

# **Management Recommendations for**

*Leioderma solediatum* D.J. Galloway & P.M. Jørg.

version 2.0

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SUMMARY

**Species:** *Leioderma solediatum* D.J. Galloway & P.M. Jørg.

**Taxonomic Group:** Lichens (Rare Oceanic-Influenced)

**ROD Components:** 1,3

**Other Management Status:** Oregon State Status 1 (critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences); Oregon Natural Heritage Program Status 2 (imperiled because of rarity or because other factors demonstrably makes it very vulnerable to extinction (extirpation), typically with 6-20 occurrences; Global Status 3 (not rare and apparently secure, but with cause for long-term concern) (Oregon Natural Heritage Program 1998); and BLM Assessment Species (USDI Bureau of Land Management 1998).

**Range:** *Leioderma solediatum* is known from only four localities in North America: two on federal land in Oregon (Siuslaw National Forest); one in Washington (private land); and one on Vancouver Island, British Columbia.

**Specific Habitat:** In the range of the Northwest Forest Plan, *L. solediatum* is found in semi-open coastal thickets, most often in dune woodlands, deflation plains, and ericaceous shrub thickets. The Sutton Creek Recreation Area site is an old, open shore pine-ericaceous shrub forest with little or no Sitka spruce in the canopy; *L. solediatum* is epiphytic over thin bryophyte mats on the stems of ericaceous shrubs. In Washington, it is found in a young riparian stand of red alder surrounded by clearcuts, and was on the bole of a 10-cm-dbh alder.

**Threats:** The major threat to *L. solediatum* is loss of populations resulting from activities that harm the population or impact its habitat, including altering the microclimate and removing colonized substrate. These activities would most likely be related to recreation, such as building trails and shelters, collecting firewood, and off-trail bicycle, off-road vehicle and foot traffic. It is probably sensitive to air pollution from vehicle exhaust and burning. It is vulnerable to loss of habitat from development along the coast, and the encroachment of non-native invasive plants.

**Management Recommendations:**

- Manage populations at known sites by maintaining ecological conditions associated with *L. solediatum*, including stand structure, substrate, and microclimatic conditions.
- Restrict building, burning, collecting specimens, collecting firewood, operating off-road vehicles and bicycles, and other recreational activities or development that could affect colonized substrates and harm known populations.
- Develop practices to route human use away from known sites to minimize impact to the populations and their habitat.

**Information Needs:**

Determine if this species meets the criteria for being closely associated with late-successional/old-growth forests.

# Management Recommendations for *Leioderma solediatum*

## I. NATURAL HISTORY

### A. Taxonomy and Nomenclature

*Leioderma solediatum* D.J. Galloway & P.M. Jørg. was described in 1987 by Galloway and Jørgensen.

### B. Species Description

#### 1. Morphology

*Leioderma solediatum* is a small, stratified, foliose lichen that lacks a lower cortex and is solediate above (Figure 1). The upper surface is grayish, bearing distinctive minute appressed woolly hairs; thallus lobes are loosely attached and round. The lower surface lacks veins and has short to longish marginal or scattered rhizines. *Leioderma solediatum* could be confused with *Erioderma solediatum*, but the latter species has erect tomentum on the upper surface and has a PD+ reaction (eriodermin) (Tønsberg, pers. comm.). *Leioderma solediatum* is PD- and has appressed woolly hairs. *Leioderma solediatum* superficially resembles *Peltigera collina*; the latter has veins on the lower surface (McCune and Geiser 1997).

Technical description: Thallus foliose, lobate, orbicular to irregularly spreading 1-3(4) cm diameter, rather loosely attached. Lobes to 6 mm wide, discrete to imbricate. Margins slightly thickened, sinuous, subscendent, entire, delicately incised or crenulate, solediate. Soralia marginal, often more or less sinuous, linear to limbiform, occasionally round, and spreading on to upper (or lower) surface; soledia coarsely granular, bluish. Upper surface more or less uniformly arachnoid-tomentose, dark blue-green when wet, pale-grayish or olivaceous-gray when dry, often with pale, pinkish-brown apothecial initials. Lower surface white, ecorticate, arachnoid, especially at the margins, pale buff towards center, rhizinate; rhizines white, buff to bluish, rarely blackened, in fascicles tufted at apex, in scattered groups or more or less densely developed. Photobiont is a cyanobacterium. Apothecia rare (Galloway and Jørgensen 1987:390).

