

**Added to California Rare Plant Rank 1B.2 of the CNPS Inventory on
October 15, 2014**

**Rare Plant Status Review: *Helianthus winteri*
Proposed Addition to California Rare Plant Rank 1B.2, G1G2 / S1S2**

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September 8, 2014

Changes made to the original document appear in blue text.

Background

Helianthus winteri J.C. Stebbins is a perennial subshrub in the Asteraceae that is known from the southern Sierra Nevada foothills in Fresno and Tulare counties, California. It was recently described by Stebbins et al. (2013) and is therefore not included in *The Jepson Manual, Second Edition* (Keil 2012), *Flora of North America* (Schilling 2006), or other state or regional floras at the time of this writing. The first known collections of *H. winteri* are from August 1, 2008 (Stebbins and Winchell 0423, 0426), and it has likely gone unnoticed all of this time due to its high similarity to *Helianthus annuus*. First year growth of *H. winteri* is nearly indistinguishable from *H. annuus*, but the novel species stands out due to its woody stems, year-round blooming period, and fairly dark, purplish buds and phyllaries (Stebbins et al. 2013; J. Stebbins pers. comm. 2014). “Although it can be genetically distinguished with sufficient sampling of its genome, [*Helianthus winteri*] is closely related to nearby *H. annuus* populations on the valley floor [...] and shows reduced heterozygosity consistent with a possible founder event or population bottleneck” (Moyers and Rieseberg 2013; Moyers and Rieseberg, unpublished data). In order to study the genetic changes that accompany a transition from herbaceous annual to woody perennial, Moyers and Rieseberg (2013) performed observations of seedling stem anatomy; comparisons of flowering time, size, and stem density; measurements of relative genome size; and RNA-Seq data for *H. annuus* and *H. winteri*. The results of their study found that *H. winteri* plants flower later and were taller at maturity than typical *H. annuus* plants, and also exhibit differences in their initiation and extent of secondary growth within the first six months of germination. Although they found that the sunflowers do not differ in genome size, they discovered that the transition from annual to perennial involved numerous genomic changes, including divergence in gene expression and coding sequence. This abrupt shift in life history and development is hypothesized to have been driven by strong selective pressures; *H. winteri* grows in relatively harsh habitat, with poor and extremely shallow granitic derived soils, on steep hillsides, and in an area that likely experiences regular water stress. The increased secondary growth of *H. winteri* may afford greater resistance to drought, and/or perennality may allow individuals to establish a foothold in this harsh environment (Moyers and Rieseberg 2013). Despite the fact that *H. winteri* routinely flowers year round, including winter months, its name is in honor of Robert F. (Bob) Winter, a very influencing former Fresno City College instructor. Robert Winter’s remarks to “look at that big sunflower (blooming in January) up there” is what eventually prompted a closer evaluation of this species (Stebbins et al. 2013).

Helianthus winteri occurs in relatively steep, open, south-facing slopes of rocky outcrops, roadcuts, valley and foothill grassland, and cismontane woodland. It grows on well-drained granitic soils at an approximate elevation of 180 to 460 meters. Associated species include *Avena barbata*, *A. fatua*, *Carduus pycnocephalus*, *Quercus douglasii*, *Q. wislizeni*, *Frangula californica*, *Bromus diandrus*, *B. hordeaceus*, *B. madritensis* subsp. *rubens*, *B. tectorum*, *Caulanthus coulteri*, *Phacelia cicutaria*, *Chaenactis glabriuscula* var. *glabriuscula*, *Eschscholzia caespitosa*, *Poa bulbosa*, *P. secunda*, *Plagiobothrys nothofulvus*, *P. tenellus*, *Erodium botrys*, *E. cicutarium*, *Amsinckia eastwoodiae*, *A. intermedia*, *Pholistoma auritum* var. *auritum*, *Lupinus albifrons* var. *albifrons*, *L. bicolor*, *L. benthamii*, *Scrophularia californica*, *Thysanocarpus curvipes*, *Dichelostemma capitatum* subsp. *capitatum*, and *Datura wrightii* (Stebbins et al. 2013).

Helianthus winteri is currently known from approximately eight occurrences, within a very narrow range in the Sierra Nevada foothills between Kings River in southern Fresno County to northern Tulare County. Its type locality is directly adjacent to Highway 180 east of Fresno, which represents a major access route to Sequoia and Kings Canyon National Parks (Stebbins et al. 2013). *Helianthus winteri* is **entirely** ~~mostly~~ known from the southern Sierra Nevada foothills, **with the northernmost** ~~but a single~~ occurrence from Hughes Mountain, Fresno County (Quibell 1641, RSA89172); ~~technically puts *H. winteri* in central Sierra Nevada as well.~~ The Hughes Mountain occurrence was relocated by J. Stebbins (pers. comm. 2014) in 2013, and the population was found to be small and heavily impacted by grazing. This relocation makes the most recent population known from 2010, and all occurrences are therefore considered recent. In the past nine months following the formal description of *H. winteri* (Stebbins et al. 2013), no additional occurrences except for the one on Hughes Mountain have been discovered. This is despite numerous surveys by J. Stebbins (pers. comm. 2014) throughout potential habitat in the central and southern Sierra Nevada foothills, south through Kern Canyon. John Stebbins (pers. comm. 2014) also alerted botanists at Sequoia and Sierra National Forests, as well as several other regional botanists from various agencies and CNPS Chapters to look out for it, but none have reported any additional occurrences as of yet. It is possible that *H. winteri* historically occurred at lower elevations and on less rocky sites in southeastern San Joaquin Valley, but these lands have since been converted to agriculture or development, and the species likely no longer occurs there (Stebbins et al. 2013). Despite the recent, ongoing survey efforts by J. Stebbins, *H. winteri* has the potential to occur in suitable habitat to the north and south of its current known range (Stebbins et al. 2013), and future surveys should continue in attempts to locate potential additional populations of this plant.

