

# **Management Recommendations for**

*Pannaria rubiginosa* (Ach.) Bory

version 2.0

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**SUMMARY**

**Species:** *Pannaria rubiginosa* (Ach.) Bory

**Taxonomic Group:** Lichens (Rare Nitrogen-fixing)

**ROD Components:** 1,3

**Other Management Status:** Oregon Natural Heritage Program List 3 (more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range); Natural Heritage Network Ranks: Oregon State Rank S1 (critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences), Global Rank G4 (not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences) (Oregon Natural Heritage Program 1998). BLM Bureau Tracking Status in Oregon (USDI, BLM 1998).

**Range:** The distribution of *Pannaria rubiginosa* in the Pacific Northwest is scattered and discontinuous, ranging from west of the Cascade Crest from British Columbia south to California and New Mexico. In the range of the northern spotted owl, *P. rubiginosa* has been documented from four sites in Oregon: BLM land in Lane and Marion counties, Siuslaw National Forest and Beaver Creek Marsh (Lincoln County). In Washington, it is reported from three historical collections in taxonomic question (Pacific, Kittitas, and Pierce counties). *Pannaria rubiginosa* was recently reported from Humboldt County, California.

**Specific Habitat:** Habitat information is limited for this species in the range of the northern spotted owl. Current information suggests it is found at low elevations, with sites ranging from 15 m to 487 m (50-1600 ft). It grows in mature Douglas-fir/western hemlock forest, old-growth conifer forest dominated by Douglas-fir, Sitka spruce, and western redcedar, and shrub thickets of willow and ericaceous shrubs in the dune and deflation plain habitat, where it is epiphytic on Hooker's willow. The habitat at the California site is a creek site in a late mature forest of Douglas-fir, tanoak and madrone with associated hardwoods and shrubs.

**Threats:** The major threat to *P. rubiginosa* is loss of populations resulting from activities that directly affect the habitat or the population, including removing colonized substrate and altering microclimate. Other threats to populations include recreational impacts in coastal habitats, and collection of specimens for scientific purposes. The air pollution sensitivity of this species is unknown.

**Management Recommendations:**

- Manage populations at known sites by maintaining the ecological conditions associated with *P. rubiginosa*, including stand structure, substrate and microclimate.
- Restrict collection of specimens where the species is rare or of limited abundance.

**Information Needs:**

- Revisit known sites to determine the extent of local populations and improve habitat information.
- Determine if *P. rubiginosa* is closely associated with late-successional and old-growth forests.
- Determine the status of the historical collections and locations in Washington.

# Management Recommendations for *Pannaria rubiginosa*

## I. NATURAL HISTORY

### A. Taxonomy and Nomenclature

*Pannaria rubiginosa* (Ach.) Bory was originally described by Acharius in the 19th century. This species is treated in the monograph of the Pannariaceae in Europe (Jorgensen 1978). It is in the order Lecanorales, suborder Peltigerineae, family Pannariaceae (Tehler 1996).

### B. Species Description

#### 1. Morphology and Chemistry

*Pannaria rubiginosa* is an inconspicuous lichen, readily recognized by its small foliose rosettes with elongated lobes, and brown to red-brown apothecia with an even thalline rim (Figure 1) (McCune and Geiser 1997). It has a PD+ orange-red reaction, unique among other Pacific Northwest *Pannaria* species. The thallus is blue-gray, lobes are narrow and can appear distinctly squamulose, especially at the center. In exposed sites, the thallus becomes darker and olivaceous (Purvis *et al.* 1992).

Technical Description: Thallus foliose, forming rosettes to 2-3 cm in diameter with marginal lobes; upper surface whitish gray-blue to brown or olive; lobes 3-4 mm x 7-8 mm, deeply indented and mostly concave with thick, pale, ascending margins; surface smooth, more or less faintly scabrid or occasionally thin pruinose; hypothallus fibrous, well developed, obscure or sometimes extending as a blue-black zone surrounding the thallus. Photobiont is the cyanobacterium *Nostoc*. Apothecia 0.5-1.5 mm in diameter, frequent; disc red-brown; thalline exciple prominent, persistent, often crenulate. Ascospores 15-19  $\mu\text{m}$  x 9-10  $\mu\text{m}$ , with perispore 20-24  $\mu\text{m}$  x 10-12  $\mu\text{m}$ , colorless, ellipsoid; perispore uneven, acuminate at one or both ends. Thallus PD+ orange-red (pannarin) (Purvis *et al.* 1992:421).

#### 2. Reproductive Biology

*Pannaria rubiginosa* reproduces sexually by ascospores; asexual propagules are unknown.

