

PIUTE MOUNTAIN JEWEL-FLOWER

Streptanthus cordatus Nutt. var. *piutensis* J. Howell

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Management Status: Federal: USFWS Species of Concern; BLM Sensitive
California: S1.2; G5T1 (CDFG, 1998)
CNPS: List 1B, R-E-D Code: 3-2-3 (Skinner and Pavlik, 1994)

General Distribution:

Piute Mountain Jewel-flower has traditionally been reported only in the Southern Sierra Nevada Mountains of Kern County, but we find specimens that appear to fit the description of this taxon also have been taken relatively recently in eastern Tulare County. Although Skinner and Pavlik (1994) report approximately ten occurrences in Kern County, this does not mean that there are 10 distinct populations. In fact, Piute Mountain jewel-flower seems to be known from only four or five areas (see discussion below).

All the collections cited in the original description (Howell, 1963) seem to be from the same vicinity: an “extensive colony” in and around the Bodfish Piute cypress grove (Twisselmann, 1967), southeast of Bodfish in the Lake Isabella South quadrangle. This colony apparently straddles the boundary between BLM and Sequoia National Forest land. It should be noted, however, that while Howell gives the location of the type specimen (*Breedlove 3840*) as southwest of the Bodfish-Havilah road, all other information would place it with the other collections, southeast of the road. Whether this was a typographical error on the label or in the preparation of Howell’s manuscript, we cannot determine at this time. Skinner and Pavlik (1994) report the presence of Piute Mountain jewel-flower in the Miracle Hot Springs quadrangle, but this seems to reflect only the directional error in Howell’s description (Howell, 1963).

Twisselmann (1967) reports two collections of Piute Mountain jewel-flower in the “isolated and inaccessible mountains at the head of Jawbone and Pine Tree canyons.” The first collection he places at Champagne Spring on the northwest shoulder of Cache Peak (Tehachapi NE quadrangle) and the second on Sweetwater Ridge southeast of Cache Peak (Cache Peak quadrangle). The only other report of this plant in Kern County is from 1897 in the area around Erskine Creek and Mt. Laura, ca. 5 mi. (8 km) due east of the Bodfish locality.

We have recently discovered that plants very similar to those described in the literature as *S. c. piutensis* (e.g., Rollins, 1993; Buck et al., 1993) occur near Chimney Peak, Tulare County. The populations in this area are documented by very few collections and these, as presently known to us, are inadequate to unambiguously determine the taxon that is present. They appear to key directly to *S. c. piutensis* (Rollins, 1993; Buck et al., 1993) but we find that only leaf shape is apparently distinctive. It appears possible that the plants are intergrades or variants of *S. c. var. cordatus*. In any event, these populations are not within the West Mojave Planning Area.

Distribution in West Mojave Planning Area:

The two occurrences reported by Twisselmann near Cache Peak are inside the WMPA. No plant counts were given for these populations (CDFG, 1997b), but Twisselmann (1967) reported the species to be “scarce”.

Natural History:

This perennial herb in the mustard family (Brassicaceae) was originally described by Howell (1963) from plants collected in the Bodfish area by Dennis E. Breedlove in 1962. These tall, 20-40 in. (5-10 dm), plants have a woody stem base and upper cauline leaves that are lanceolate-oblong, acuminate and deeply clasping. The basal leaves are widely obovate, toothed above the middle, often have bristly teeth, and have petioles equal in length to the blades. The leaf margins are often ciliate. The calyx is radially symmetrical with the sepals 0.32-0.52 in. (8-13 mm) long, yellow to greenish in buds, becoming purple in flowers, and the sepal tips have short hairs. The petals are exerted from the calyx, 0.4-0.56 in. (10-14 mm) long, linear, and purple in color. The stamens are free and equal in length. The stigma is two-lobed (Buck et al., 1993). The fruits are wide, straight, flattened siliques, 2-4 in. (5-10 cm) long and 0.1-0.24 in. (2.5-6 mm) wide. This description is drawn from Howell (1963) and Buck et al. (1993). Piute Mountain Jewelflower blooms from May through July (Skinner and Pavlik, 1994).

Streptanthus cordatus, as a species, is widespread in the Great Basin and eastern Sierra Nevada (Rollins, 1993). Over most of its range it appears to be relatively uniform with respect to morphology, but in the Sierra Nevada of California there is enough variation that additional varieties have been described. Two of these additional varieties have received some degree of acceptance. *S. c.* var. *duranii* Jeps. was not recognized by either Munz (1959) or Rollins (1993), but was accepted by Buck et al (1993). *S. c.* var. *piutensis* has been generally accepted (Munz, 1968; Rollins, 1993; Buck et al., 1993) since its original description (Howell, 1963), but its status seems not to have been carefully reviewed. Piute mountain jewelflower is supposed to differ from typical *S. c. cordatus* in that the plants are much larger (to 1 m), are somewhat woody based, have more strongly flattened and wider (>5 mm) pods, and a distinctive leaf morphology with more attenuate leaf tips, rather than the broad blunt-tipped leaves of typical *S. cordatus*.

