Rare Plant Status Review: *Phacelia lyonii*
Proposed Addition to California Rare Plant Rank 1B.2, G2 / S2
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Changes to the original document are in blue text.

Background and Taxonomy
Phacelia lyonii A. Gray is an annual herb in Hydrophyllaceae known from San Clemente and Santa Catalina islands (Los Angeles County) as well as one waif collection from the beach at Camp Pendleton (San Diego County). It is included in *The Jepson Manual* (Wilken et al. 1993) and the *Jepson eFlora* (Walden et al. 2012); this genus is not yet treated in *Flora of North America* (FNA 1993+). *Phacelia lyonii* (as *P. lyoni*) was first described in 1885 from Santa Catalina Island (Gray 1885), and this is the only island location reported in *A Manual of Flowering Plants of California* (Jepson 1925). It was reported from San Clemente Island by 1951 (Abrams 1951, Munz and Keck 1959). There are no taxonomic or nomenclatural synonyms for the name *Phacelia lyonii* (Tropicos 2021).

Phacelia lyonii was Considered But Rejected (CBR) in the third edition of the CNPS Inventory as being too common (Smith and York 1984), and has remained CBR ever since that time. There is only a single document in the CNPS Rare Plant Program files for this species (attached) and it unfortunately does not provide sufficient information to support it as being too common for inclusion at that time.

Phacelia lyonii is placed in Phacelia section *Ramosissimae* (Rydb.) Walden & R. Patt., a section of 22 annual species, some of which are widely distributed California natives, such as *P. cicutaria*, *P. distans*, *P. ramosissima*, and *P. taneticifolia* (Walden and Patterson (2012). *Phacelia lyonii* is distinguished from similar species (and notably from *P. distans*, with which it co-occurs) by its combination of few-branched stems, strongly glandular, deeply lobed to compound leaves, relatively dense inflorescence, abaxially cupped calyx lobes, bell-shaped corollas, 5–7 mm long, with white to very light-purple limb and yellowish base (usually deciduous in fruit), and 7–20 pitted seeds per capsule (Walden et al. 2012, Guilliams 2021 pers. comm.).

The specific epithet honors botanist William S. Lyon who collected the type specimen of this species in 1884 (Gray 1885).

Ecology
Phacelia lyonii grows in coastal dunes, coastal bluff scrub, coastal scrub, and chaparral. It is found on flood plains, in ephemeral stream beds, in canyons (including canyon bottoms, flats, and sides), on ridges and cliff faces, as well as in eroded areas or earth slides from 0–1500 ft (0–460 m) in elevation (Walden et al. 2012, CCH1 2021, CCH2 2021, Kauppinen 2021 pers. comm., Lee 2021 pers. comm., Junak and Wilken 1998, Ratay 2021 pers. comm.). The soil type is not usually specified by observers, but it has been collected from rock outcrops, talus, gravelly flood plains, and rocky clay soil. It blooms between April and October. Species associates listed by observers are numerous and include: *Rhus* spp., *Salvia* spp., *Erythranthe* spp., *Artemisia californica*, *Baccharis pilularis, Nicotiana glauca*, *Perityle emoryi*, *Hemizonia clementina*, *Galium catalinense*, *Amblyopappus pusillus*, *Dudleya virens*, *Abronia maritima*, and several

species of cactus (*Bergerocactus emoryi*, *Opuntia occidentalis*, *O. littoralis*) (Walden et al. 2012, CCH1 2021, CCH2 2021, Kauppinen 2021 pers. comm., Lee 2021 pers. comm., Junak and Wilken 1998, Ratay 2021 pers. comm.).

Distribution and Abundance
San Clemente Island is the southernmost of California's Channel Islands, situated approximately 40 miles from the mainland. Santa Catalina Island is approximately 34 miles to the northeast of San Clemente Island and is approximately 19.7 miles from the mainland. There are about 40 estimated occurrence records of *Phacelia lyonii*, with 18 on San Clemente Island and 22 on Santa Catalina Island, all in Los Angeles County. An additional record was collected from the beach at Camp Pendleton (San Diego County) in 2011, but more plants have not been seen during subsequent visits, indicating that the occurrence was just a single waif plant (Rebman 2021 pers. comm.).

San Clemente Island is owned and managed by the United States Navy. Natural Resource management on the island focuses on Federally-listed taxa, and they have not been actively mapping populations of *Phacelia lyonii* (Munson 2021 pers. comm.). Only six of the 19 occurrences on San Clemente Island have been observed over the past 20 years, and the botanist working on a new flora of San Clemente believes that the species has become very rare, known from only a few locations and with populations having fewer than 25 plants (Rebman 2021 pers. comm.). Eleven of the occurrence records on San Clemente Island date from a survey performed for the Navy in 1996-1997 by Steve Junak (Junak and Wilken 1998); population numbers for those records range from two to 61 plants, but there are no subsequent population counts at those locations. More recently, 70 plants were observed at Balanced Rock in 2010, two plants were observed at the mouth of Warren Canyon in 2011, and fewer than 25 plants at Chukit Canyon in 2007 and 2019 (Lee 2021 pers. comm., Rebman 2021 pers. comm.). Labels for historical herbarium specimens noted that the plants were never widespread by using language such as "locally common," "occasional," "scattered," or "rare" (CCH1 2021, CCH2 2021).