#### 3. Ecological Roles

Little is known about the ecological role of *P. rubiginosa* in the range of the northern spotted owl. It is a nitrogen-fixing species.

### C. Range and Known Sites

*Pannaria rubiginosa* is broadly distributed globally, on all continents except Australia (Purvis *et al.* 1992). Its distribution in the Pacific Northwest is scattered and widespread (McCune and

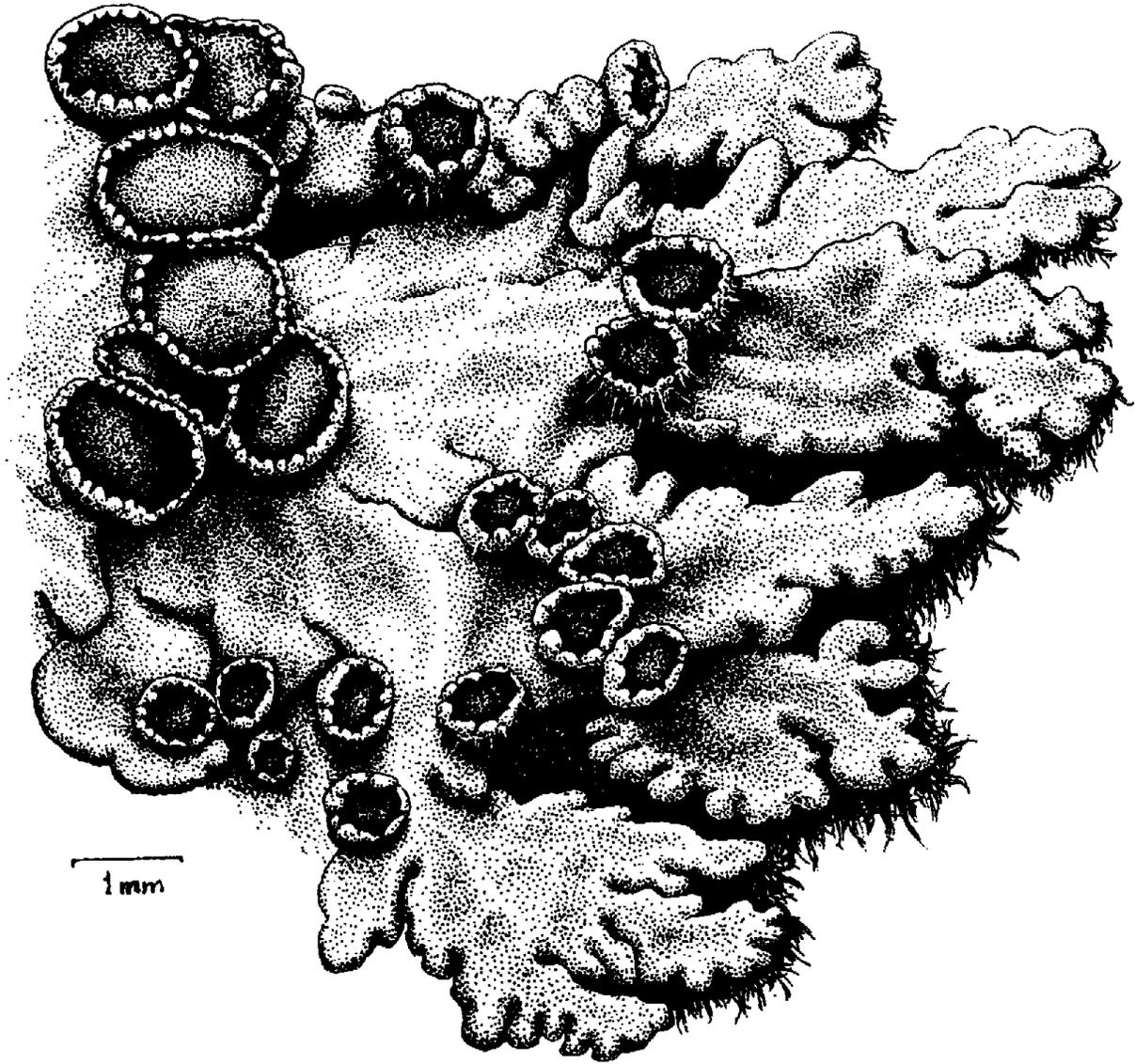


Figure 1. Line drawing of *Pannaria rubiginosa* by Alexander Mikulin.

Geiser 1997). It is found west of the Cascades from British Columbia south to California and New Mexico.

In the Pacific Northwest, *P. rubiginosa* is known from three sites in Washington State from historical collections that need verification (Pacific, Kittitas, and Pierce counties). The taxonomic identity of these collections is in question and should be verified by a qualified lichenologist.

