

**Rare Plant Status Review: *Helianthus exilis***  
**Proposed Deletion from California Rare Plant Rank 4.2, G3 / S3**  
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This species review is being expedited through 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.

### **Introduction**

*Helianthus exilis* A. Gray is an annual herb in the Asteraceae first described from California in 1865. Gray (1865) based the species on specimens collected by Bolander from wet places near Clear Lake (Lake County) (Lectotype: *Bolander 2623*, GH). The plants were described as hirsute, not scabrous, with heads borne on nearly filiform peduncles and having a brown-purple disk that was only a half an inch broad (Gray 1865). *Helianthus exilis* was added to the CNPS Rare Plant Inventory in 1974 and is a California Rare Plant Rank 4.2 taxon (CNPS 2022).

As described below, *H. exilis* has been recognized at the species level by Jepson (1925), Schilling (2006), and Keil (2012), but it was treated as a synonym of *H. bolanderi* by Munz and Keck (1968), Keil (1993), and Keil (2020). Recent work by Owens et al. (2016) has shown definitively that *H. exilis* and *H. bolanderi* are one lineage that should be considered one species with many different subpopulations, some on serpentine soils and some off serpentine soils. The morphological plasticity within the species, sometimes due to stunting on serpentine soils, has created confusion in the literature and caused conjecture about hybridization between *H. annuus*, *H. exilis*, and *H. bolanderi* (Schilling 2006, Owens et al. 2016).

### **Background and Taxonomy**

*Helianthus exilis* was recognized in Jepson's *A Manual of the Flowering Plants of California* (Jepson 1925) and was distinguished from the similar (and geographically overlapping) *H. bolanderi* A. Gray by hirsute (vs scabrous) stems and chaff awns longer than the disk flowers (vs equaling the disk flowers). However, *H. exilis* was synonymized with, *H. bolanderi* in Munz and Keck's *A California Flora and Supplement* (1968) and the *The Jepson Manual: Higher Plants of California* (Keil 1993). In both Munz and Keck (1968) and Keil (1993) the authors noted the existence of a serpentine form of *H. bolanderi* that had received the name *H. exilis*. Under *H. bolanderi*, Munz and Keck (1968) noted: "The serpentine form received the name *H. exilis*. It is not as large as the otherwise indistinguishable v. ruderal (typical *Bolanderi*) which Heiser believes may have arisen through the introgression of genes of *H. annuus* into the *exilis* race." Likewise, under *H. bolanderi*, Keil (1993) noted: "Slender plants on serpentine have been called *H. exilis* A. Gray, serpentine sunflower." In the key to species in Keil (1993), *H. bolanderi* is separated from like species by having chaff scales awn tipped and much longer than the disk flowers.

*Helianthus exilis* was again recognized as a separate species in *The Jepson Manual: Vascular Plants of California* (Keil 2012) with *H. exilis* restricted to the Klamath Ranges and North Coast Ranges bioregions (often on serpentine) and *H. bolanderi* more widely distributed (including the Klamath Ranges and North Coast Ranges bioregions). Under *H. bolanderi*, Keil (2012) noted:

“Similar and closely related to *H. exilis*.” In the key to species, both species are distinguished as having awn tipped paleae (chaff scales) that are much longer than the disk flowers, and they are distinguished from one another by fruit size (2.7 to 3.5 mm in *H. exilis* vs 3.5 to 4.5 mm in *H. bolanderi*) and the diameter of the heads (15 to 20 mm in *H. exilis* vs generally 20 mm or more in *H. bolanderi*).

Adding additional confusion, in the treatment of *Helianthus* for *Flora of North America* (Schilling 2006), *H. exilis* was recognized as a species, distinguished from *H. bolanderi* by the same fruit and head size characters used by Keil (2012). However, this additional comment was provided: “*Helianthus bolanderi* and *H. exilis* form a closely related pair of sister species that share the distinctive feature of having the middle teeth of the paleae glabrous and relatively elongated, surpassing the disc florets. As treated here, *H. bolanderi* corresponds to the "valley weed race"; it is separated from the "serpentine foothill race," here recognized as *H. exilis*. Heiser (1949) proposed that *H. bolanderi* originated through hybridization between *H. annuus* and *H. exilis*; molecular studies by Rieseberg [and Palmer] (1988) do not support this scheme. In an ironic twist, it appears that *H. bolanderi* may be undergoing "genetic assimilation" through hybridization with *H. annuus*.”