According to online specimen and observation records and personal communications from botanists, only seven of the 22 estimated occurrence records on Santa Catalina Island have been seen over the past 20 years. However, between 2006 and 2012, a botanist familiar with *Phacelia lyonii* on Santa Catalina observed the species in landslide areas along the coast of the island fairly reliably, although never in large numbers (Ratay 2021 pers. comm.). Population numbers have only been recorded for four records on Santa Catalina: #20 with 25 plants, #21 with 4 plants, #22 with over 50 plants, and #36 with 2-10 plants (Calflora 2021, CCH1 2021, CCH2 2021). Similar to those from San Clemente Island, specimen labels for collections from Santa Catalina use language such as "locally common," "scattered," or "rare" to describe the abundance of this species (CCH1 2021, CCH2 2021). All but four of the occurrence records on Santa Catalina Island are located on lands owned by the Santa Catalina Island Conservancy; the remaining four are of unknown land ownership.

Status and Threats
Phacelia lyonii currently has a global ranking of G1, critically imperiled (NatureServe 2021); this ranking is most likely due to the species being endemic to the Channel Islands and having a very restricted range. The floras of San Clemente and Santa Catalina islands are thought to have arrived through air and water from the mainland (including animal- or people-mediated). Some

species are paleoendemics that once occurred on the mainland but are now restricted to the islands; other species are thought to have evolved in isolation on the islands (Thorne 1969). San Clemente Island has an especially rich native endemic flora, both because it is more remote from other land areas and because it is thought to have stayed emergent during the late Pleistocene (Slakey et al. 2013); however, both islands are home to endemic plants that occur nowhere else (Thorne 1969).

Over the past two centuries, both San Clemente and Santa Catalina islands have lost parts of their rich and unique plant life by the introduction of grazing animals and invasive plant species (Thorne 1969, Slakey et al. 2013). Today, much of Santa Catalina Island is owned and managed by the Santa Catalina Island Conservancy, and all of San Clemente Island is owned and managed by the United States Navy. Feral goats and pigs have been removed from both islands. However, introduced mule deer and American bison still remain on Santa Catalina Island, and exclosure experiments have shown the impact of these herbivores on the native flora. In addition, invasive plant species continue to impact both islands (Slakey et al. 2013, Catalina Island Conservancy 2021, Guilliams 2021 pers. comm.). Naval training activities on San Clemente Island, although contained, continue to affect some habitats on that island (Slakey et al. 2013). Climate change and decreasing precipitation may also affect future seedling/plant survivorship of *Phacelia lyonii* (Levine et al. 2008).

Summary
Based on the available information, CNPS and CNDDB recommend adding *Phacelia lyonii* to California Rare Plant Rank 1B.2 of the CNPS Inventory. If knowledge on the distribution, threats, and rarity status of *Phacelia lyonii* changes in the future, we will re-evaluate its status at that time.

Recommended Actions
CNPS: Add *Phacelia lyonnii* to CRPR 1B.2
CNDDB: Add *Phacelia lyonnii* to S2, change from G1 to G2

Draft CNPS Inventory Record
Phacelia lyonii A. Gray
Lyon’s phacelia
Hydrophyllaceae
Synonym(s)/Other Name(s) in CNPS Inventory: None
CRPR 1B.2
Los Angeles
San Clemente Island Central (3211874), San Clemente Island South (3211873), Santa Catalina East (3311833), Santa Catalina North (3311844), Santa Catalina South (3311834), Santa Catalina West (3311845)
Coastal dunes, coastal scrub, coastal bluff scrub, chaparral / openings, gravelly, rocky, talus; elevation 0-460 meters.
Annual. Blooms April to October.
Threatened by feral herbivores, overgrazing, and non-native plants. Possibly threatened by military activities. Single collection in 2011 from the beach at Camp Pendleton (SDG Co.) is considered a waif. See *Proceedings of the American Academy of Arts and Sciences* 20: 257–310 for original description.

Sent to: SW, G. Walden, R. Patterson, L. Garrison, D. Hansen, S. Ratay, S. Kauppinen, B. Munson, B. Lee on 2021-03-08

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[CCH2] Consortium of California Herbaria Portal 2. 2021. Data provided by the participants of the Consortium of California Herbaria and the California Phenology Thematic Collections Network (CAP-TCN). Regents of the University of California, Berkeley and Cal Poly, San Luis Obispo. Website http//:www.cch2.org/portal/index.php [accessed February 2021].

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