

Added to California Rare Plant Rank 1B.2 of the CNPS Inventory on January 30, 2019**Rare Plant Status Review: *Ceanothus pendletonensis*****Proposed Addition to California Rare Plant Rank 1B.2, G1 / S1**

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Background and Taxonomy

Ceanothus pendletonensis D.O. Burge, Rebman & M.R. Mulligan is an edaphic-endemic perennial shrub in the Rhamnaceae known mostly from Camp Pendleton of San Diego County, California. It is not included in the *Jepson eFlora* (Wilken and Burge 2016) or *Flora of North America North of Mexico* (Schmidt and Wilken 2016). *Ceanothus pendletonensis* was described by Burge et al. (2017) along with two other rare, edaphic-endemic *Ceanothus* taxa, *C. foliosus* var. *viejasensis*, and *C. thyrsiflorus* var. *obispoensis*, which are concurrently under review for addition to CNPS *Inventory*. In order to assess morphological differences of the three new *Ceanothus* taxa, Burge et al. (2017) examined herbarium specimens of the new taxa and their closest relatives. In total, 121 specimens (from RSA, SD, SBBG, and DAV) were examined with the naked eye or at 10-50X magnification under dissecting microscopes, noting characteristics frequently used to diagnose *Ceanothus* taxa, such as leaves, inflorescences, fruits, and young stems. Only qualitative characters were used to differentiate *C. foliosus* var. *viejasensis* and *C. thyrsiflorus* var. *obispoensis* from close relatives, while quantitative data on leaf size and shape was collected for *C. pendletonensis*. Through their analysis it was determined that all three *Ceanothus* are edaphic endemics, restricted to soils derived from a particular type of geological material, including gabbro (*C. foliosus* var. *viejasensis*), dacite (*C. thyrsiflorus* var. *obispoensis*), and granodiorite (*C. pendletonensis*); bringing the total of known edaphic endemic *Ceanothus* taxa to 19.

Ceanothus pendletonensis is similar to *C. spinosus* and *C. leucodermis*, and while both occur in the same region as *C. pendletonensis*, neither of them co-occurs with it. *Ceanothus pendletonensis* can be distinguished from *C. spinosus* and *C. leucodermis* as well as most other *Ceanothus* by having unusual warty (vs. smooth) stem texture. It is more similar to *C. leucodermis*, but is distinct in having shorter leaves (2-17 mm vs. 12-30 mm long), with mature stems that are yellowish-green (vs. glaucous-green in *C. leucodermis*). In addition to having warty stems, it is also differentiated from *C. spinosus* in having shorter leaves (2-17 mm vs. 10-37 mm long), and in having leaves with 1-3 veins (vs. 1 midvein in *C. spinosus*). The specific epithet, *pendletonensis*, refers to the Marine Corps Base Camp Pendleton, where the majority of populations of this taxon occur (Burge et al. 2017).

Ecology

Ceanothus pendletonensis occurs in granitic soils of chaparral and cismontane oak woodland, from an approximate elevation of 110 to 870 meters (Burge et al. 2017). Based on herbarium vouchers, it is believed to bloom from March to June (CCH 2018). Associated species include *Adenostoma fasciculatum*, *Arctostaphylos glandulosa*, *Hesperoyucca whipplei*, *Pickeringia montana*, and *Quercus berberidifolia* (Burge et al. 2017). Additional associates may include *Quercus agrifolia* var. *agrifolia*, *Ceanothus crassifolius*, *Malosma laurina*, *Eriogonum fasciculatum* var. *foliolosum*, *Heteromeles arbutifolia*, *Crocantemum scoparium*, *Diplacus aurantiacus*, *Styrax redivivus*, *Helianthus gracilentus*, and *Acmispon glaber* var. *glaber* (CCH

2018). Other rare associated species include *Arctostaphylos rainbowensis*, *Brodiaea filifolia*, and *Horkelia truncata* (CNDDDB 2018).

Distribution and Abundance

Ceanothus pendletonensis is currently only known from approximately five occurrences on the southern portion of the Santa Margarita Mountains of San Diego County, almost entirely on Marine Corps Base Camp Pendleton. Of the five occurrences, only one (1/5, ~20%) is considered historical (occurrences not seen in over 20 years are considered historical by CNDDDB). Three occurrences are located on Camp Pendleton, one occurrence is located in the Cleveland National Forest, and the remaining occurrence is located on land of unknown ownership (CCH 2018; Burge et al. 2017).

Status

Ceanothus pendletonensis is a recently described California endemic, and is therefore not ranked elsewhere. It co-occurs with three other rare plants, *Arctostaphylos rainbowensis* (CRPR 1B.1; <http://www.rareplants.cnps.org/detail/1797.html>), *Brodiaea filifolia* (CRPR 1B.1, federally threatened, state endangered; <http://www.rareplants.cnps.org/detail/363.html>), and *Horkelia truncata* (CRPR 1B.3; <http://www.rareplants.cnps.org/detail/917.html>) (CNDDDB 2018; CNPS 2018). Rare or special status animals that co-occur or occur in the vicinity (within ¼ mile) of *C. pendletonensis* include four bats: pallid bat, pocketed free-tailed bat, Yuma myotis, and western mastiff bat; two amphibians: arroyo toad and coast range newt; and seven reptiles: Coronado skink, coastal whiptail, orange-throated whiptail, coast horned lizard, San Diego ringneck snake, coast patch-nosed snake, and two-striped gartersnake (CNDDDB 2018).