*Pannaria rubiginosa* has been collected from four places in Oregon. It is known from Eugene District BLM Heceta Dunes Area of Critical Environmental Concern (Lane County), Salem District BLM Fishermen's Bend Recreational Site on the North Santiam River (Marion County), Siuslaw National Forest on Lower Canal Creek near Waldport (Lincoln County), and the Beaver Creek Marsh (Lincoln County, ownership unknown) (McCune *et al.* 1997).

In California, *P. rubiginosa* has recently been reported from Kings Peak Road in Humboldt County. It is also reported from San Mateo County, which is south of the area covered by the Northwest Forest Plan.

#### **D. Habitat Characteristics and Species Abundance**

*Pannaria rubiginosa* appears to be rare in the Pacific Northwest. Current information suggests it is a low-elevation species, with sites ranging in elevation from 15 m to 487 m (50-1600 ft). Habitat data are limited, but *P. rubiginosa* appears to grow in a variety of habitats. Its largest known populations in this region are on the Oregon Coast in coastal shrub thickets on wet deflation plains (McCune and Geiser 1997, McCune *et al.* 1997).

The recent collections in Oregon are from different types of habitats. The Cascade foothill site is described as a mature Douglas-fir/western hemlock (*Pseudotsuga menziesii*/*Tsuga heterophylla*) forest at 260 m (850 ft) elevation, where *P. rubiginosa* was collected from fallen conifer limbs. The Oregon Coast sites at 15 m (50 ft) elevation are noted as a Hooker's willow (*Salix hookeriana*) thicket near vernal-pool lowlands, and a shady willow/ericaceous shrub thicket in dune and wetland mosaic amid patchy forests of shore pine (*Pinus contorta*) and Sitka spruce (*Picea sitchensis*). The shrub thickets at the latter site were rich in cyanolichen diversity. *Pannaria rubiginosa* was reported as an epiphyte on Hooker's willow at both sites. At the Siuslaw National Forest site, 30 m (100 ft) elevation, *P. rubiginosa* was found in litterfall in an old-growth conifer forest dominated by Douglas-fir and western redcedar (*Thuja plicata*), with Sitka spruce and red alder (*Alnus rubra*).

The site in Humboldt County, California, is reported as a creek in a late-mature forest of Douglas-fir, tanoak (*Lithocarpus densiflorus*), and Pacific madrone (*Arbutus menziesii*), with associated hardwoods and shrubs. The elevation ranged from 463 m to 487 m (1520-1600 ft).

## II. CURRENT SPECIES SITUATION

### A. Why Species Is Listed Under Survey and Manage Standard and Guideline

*Pannaria rubiginosa* was considered at risk under the Northwest Forest Plan because of its presumed rarity in the range of the northern spotted owl. At the time of the FEMAT viability rating (USDA and USDI 1994a) and additional species analysis (USDA and USDI 1994b), this species was reported from only two sites in the region. Viability concerns were also noted for this species because of its presumed sensitivity to air pollution inferred by the known sensitivity of other nitrogen-fixing lichens. The pollution sensitivity of *P. rubiginosa* is unknown, however.

There was a high level of concern for the persistence of this species. Because of persistence concerns, it was listed as a Survey and Manage strategy 1 and 3 species (USDA and USDI 1994c), with the objectives to manage known sites and to conduct extensive surveys to identify high priority sites for management.

### B. Major Habitat and Viability Considerations

The major viability considerations for *P. rubiginosa* are loss of populations resulting from management or other activities that affect the populations or their habitat.

The occurrence of *P. rubiginosa* in different habitats, and in young and mature stands, suggests that it may have a broader ecological amplitude than was known at the time of the viability rating (USDA and USDI 1994a, 1994b).

### C. Threats to the Species

Threats to *P. rubiginosa* are those actions that disrupt stand conditions necessary for its survival, including treatments that may directly or indirectly affect populations such as removing colonized substrate, stand treatments that change microclimate, effects from recreational activities and development, or possibly a significant deterioration in air quality. Collection of voucher specimens for scientific purposes may also threaten this species because few individuals are known to exist in this region.

### D. Distribution Relative to Land Allocations

The distribution of known sites of *P. rubiginosa* relative to land allocations needs to be determined. The Heceta Dunes is managed as an Area of Critical Environmental Concern by the Eugene District BLM. Each administrative unit should evaluate the land allocations for known sites on lands within its jurisdiction, and share this information at the regional level.

