

Added to California Rare Plant Rank 4.2 in CNPS Inventory on January 20, 2015**Rare Plant Status Review: *Kallstroemia parviflora*****Proposed Addition to CRPR 4.2, G5 / S3**

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Background

Kallstroemia parviflora is an annual herb in the Zygophyllaceae that is restricted to the southern United States and Mexico. It is included in *The Jepson Manual* (Porter 1993), the *Jepson Desert Manual* (Porter 2002) and *The Jepson Manual, Second Edition* (Porter 2012) as a waif in California. However, the *Jepson eFlora* has recently been updated, and it is now treated as a California native (Jepson Flora Project 2014).

Kallstroemia parviflora was first described from the type locality in Texas by Norton (1898). The first California collections of this plant were made in San Diego County in 1936, followed by collections from San Bernardino County in 1950 (CCH 2014). Therefore, it was absent from early treatments, such as Jepson (1925). The plant was then treated as a California native by Munz (1959, 1974) and in the *Intermountain Flora* (Cronquist et al. 1997). However, in their *Vegetation and Flora of the Sonoran Desert*, Shreve and Wiggins (1964) mentioned the full range of this plant, but did not include California. Recently, several desert botanists have made observations of the plant in order to determine whether or not it is native to California. Botanist T. Chester (pers. comm. 2013) theorized that the plant went uncollected for so long due primarily to its late-summer to fall flowering time and its occurrence in remote areas. Also of note is the fact that the San Diego County occurrences of *K. parviflora* are found in pristine habitats rather than disturbed ones (T. Chester and J. Andre pers. comm. 2013).

Kallstroemia parviflora also has seeds that are not well-equipped for long-distance dispersal. This contrasts with *Tribulus terrestris*, a non-native invasive plant also in the Zygophyllaceae that also makes use of fall monsoonal rains, and has armed seeds that are well-equipped for dispersal (T. Chester and R.T. Hawke pers. comm. 2013). Furthermore, the occurrences of *K. parviflora* from San Bernardino County are not particularly disjunct from the species' global distribution, but are rather peripheral (SEINet 2014). *Kallstroemia parviflora* has two congeners in California, *K. californica* and *K. grandiflora*. *Kallstroemia californica* has shorter styles, smaller peduncles, smaller petals, and deciduous (versus persistent) sepals when compared to *K. parviflora*. *Kallstroemia grandiflora* has larger sepals and petals compared to *K. parviflora* (Porter 2012). *Kallstroemia parviflora* flowers in California from August to November.

Kallstroemia parviflora occurs in a variety of habitats, including Mojavean desert scrub, Joshua tree woodland, and pinyon and juniper woodland. It is sometimes found in disturbed areas, whether that disturbance is natural (e.g. desert washes) or human-induced (e.g. roadsides, mining sites and livestock areas). However, it can also be found in lower-disturbance areas, such as exposed sandy slopes and bajadas. A few collections were made on limestone or carbonate soils, but the plant appears to be

more of a generalist with respect to substrates. *Kallstroemia parviflora* occurs between elevations of 855 and 1705 meters in California (inferred from data in the CCH 2014).

Outside of California, *K. parviflora* is known from many southern states, including Arizona, Colorado, Kansas, Louisiana, Maryland, Missouri, Mississippi, New Mexico, Nevada, Oklahoma, Texas, and Utah. It is also known from Illinois, Washington D.C., and Pennsylvania; it is considered exotic in the first two states, and probably should be considered exotic in Pennsylvania as well, based on the disjunction from its native range (NatureServe 2014; USDA 2014). In both Kansas and Utah, the plant is ranked S1, meaning that the plant is critically imperiled and has around one to five occurrences (NatureServe 2014). *Kallstroemia parviflora* also occurs in several Mexican states, including Sonora (SEINet 2014).