Threats

There are no known direct threats to *Ceanothus pendletonensis* at this time. It is naturally rare and seemingly geographically limited. While there are no known direct threats to this taxon, the nature of its limited geographic range implies that even a small change in land use within its distribution could have drastic reductions in population size. Furthermore, the unusual edaphic ecology of this taxon also means that mitigation efforts via transplantation or ex-situ conservation could be problematic (Burge et al. 2017).

Camp Pendleton is home to at least 34 additional rare plant taxa, not including all watchlist (CRPR 4) plants (CNDDDB 2018). Approximately 35 of the 203 rare plant occurrences in the CNDDDB (2018) known from Camp Pendleton include mention of threats, including but not limited to military operations (17 occurrences), invasive plant impacts (7), development (6), ORV activity (5), and improper burning regime (3). Documentation is needed to determine what potential and possible threats might affect occurrences of *Ceanothus pendletonensis* on Camp Pendleton and other areas.

The majority of *C. pendletonensis* occurrences (4 of 5) are co-located with or nearby other rare plants, some of which have recorded threats and overall site/occurrence quality/viability ranks in the CNDDDB (Table 1). The threats for these nearby or co-occurrences include military operations and road expansion, which are typical disturbances of concern on navy bases; however, it's unknown how these possible threats might affect *C. pendletonensis*. The extreme rarity and substrate specificity of *C. pendletonensis* make it vulnerable to extirpation, and therefore communication with the landowner will be important.

Summary

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

Recommended Actions

CNPS: Add *Ceanothus pendletonensis* to CRPR 1B.2

CNDDDB: Add *Ceanothus pendletonensis* to G1 / S1

Draft CNPS Inventory Record

Ceanothus pendletonensis D.O. Burge, Rebman & M.R. Mulligan

Pendleton ceanothus

Rhamnaceae

CRPR 1B.2

San Diego

Fallbrook (051A) 3311743, Margarita Peak (051B) 3311744

Chaparral, cismontane woodland/granitic; elevation 110-870 meters.

Perennial shrub. Blooms March to June.

Possibly threatened by road widening and military activities. Similar to *C. leucodermis* and *C. spinosus*; differentiated by warty stem texture and shorter leaves. See *Systemic Botany* 42(3):529-542 (2017) for original description.

Literature Cited

Burge, D. O., J. P. Rebman, M. R. Mulligan, and D. H. Wilken. 2017. Three edaphic-endemic *Ceanothus* (Rhamnaceae) new to science. *Systematic Botany* 42(3): 529-542. (Original description.)

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Consortium of California Herbaria. 2018. Data provided by the participants of the Consortium of California Herbaria. Regents of the University of California, Berkeley. Website <http://ucjeps.berkeley.edu/consortium/> [accessed 6 November 2018].

Schmidt, C. L. and D. H. Wilken. 2016. *Ceanothus*. Pp. 77-108 in: Flora of North America Editorial Committee (eds.), *Flora of North America North of Mexico*, Vol. 12. New York and Oxford.

Wilken, D. H. and D. O. Burge. 2016. *Ceanothus*. In: Jepson Flora Project (eds.), *Jepson eFlora*. Website <http://ucjeps.berkeley.edu/IJM.html> [accessed 6 November 2018].

APPENDIX I – Tables and Figures

<i>Ceanothus pendletonensis</i>	Scientific name	Element Occurrence	Last documented	EO Rank	Threats
Record 1 & 3	<i>Brodiaea filifolia</i>	EO 139	2007	Unknown	None noted
Record 1	<i>Horkelia truncata</i>	EO 1	2009	Excellent	Road expansion / military operations
Record 1	<i>Arctostaphylos rainbowensis</i>	EO 83	2009	Unknown	None noted
Record 3	<i>Arctostaphylos rainbowensis</i>	EO 31	2007	Excellent	Road expansion / military operations
Record 3	<i>Arctostaphylos rainbowensis</i>	EO 83	2009	Unknown	None noted
Record 4	<i>Arctostaphylos rainbowensis</i>	EO 74	1973	Unknown	None noted
Record 5	<i>Horkelia truncata</i>	EO 24	1992	Excellent	Road expansion

Table 1: Summary of rare plant occurrences that co-occur with *Ceanothus pendletonensis*; showing record number of *C. pendletonensis* followed by the rare plant that co-occurs at that record, along with the rare plants element occurrence (EO) number, year the EO was last documented, overall site/occurrence quality/viability ranks of the EO (EO Rank), and threats (data provided from CNDDDB 2018).