### III. MANAGEMENT GOAL AND OBJECTIVES

#### A. Management Goal for the Species

The goal for managing *Pannaria rubiginosa* is to assist in maintaining species viability.

#### B. Objectives

Manage known sites on federal lands by maintaining habitat, stand structure, occupied and potential suitable substrate, and microclimatic conditions associated with *P. rubiginosa*.

### IV. HABITAT MANAGEMENT

#### A. Lessons From History

Very little is known about the ecology of *P. rubiginosa* in the Pacific Northwest, or how past actions have affected its distribution or persistence. Concerns have been expressed about the sensitivity of this species to air pollution, however.

Many lichen species are known to be sensitive to air pollution, and lichen population declines attributed to air pollution have been documented in Europe and North America (Rao and LeBlanc 1967, Skye and Hallberg 1969, Hawksworth 1971, Ferry *et al.* 1973, Hawksworth and Rose 1976, Case 1980, Sigal and Nash 1983, Gilbert 1992). Many nitrogen-fixing lichen species are especially sensitive to air pollution, particularly sulfur dioxide (Wetmore 1983). The sensitivity of *P. rubiginosa* to air pollution is unknown, but, based on the known sensitivity of other nitrogen-fixing lichens, *P. rubiginosa* is likely to also be sensitive to air pollution.

The decline of lichens in Europe has resulted in listing threatened species. Sweden has a “red list” of lichens that are threatened with extinction because of air pollution and habitat degradation (Thor 1990); *Pannaria rubiginosa* is on this list as endangered (Databanken for hotade arter och Naturvardsverket 1991).

#### B. Identifying Habitat Areas for Management

All known sites of *P. rubiginosa* on lands administered by the Forest Service and BLM in the range of the northern spotted owl are identified as habitat areas where these management recommendations apply. A habitat area is defined as suitable habitat occupied by or adjacent to a known population.

#### C. Managing in Habitat Areas

- Determine the extent of the local population and habitat area with a field visit.
- Manage habitat areas to maintain the ecological conditions associated with *P. rubiginosa*, including stand structure, occupied and potentially suitable substrate, and associated

microclimatic conditions. Current habitat conditions should be maintained at all locations, and be allowed to develop naturally.

- Avoid disturbance to occupied substrate.
- Restrict collecting of specimens where the species is rare or of limited abundance.
- Manage habitat areas in coastal willow thickets to minimize recreation impacts to local populations and their habitat, including minimizing impacts to occupied and potentially suitable substrates.

#### **D. Other Management Issues and Considerations**

*Pannaria rubiginosa* is a small, inconspicuous species. Additional populations may be found with surveys in suitable habitats.

Populations of this species may exist on non-federal lands, and these populations will contribute to the species' persistence. Share information with state and private sectors, including Oregon State Parks and Highway Department to further activities directed at the conservation of this species on nonfederal lands, especially along the Oregon Coast.

Limited habitat data is available for *P. rubiginosa*. However, the current information suggests that *P. rubiginosa* may not meet the criteria for close association with late-successional and old-growth forests (USDA and USDI 1994a [Table IV-6], 1994b). For a species to be appropriately listed as a Survey and Manage species, it must first meet the criteria established for designation as a species closely associated with late-successional and old-growth forests. This issue should be addressed by a regional coordinating body.

### **V. RESEARCH, INVENTORY, AND MONITORING NEEDS**

The objective of this section is to identify opportunities to acquire additional information which could contribute to more effective species management. The content of this section has not been prioritized or reviewed as to how important the particular items are for species management. The inventory, research, and monitoring identified below are not required. These recommendations should be addressed by a regional coordinating body.

#### **A. Data Gaps and Information Needs**

- Revisit known sites to verify the status of known populations, determine the extent of the populations, and characterize the ecological conditions.
- Determine if *P. rubiginosa* meets the criteria for being closely associated with late-successional and old-growth forests.
- Verify the taxonomic identity of the historical collections from Washington. If verified as *P. rubiginosa*, attempt to locate the populations if they occur on federal land.
- Determine if additional populations of *P. rubiginosa* exist in areas identified as potentially suitable habitat.

## **B. Research Questions**

- What habitat characteristics and ecological conditions are necessary for the establishment of *P. rubiginosa* propagules and survival of established thalli?
- What are the dispersal mechanisms and dispersal distances of *P. rubiginosa*?
- Is *P. rubiginosa* sensitive to air pollution?
- What are the mechanisms and rates of reproduction and growth for this species?
- What is the genetic diversity of this species within its local populations and across the region?

## **C. Monitoring Needs and Recommendations**

- If management treatments occur adjacent to known sites, monitor the population to determine response to treatment and effects on the population.

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