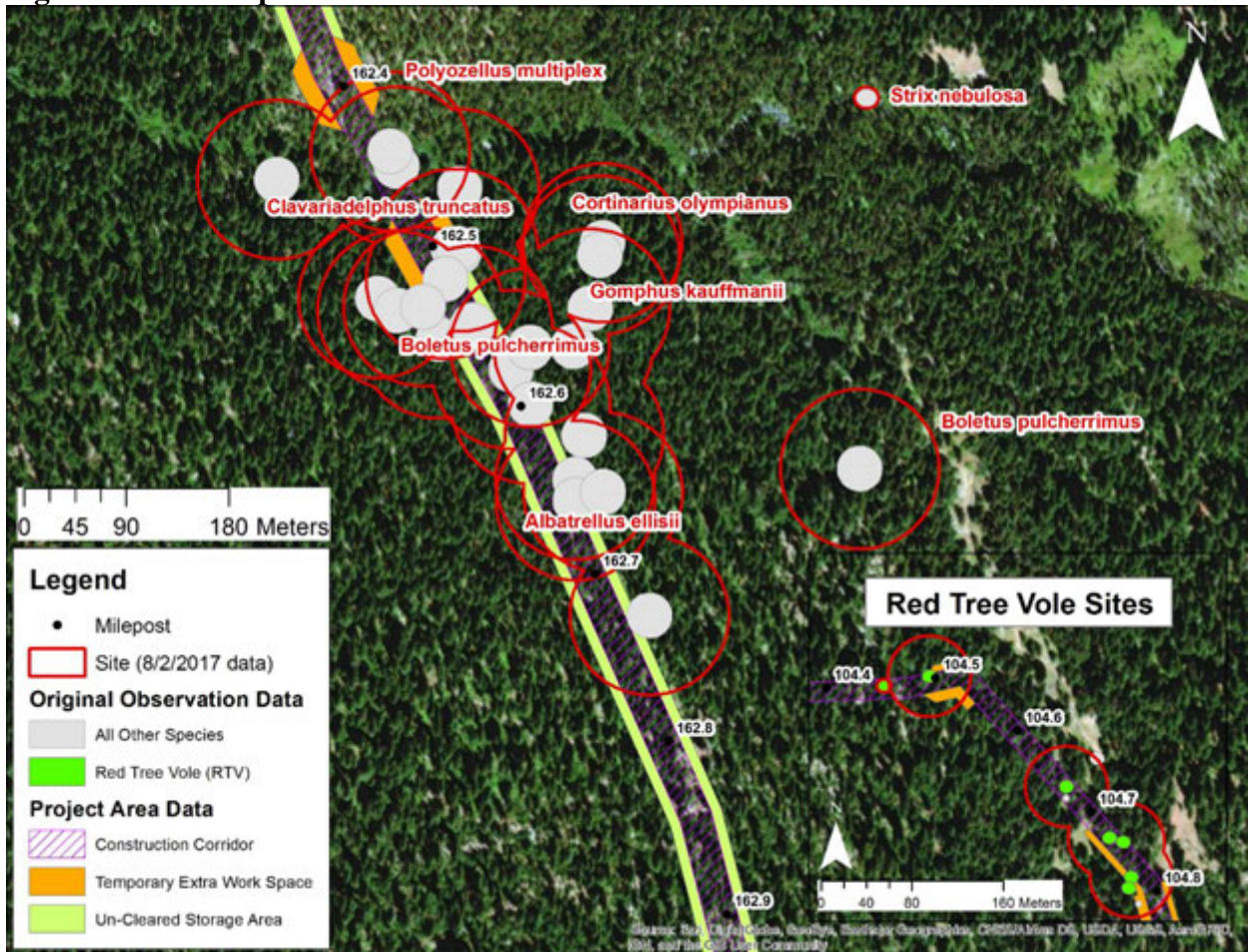


Figure C-2: Analysis Area Boundaries

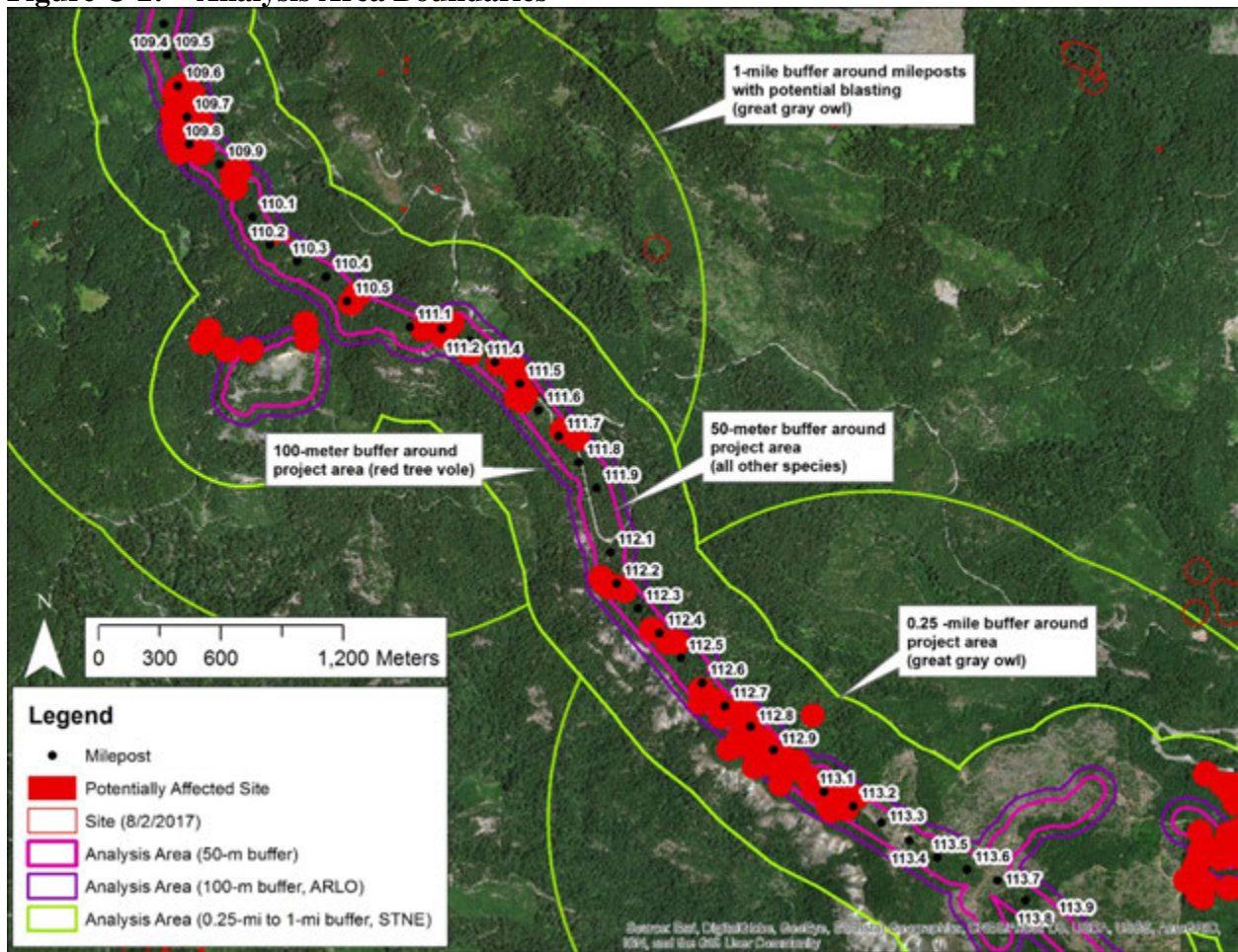
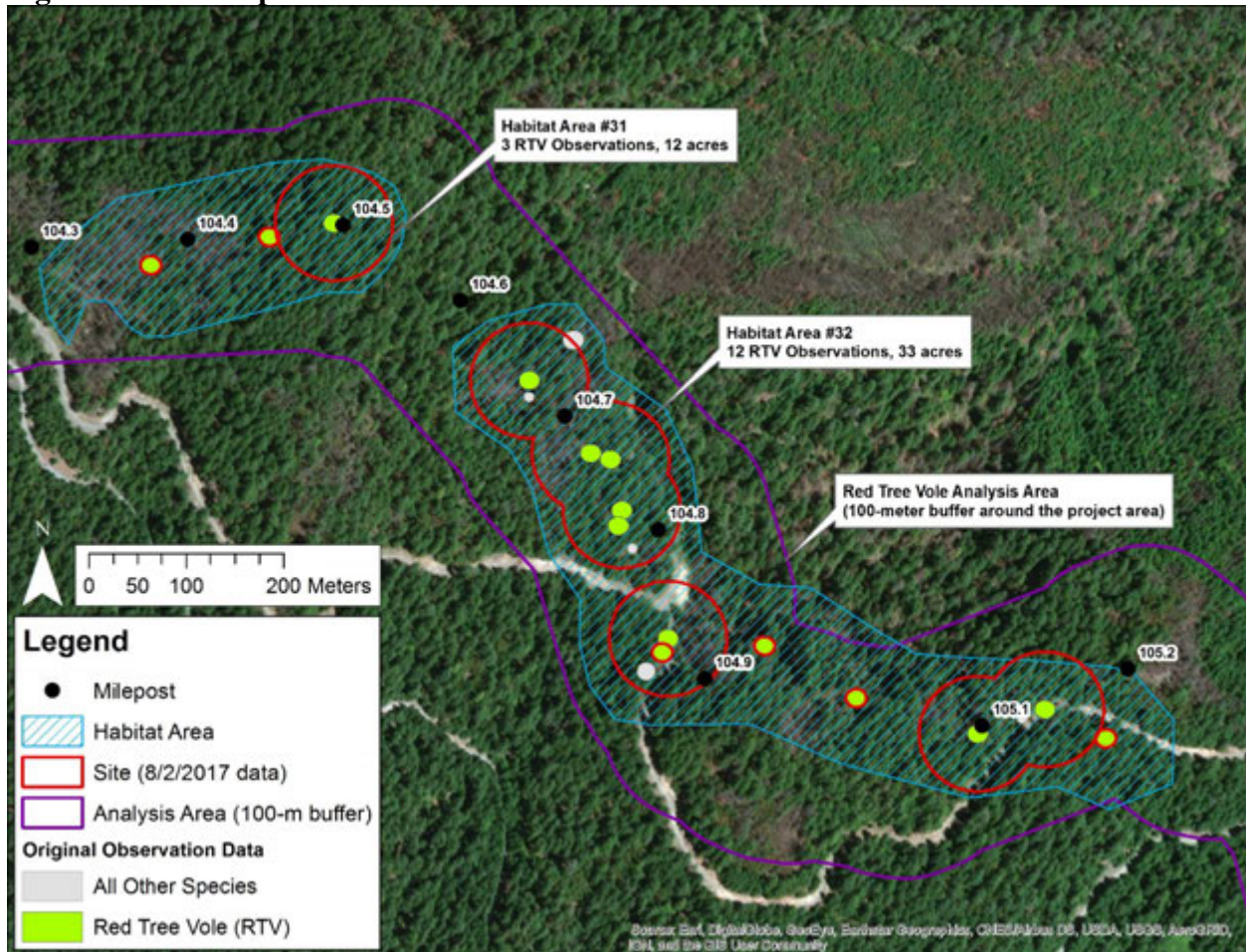


Figure C-3: Sample Habitat Area Data for Red Tree Vole



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_Impacted.shp layer, and the resulting selection of sites located outside the fire impact area was exported as SMKknownSites_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: “SMKknownSites_2017_StoutsRemoved_AnalysisArea50m.” The extracted red tree vole and great gray owl sites were also exported as SMKknownSites_2017_StoutsRemoved_STNE_AnalysisArea.shp and SMKknownSites_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_spsz_2006.grd) with forest cover, structure, and age were obtained from the Forest Service and Oregon State University, Landscape Ecology, Moderating, 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 allocations 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.