There are approximately 31 known occurrences of *K. parviflora*. 27 of these occurrences have been recently documented, mostly within the last ten years. The recent surge of data is due primarily to a recent interest in fall-blooming desert annuals. Recent survey data were supplied by T. Chester (pers. comm. 2013) and most of the recent collections were made by J. Andre or D. Bell (along with CNPS volunteers) (CCH 2014). In San Diego County, nearly all of the known occurrences are within Anza-Borrego Desert State Park. It is possible that some of the occurrences from Anza-Borrego should be lumped together, as many of them occur within a mile of each other. In San Bernardino County, most occurrences are either on BLM land or are within the Mojave National Preserve. A single collection from Riverside County keyed out to *K. parviflora*, but was found in habitat typical of *K. californica*. Therefore, D. Bell (pers. comm. 2014) believes it to be an unusual morphological variant of *K. californica*. Occurrences vary considerably in population size, and given that this plant is highly dependent on monsoonal rains, populations could fluctuate wildly from year to year. Of the CCH specimens that included population information, seven labels suggested the plant was uncommon at the site (with modifiers such as scarce, uncommon, or occasional), while 4 labels suggested that the plant was common at the site (with modifiers such as locally common or frequent). Similarly, T. Chester (pers. comm. 2013) reported a small population size (less than 100 individuals) for several occurrences with few individuals, but also noted that some observations without population estimates had “zillions” of plants in a local area.

In at least part of its range, *K. parviflora* is threatened by desert renewable energy projects. Several occurrences are in close proximity to the Ivanpah Solar Electric Generating System, so it is highly possible that the construction of the facility has already eliminated some occurrences. Though mining may be considered a threat in part of its range (D. Bell pers. comm. 2014), it's difficult to determine if mining is a true threat to this species due to its potential favorable response to this type of disturbance. Although the effects of fire on this plant are poorly understood at the moment (J. Andre pers. comm. 2013), anecdotal observations by T. Chester (pers. comm. 2013) suggest that intense fires fueled by non-native grasses and forbs can reduce the abundance of this plant. A fire occurring in the absence of non-native annuals, however, led to greater

abundance of *K. parviflora* (J. Andre pers. comm. 2013). More study on the interactions of this plant with fire and exotic annuals is still needed.

Based on the available information, CNPS and CNDDDB recommend adding *Kallstroemia parviflora* to CRPR 4.2. Although the plant's abundance falls within the range of many CRPR 2B plants, the remoteness of occurrences and the fall blooming period suggest that this plant could be more common in California than indicated by current records. The vast disparity in population sizes, as well as the likelihood of major population fluctuations, present us with data gaps in regard to the plant's overall abundance in California. If more information on this plant becomes available in the future, we will re-evaluate its status at that time.

Recommended Actions

CNPS: Add *Kallstroemia parviflora* to CRPR 4.2

CNDDDB: Add *Kallstroemia parviflora* to G5 / S3

Draft CNPS Inventory Record

Kallstroemia parviflora J.B.S. Norton

warty caltrop

Zygophyllaceae

CRPR 4.2

Arizona, Colorado, Washington D.C., Illinois, Kansas, Louisiana, Maryland, Missouri, Mississippi, New Mexico, Nevada, Oklahoma, Pennsylvania, Texas, Utah; Sonora San Bernardino, San Diego

Tubb Canyon (032B) 3311624, Earthquake Valley (032C) 3311614, Whale Peak (032D) 3311613, Ranchita (033A) 3311625, Warners Ranch (033B) 3311626, Julian (033D) 3311615, Borrego Palm Canyon (047C) 3311634, Warner Springs (048C) 3311636, Hackberry Mountain (199C) 3511512, Pinto Valley (200A) 3511523, Crescent Peak (224B) 3511542, Castle Peaks (224C) 3511532, Hart Peak (224D) 3511532, Mineral Hill (225B) 3511544, Ivanpah Lake (248C) 3511554, Clark Mtn. (249D) 3511555, Mojavean desert scrub, Joshua tree woodland, pinyon and juniper woodland / sometimes disturbed areas; elevation 855-1705 meters.

Annual herb. Blooms August to November.

Threatened by solar energy development. Possibly threatened by mining and severe fires. Treated as a waif in *TJM* (1993) and *TJM 2*, but now considered native to California. See *Annual Report of the Missouri Botanical Garden* 9:153 for original description.

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