Rare Plant Status Review: *Sulcaria badia*
Addition to California Rare Plant Rank 4.2, G3 / S3
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This species review is being expedited though a challenge cost share agreement between the California Native Plant Society and the USDA Forest Service, Pacific Southwest Region. Aside from being advanced as part of this agreement, the process, content, and information provided herein is not altered, modified, or developed differently in any way or form compared to other status reviews developed by CNPS.

Background and Taxonomy
Sulcaria badia Brodo & D. Hawksw. is an epiphytic fruticose lichen in Parmeliaceae that is endemic to the Pacific Northwest with a historical distribution from the Olympic Peninsula in Washington in the north to the general area of Laytonville, California in the south, a range of approximately 940 km. Its contemporary distribution is from Corvallis, Oregon to Lake Pillsbury, Lake County, California, a distance of approximately 580 km. According to Brodo and Hawksworth (1977), the placement of this species into the genus *Sulcaria* should be regarded as tentative until fertile material is available for study, though most contemporary authors treat the species as though that placement were permanent (Carlberg and Toren 2006).

Sulcaria badia has a pendent, flaccid thallus that is 20-50 cm long, with branches markedly flattened and twisted, conspicuously marked with parallel grooves, 0.25 – 0.4 (1.0) mm diameter at base, with short, slender almost perpendicular lateral branches. Its thallus is dull, chestnut-brown to almost badious or yellowish-brown in parts. From a distance of three meters its color is the most distinctive character, although it can be as brown as many *Bryoria* species. "At a magnification of 10-14x, well-developed specimens of *Sulcaria badia* are easily distinguished from other Alectorioid lichens by the deep grooves (pseudocyphellae) that spiral around the main branches. The color of pale forms from shaded locales can be very close to *Bryoria capillaris*, while thalli from exposed locations can be as dark brown as many other species of *Bryoria*." (Carlberg and Toren 2006). See "*Sulcaria badia*, Sponsorship for the CALS Conservation Committee" by Carlberg and Toren (2006) for further taxonomic description and biological characteristics: http://californialichens.org/Sponsorships/Sulcaria_badia.pdf).

Ecology
Sulcaria badia appears to be a generalist, but is described as being most abundant on trees, especially of *Malus* (apple) and *Quercus* (oak), in well-lighted *Quercus garryana* habitat (Brodo and Hawksworth 1977). The habitats of Laytonville and Lake Pillsbury of California and Medford BLM of Oregon are consistent with this description. "The localities proximal to the Klamath and Trinity Rivers are mid- to late-mature Douglas-fir forests, sometimes with dense sheltering canopy covers and either a sparse presence of black oak (*Quercus kelloggii*), or none." (Carlberg and Toren 2006). One site in Oregon is a coastal dune forest. Additional substrates include *Acer macrophyllum*, *Fraxinus oregana*, *Pinus ponderosa*, and *Rhododendron macrophyllum* (Carlberg and Toren 2006).

Sulcaria badia is primarily asexual, reproducing via thallus fragmentation. Characteristics of its apothecia (spore-bearing structures) are unknown. It has a limited dispersal ability, with wind,

gravity, and birds listed as possible dispersers (Carlberg and Toren 2006). In California, *S. badia* is known from an approximate elevation of 415 to 1,510 meters (Google LLC 2020).

Distribution and Abundance
Sulcaria badia is known from 13 occurrences in California, occupying a wide, yet inconsistent range from the vicinity of the Trinity River in Humboldt County, to Lake Pillsbury in Lake County. Six of its occurrences are considered historical, having not been seen in the past 20 years. An additional five records of *S. badia* based on herbarium records exist from San Mateo (one), Santa Cruz (one), and San Luis Obispo (three) counties. These specimens were collected outside of the reported range of *S. badia* and should be examined for proper identification. If they are actually *S. badia*, the species would be known from a total of 18 occurrences and its range would be significantly broadened.

Nine of the 13 occurrences of *S. badia* are on Forest Service lands, with four on Mendocino NF, two on Six Rivers NF, two on Lassen NF, one on Shasta-Trinity NF, and the remaining four on land of unknown owenership. The type locality of *S. badia* is Philomath, Oregon, and it was reported to be extant at this locality in 2004 (McCune 2004).

Status and Threats
Sulcaria badia is a Region 5 Forest Sensitive species in Mendocino, Shasta-Trinity, and Six Rivers National Forests (USDA 2015). It is Vulnerable (S3) in Oregon and Possibly Extirpated (SH) in Washington (NatureServe 2020), and is further considered Threatened or Endangered Throughout Range (ORBIC List 1) in Oregon (ORBIC 2019). Agricultural conversion and residential development generally threaten this species either by removal of substrate trees or causing a decline in air quality (Carlberg and Toren 2006). Voucher collecting has severely impacted this species at its type locality in Philomath, Oregon (Peterson et al. 1998).

Summary
Based on the available information, CNPS and CNDDB recommend adding *Sulcaria badia* to 4.2 of the CNPS Inventory. With nearly half of its occurrences being historical and threats from agricultural conversion and residential development, we propose a threat rank of 0.2 at this time. If knowledge on the distribution, threats, and rarity status of *S. badia* changes in the future, we will re-evaluate its status at that time.

Actions
CNPS: Add *Sulcaria badia* to 4.2
CNDDB: Add *Sulcaria badia* to G3 / S3

CNPS Inventory Record
Sulcaria badia Brodo & D. Hawksw.
grooved beard lichen
Parmeliaceae
CRPR 4.2
Oregon, Washington(?)
Humboldt, Lake, Mendocino, Shasta, Trinity

Lake Pillsbury (565B) 3912248, Burbeck (567B) 3912344, Laytonville (583B) 3912364, Cahto Peak (584A) 3912365, Covelo East (598C) 3912372, Viola (644C) 4012156, Hayfork Bally (650B) 4012362, Salyer (670A) 4012385
Cismontane woodland, lower montane coniferous forest / usually on bark of hardwoods and conifers; elevation 415-1,510 meters.
epiphytic fruticose lichen
Potentially threatened by agricultural conversion and development. Often occurs on *Pseudotsuga menziesii* and *Quercus garryana*; also occurs on *Acer macrophyllum*, *Fraxinus oregana*, *Pinus ponderosa*, and *Rhododendron macrophyllum*. See *Opera Botanica* 42: 146 (1977) for original description, and *Bulletin of the California Lichen Society* 13(2):45-50 (2006) for CALS Conservation Committee sponsorship.
CALS Conservation Committee: http://www.californialichens.org/conservation/sulcaria-badia/

Literature Cited

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