Those trying to separate *H. exilis* from *H. bolanderi* in the field and herbarium struggled to find non-overlapping characters. For example in Ruygt (2020), there is this comment under *H. exilis*: “Difficult to distinguish from *H. bolanderi*; probably better treated as a var. of that taxon.”

In 2016, Owens et al. published a detailed analysis of the relationship between *H. annuus*, *H. bolanderi*, and *H. exilis* based on genomic data. Their results do not support a hybrid origin of *H. bolanderi*, and although they found some introgression of *H. annuus* into the other two “species,” their “... results do not support *H. exilis* and *H. bolanderi* as separate species but are more consistent with a single species with population structure associated with geographic location.”

In 2020, Keil updated the *Jepson eFlora* to reflect this new information. *Helianthus exilis* is no longer recognized as a separate species in the California flora and is once again a synonym of *H. bolanderi*.

### Summary

Based on the available information, CNPS and CNDDDB recommend deleting *Helianthus exilis* from California Rare Plant Rank 4.2 of the CNPS Inventory and placing it on the Considered But Rejected list. If knowledge on the distribution, threats, and rarity status of *Helianthus exilis* changes in the future, we will re-evaluate its status at that time.

### Recommended Actions

CNPS: Change *Helianthus exilis* from CRPR 4.2 to CBR

CNDDDB: Delete *Helianthus exilis* from G3 / S3

### Original CNPS Inventory Record

*Helianthus exilis* A. Gray

serpentine sunflower

Asteraceae

USDA Plants Symbol: PDAST4N1J0

Synonym(s)/Other Name(s): none

CRPR 4.2

Counties: Colusa (COL), Glenn (GLE), Lake (LAK), Mendocino (MEN), Napa (NAP), Santa Clara (SCL), Shasta (SHA), Siskiyou (SIS), Sonoma (SON), Tehama (TEH), Trinity (TRI)

States: California (CA)

Quad name (code): Aetna Springs (3812264), Black Rock Mtn. (4012321), Brushy Mtn. (3912352), Callahan (4112237), Chicken Hawk Hill (4112214), Chiles Valley (3812253), China Mtn. (4112245), Covington Mill (4012287), Detert Reservoir (3812265), Dubakella Mtn. (4012342), Gilmore Peak (3912235), Hall Ridge (3912276), Jamison Ridge (3912362), Jericho Valley (3812274), Jimtown (3812267), Knoxville (3812273), Leesville (3912224), Middletown (3812275), Mineral (4012135), Newville (3912275), Pony Buck Peak (4012331), Rackerby (3912143), Riley Ridge (3912286), Rutherford (3812244), Salt Canyon (3912213), Santa Teresa Hills (3712127), Scott Mountain (4112236), Smoky Creek (4012332), St. Helena (3812254), Stonyford (3912245), Tangle Blue Lake (4112226), Trinity Center (4012286), Walter Springs (3812263), Whispering Pines (3812276), Wilbur Springs (3912214), Wildwood (4012341)

General Habitat: chaparral, cismontane woodland

General Micro Habitat Notes: none

Micro Habitat: seeps, serpentinite

Elevation: 150-1525 meters

Life form: annual herb

Blooms: Jun-Nov

Notes: Difficult to distinguish from *H. bolanderi*; see this name in *TJM* (1993). See *Oikos* 84:69-76 (1999) for information on distribution.

Threats: none

### Revised CNPS Inventory Record

*Helianthus exilis* A. Gray

Changed from 4.2 to CBR on 2022/03/XX

CBR Reason: A synonym of *H. bolanderi*; a common taxon.

Selected References:

Original Description: *Proceedings of the American Academy of Arts and Sciences* 6: 519–556 (1865)

Revised Nomenclature: *Molecular Ecology* 25: 2630–2643 (2016) [doi: 10.1111/mec.13569]

### Literature Cited

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### **Personal Communications**

Keil, D. J. 2021. Professor emeritus, Cal Poly San Luis Obispo. Email correspondence about taxonomic changes in *H. exilis*. Personal communication to A. Sims and B. Baldwin, 8 June 2020.