#### 2. Reproductive Biology

This species reproduces asexually by producing soledia that are distributed by wind, gravity, animals, or birds (McCune and Geiser 1997). Apothecia are very rare in *L. solediatum* (Galloway and Jørgensen 1987), so sexual reproduction is probably also rare.

#### 3. Ecological Roles

Because of its extreme rarity in North America, very little is known about the ecological roles of

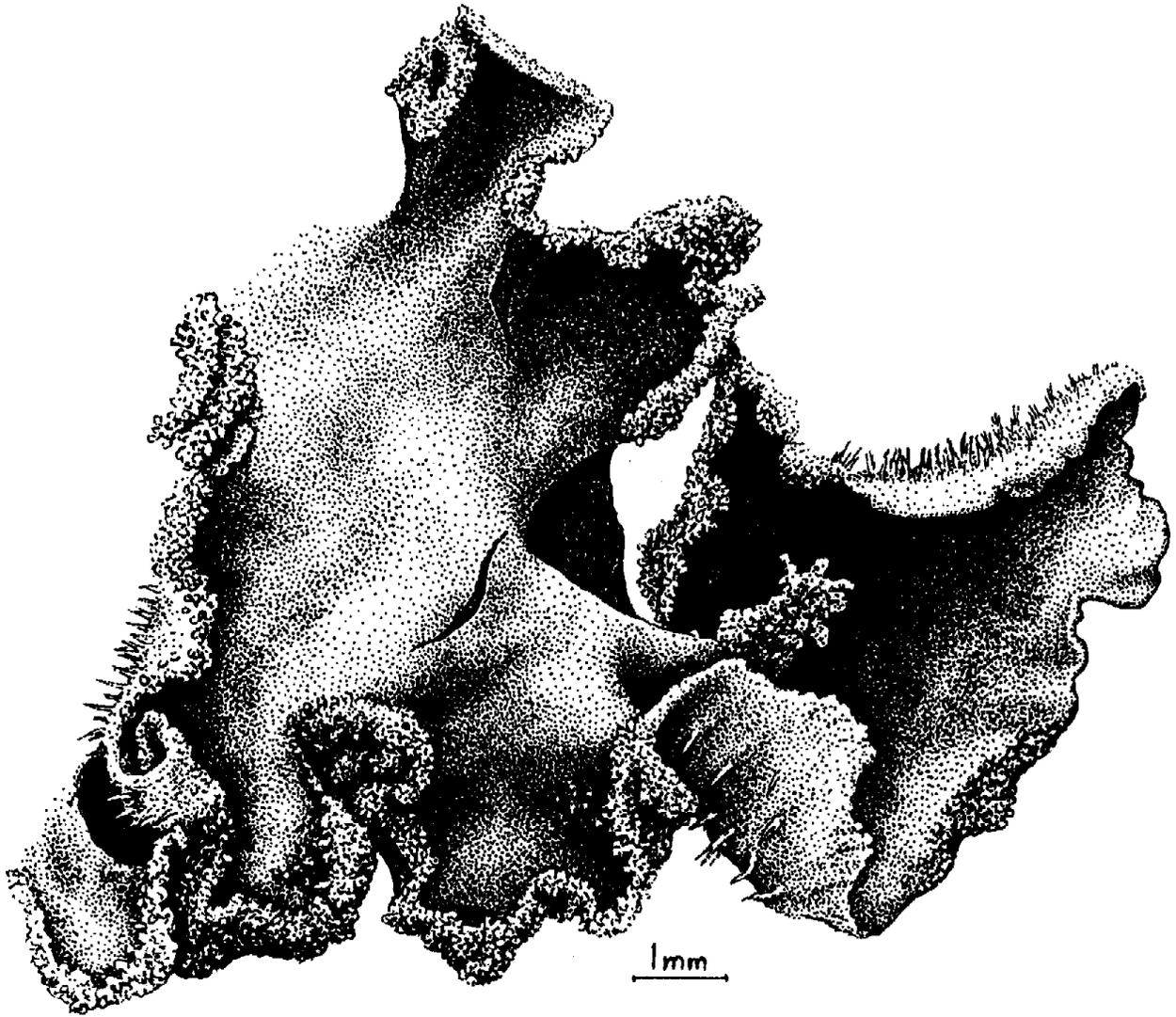


Figure 1. Line drawing of *Leioderma solediatum* by Alexander Mikulin.