Reviewing herbarium material of *H. annuus* that is possibly actually misidentified *H. winteri* would prove difficult, as first year growth of *H. winteri* is nearly indistinguishable from *H. annuus* (Stebbins et al. 2013; J. Stebbins pers. comm. 2014). However, it is unlikely that many of the known collections of *H. annuus* from the Sierra Nevada are *H. winteri*. A recent search of *Helianthus annuus* in the Consortium of California Herbaria (CCH 2014) using the terms "Sierra Nevada" brought up 17 records that are truly from the Sierra Nevada (i.e., some of the records brought up in the search were from Sierra

Madre, Los Angeles County, and other areas outside of the Sierra Nevada, but these were omitted). Of these, only three were from Tulare County (*Twisselmann et al. 18268*, JEPS68303; *Charlton 366*, UCR44185; *Charlton 429*, RSA463714), and none were from Fresno County. The three collections of *H. annuus* from the Sierra Nevada in Tulare County represent the closest records (geographically) to *H. winteri*. All are from Soda Flat near Kern River, approximately 85 air km from the nearest location of *H. winteri*. Not only would this population represent a potential major disjunction from the known distribution of *H. winteri*, but it would also represent a major range and habitat extension. Soda Flat is in the southern High Sierra Nevada as opposed to the Sierra Nevada foothills, and the populations are in highly mineralized soils of wet meadows within upper montane coniferous forest at around 1,830 meters in elevation. It is therefore highly unlikely that these collections are actually *H. winteri*. All other collections within this CCH search were well outside the known range of *H. winteri*, and/or also occurred in dissimilar habitat, soil, or elevations.

Cattle grazing and habitat loss appear to be the most significant threats to *H. winteri* at this time. Its presence only on slopes with little apparent livestock grazing suggests an intolerance to herbivory, and young plants of *H. annuus*, its most similar species, are not tolerant of intensive grazing. *Helianthus winteri* potentially once occurred on the east side of the southern San Joaquin Valley, but if so, it has since been extirpated by agriculture or development (Stebbins et al. 2013; J. Stebbins pers. comm. 2014). All of the occurrences of *H. winteri* are on privately owned lands, and several (including the type) are adjacent to well-travelled highways or roads, and are therefore threatened by road maintenance (including regular chemical and mechanical vegetation control). Furthermore, all of the sites are either adjacent to, near, or surrounded by intensive agriculture, and incidental ongoing impacts, including spraying, trespassing, OHV use, etc. are common. Lastly, in addition to the heavily grazed, degraded occurrence at Hughes Mountain, the occurrence off Boyd Drive in Tulare County (*Stebbins & Constable 12944*) was recently reduced by about 40% due to the landowner moving their fence (J. Stebbins pers. comm. 2014).

Based on the available information, CNPS and CNDDDB recommend adding *Helianthus winteri* to California Rare Plant Rank (CRPR) 1B.2 of the CNPS Inventory. Although all occurrences appear to have negative impacts to varying degrees, some of the populations, including the largest at Curtis Mountain (*Stebbins & Constable 12943*, *12945*), benefit from being on steep slopes that are not easily grazed or developed (J. Stebbins pers. comm. 2014). We therefore recommend a threat rank of .2 (moderately threatened) at this time. If additional information becomes available in the future which might constitute a change in the rarity or threat status of *H. winteri*, we will re-evaluate its status at that time.

Recommended Actions

CNPS: Add *Helianthus winteri* to 1B.2

CNDDDB: Add *Helianthus winteri* to G1G2 / S1S2

Sent to: GV, SN, B. Baldwin, J. Constable, D. Keil, B. Moyers, L. Rieseberg, C. Winchell, on 09/08/2014

Draft CNPS Inventory Record

Helianthus winteri J.C. Stebbins

Winter's sunflower

Asteraceae

CRPR 1B.2

Fresno, Tulare

Stokes Mtn. (355C) 3611952, Orange Cove North (356A) 3611963, Orange Cove South (356D) 3611953, Pine Flat Dam (377D) 3611973

Cismontane woodland, valley and foothill grassland / openings on relatively steep south-facing slopes, granitic, often rocky, often roadsides; elevation 180 to 460 meters

Perennial herb/shrub. Blooms January to December

Threatened by grazing, agriculture, road maintenance, and habitat loss. First year growth nearly indistinguishable from *H. annuus*; mostly distinguished from *H. annuus* in having woody stems, year-round blooming period, and dark purplish buds and phyllaries. See *Aliso* 31:19-24 (2013) for original description, and *International Journal of Plant Sciences* 174(7):1079-1089 (2013) for information on life history.

Literature Cited

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