*L. soreliatum* in this area. It apparently is a strictly hypermaritime species, which suggests a fairly narrow ecological amplitude and an affinity for the high precipitation and humidity present in these habitats. *Leioderma soreliatum* is a nitrogen-fixing species, providing a small amount of usable nitrogen to the ecosystems it inhabits.

### C. Range and Known Sites

*Leioderma soreliatum* is known from only four localities in North America: two in Oregon (Sutton Creek Recreation Area (Lane County) and Eel Creek Recreation Area (Douglas County), Siuslaw National Forest); one in Washington on private land, Hoh River Road, Olympic Peninsula (Jefferson County) (Tønsberg, pers. comm.); and one on Vancouver Island, British Columbia (Goward *et al.* 1994). *Leioderma soreliatum* is known mainly from the South Pacific, New Zealand, Australia, Sri Lanka, and mainland India; in Asia, Malaya, Japan and Hawaii; with disjunct populations on the Pacific coasts of North and South America (Galloway and Jørgensen 1987).

### D. Habitat Characteristics and Species Abundance

*Leioderma soreliatum* is rare in North America, with two of its four known sites on the Siuslaw National Forest. In Oregon, *L. soreliatum* is found in semi-open coastal thickets, and deflation plains and ericaceous shrub thickets of shore pine (*Pinus contorta*) and ericaceous shrubs on stabilized dunes and deflation plains (McCune *et al.* 1997). The Sutton Creek Recreation Area site is an open, old shore pine-shrub forest with little or no Sitka spruce (*Picea sitchensis*) in the canopy; *L. soreliatum* is epiphytic over thin bryophyte mats on the stems of ericaceous shrubs (*Vaccinium* spp. and *Rhododendron macrophyllum*). In Washington, it is found in a young riparian stand of red alder (*Alnus rubra*) surrounded by clearcuts, and was on the bole of a 10-cm-dbh alder. This site was unusual in that the cyanolichen *Lobaria oregana* was abundant in a young stand (Tønsberg, pers. comm.). In British Columbia, it is found over mossy conifer branches in an open hypermaritime forest (Goward *et al.* 1994). In the South Pacific, *L. soreliatum* grows in damp, humid habitats such as rainforests and swampy areas, where it is most commonly epiphytic on trees and shrubs in moderate light, and also occurs on pumice, clay banks, or on mossy rocks (Galloway and Jørgensen 1987). In parts of its range, it is best developed on disturbed sites, such as edges of secondary forests and road margins (McCune *et al.* 1997)

## II. CURRENT SPECIES SITUATION

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

*Leioderma soreliatum* was thought to be at risk under the Northwest Forest Plan because of its rarity and limited distribution in the range of the northern spotted owl. At the time of the FEMAT viability analysis it was known from only two sites in the range of the northern spotted owl (USDA and USDI 1994a and b).

## **B. Major Habitat and Viability Considerations**

The major viability consideration for *L. soreliatum* is loss of populations due to management activities which harm the populations or their habitat. Because of the limited extent of Oregon coastal dune habitat, the tendency of other rare oceanic lichens to be found in this habitat, the rarity of this species in North America, and land development on privately owned coastal land, all known sites on federal land are important for maintenance of the species.

## **C. Threats to the Species**

Threats to *L. soreliatum* are those actions that harm the populations or impact their habitat, including altering the microclimate and removing colonized substrate, which could result in the loss of individuals and populations. These activities are mainly related to recreation and include building trails and shelters, collecting firewood, and off-trail bicycle, off-road vehicle, and foot traffic. As a cyanolichen, *L. soreliatum* is probably sensitive to air pollution from vehicle exhaust and fire, although its specific sensitivity is unknown. It is vulnerable to loss of habitat resulting from increased development along the coast and the encroachment of non-native invasive plants.

## **III. MANAGEMENT GOAL AND OBJECTIVES**

### **A. Management Goal for the Taxon**

The goal for managing *Leioderma soreliatum* is to assist in maintaining species viability.

### **B. Objectives**

Manage known sites on federal lands by maintaining habitat, stand structure, occupied and potentially suitable substrate, and microclimatic conditions required by *L. soreliatum*, and by allowing existing habitat conditions to persist and evolve naturally.

## **IV. HABITAT MANAGEMENT**

### **A. Lessons From History**

No specific historical lessons are available for *L. soreliatum*. As a nitrogen-fixing lichen, however, it is probably sensitive to air pollution, and in many industrialized parts of the world nitrogen-fixing lichens have disappeared due to air quality degradation (Rhoades 1988; Ryan and Rhoades 1992; Geiser *et al.* 1994). In many parts of the industrialized world lichen populations are declining because of habitat alteration (Seaward 1977). *Leioderma soreliatum* habitat is at risk because of coastal development along the Oregon dunes.

## **B. Identifying Habitat Areas for Management**

All known sites of *L. soreliatum* on federal lands in the range of the Northwest Forest Plan are identified as habitat areas where these management recommendations should be implemented. A habitat area for management is defined as suitable habitat occupied by or adjacent to a known population.

## **C. Managing in Habitat Areas**

- Manage known sites on federal land by allowing existing habitat conditions to persist and evolve naturally.
- Collecting firewood should be restricted.
- Collecting voucher specimens for scientific purposes should be restricted, unless they are found in litterfall.
- Restrict off-trail use of vehicles, bicycles and foot traffic in areas of known populations in the coastal ericaceous shrub habitats.
- Minimize the extent of shrub and tree clearing along trails during maintenance activities.
- Develop practices to route human use away from the populations (*e.g.*, divert trails and roads). The trampling of shrubs, removing trees or branches, introducing non-native species by seed dispersal or planting, compacting tree or shrub roots which support the species, are all examples of potential recreational impacts.

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

Information from reported sites suggests that *L. soreliatum* may not be a species closely associated with late-successional and old-growth forests. For a species to be appropriately listed as a Survey and Manage species, it must first meet the criteria established for designating a species as closely associated with late-successional and old-growth forests (USDA and USDI 1994a [Table IV-6] and 1994b). This issue should be addressed by a regional coordinating body.

- Share information with state and private sectors to further activities directed at the conservation of *L. soreliatum*.
- Consider opportunities for managing known sites, such as Botanical Special Interest Areas, Areas of Critical Environmental Concern, or other administratively withdrawn designation, or by prescribing special standards and guidelines during Forest Plan and Resource Management Plan revisions.
- Request the Oregon and Washington State Natural Heritage Programs track and store information for *L. soreliatum* across all land ownerships.
- Continue to work with state and federal air regulatory agencies to control off-site emission sources that adversely impact on lichens and bryophytes.

## **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 abundance, and to characterize ecological conditions.
- Determine if *L. soreliatum* meets the criteria for being closely associated with late-successional/old-growth forests.
- Determine the distribution of *L. soreliatum* in areas identified as potentially suitable habitat. Potentially suitable habitat is identified as coastal deflation dune systems with scattered old Sitka spruce, shore pine forests and ericaceous shrub thickets, and coastally influenced riparian alder stands. Areas with potentially suitable habitat include Gwynn Creek Recreation Area and Sand Lake, Siuslaw National Forest; BLM Heceta Dunes ACEC; and other coastal BLM parcels.
- Share information with other land management agencies regarding potentially suitable habitat in areas such as Cape Lookout, Cape Arago and Cape Blanco State Parks.

### **B. Research Questions**

- What are the dispersal rates and mechanisms of *L. soreliatum*?
- Which habitat characteristics and ecological conditions are necessary for survival of *L. soreliatum* propagules?
- What limits dispersal and establishment of propagules and colonization of suitable *L. soreliatum* habitat?
- Is *L. soreliatum* sensitive to air pollution?
- Which suites of other rare lichens occur with *L. soreliatum*?
- How do populations of *L. soreliatum* respond to successional changes and associated changes in microclimate?

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

Monitor the effects of recreational activities on populations of *L. soreliatum* in habitat areas.

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