The accounts of *Streptanthus cordatus* in the *Jepson Manual* (Buck et al., 1993) and in *The Cruciferae of Continental North America* (Rollins, 1993) are not perfectly clear nor consistent. *The Jepson Manual* recognizes *S. c.* var. *duranii* Jepson in the southern eastern Sierra, and this name might apply to the Tulare Co. plants here considered to probably be *S. c. piutensis*. Rollins, however, synonymizes var. *duranii* with var. *cordatus*.. It seems possible to separate the varieties only by leaf form.

Clinal variation is one possible explanation of the difficulty distinguishing the varieties. It could be that, from north to south, var. *cordatus* grades into var. *duranii* and var. *duranii* grades into var. *piutensis*. A second possible explanation is hybridization: var. *cordatus* and var. *piutensis* may once have been genetically isolated by physical separation, but subsequent geographical spread, probably by var. *cordatus*, resulted in contact and hybridization. This hybridization may have created the intermediate var. *duranii*.

Piute Mountain Jewelflower can be distinguished from the also rare southern jewelflower (*Streptanthus campestris*) by the wider flattened siliques, shorter stems, wider cauline leaves and usually larger flowers (Howell, 1963) of *piutensis*. *Streptanthus campestris* is also reported to have the fruits somewhat curved and spreading away from the stem, while the fruits of *S. cordatus* in all its forms are relatively straight and either erect or ascending (Buck et al., 1993).

There appears to have been no detailed study of the biology of Piute Mountain jewelflower, but in a study of the related mountain jewel-flower (*Streptanthus tortuosus*), Preston (1994) reported flowers from both high and low elevation populations are self-compatible, but set few seeds in the absence of pollinators. Bees are the most common and consistent floral visitors, although wasps, flies, butterflies, and beetles were also observed visiting the flowers foraging for pollen and nectar. Floral differences do not appear to be linked to breeding system differences or to pollinator differences but may instead be associated with some other phenomenon, such as climatic adaptation. Whether these observations apply to Piute Mountain jewel-flower is uncertain, but given the similarities of flower form, the pollinators are very probably similar or identical.

Habitat Requirements:

Most of the occurrences are associated with the groves of Bodfish Piute cypress (*Cupressus nevadensis*) and California juniper (*Juniperus californica*) in the Piute Mountains, but they are also associated with broad-leaved upland forests, Closed-cone coniferous forests, and Pinyon-juniper woodland (BLM, 1990; Howell, 1963; Twisselmann, 1967). Collections have been made at 3600-7000 feet (1,200-2,100 m) elevation. The two population sites near Cache Peak, 5200 and 5700 feet (1585 and 1738 m), are associated with Canyon oak (*Quercus chrysolepis*) and Pinyon pine (*Pinus monophylla*). The highest reported elevation of collection is at 7000 feet (2134 m) in the Southern Sierra Nevada Mountains in Chimney Creek Canyon south of Chimney Meadow. This is one of the Tulare County collections of questionable identity. These populations are associated with single-needled pinyon (*Pinus monophylla*), oak (*Quercus*), and manzanita (*Arctostaphylos*), based on herbarium label data.

These plants occur in a variety of soils from shattered metamorphic rock, gravel and gravely loam, to heavy clay soils. Rollins (1993) reports it from “heavy clay on brushy slopes, rocky red clay, Piute cypress association”. The Chimney Creek Canyon population was recorded as occurring on a sandy slope. Collections by Howell in the Piute mountains report both stony gabbro substrate and very dark brown-red soil and rock.

Population Status:

This species is apparently endemic to the Piute Mountains in Kern County, California, though there may be populations or hybrids extending northeast into eastern Tulare County. At present, there are only four undisputed areas in which the plant grows, but much of its potential range is poorly explored. Actual population counts and estimates are few and somewhat contradictory. Some reports indicate that as few as 100 plants are known (CDFG, 1997b) while others imply larger populations (Twisselmann, 1967).

Twisselmann reported an extensive colony occupying much the same area as the Bodfish cypress grove, which implies much more than 100 plants at that time.

Threats Analysis:

Cache Peak and Tehachapi NE quad populations within the WMPA are currently threatened by maintenance of wind energy facilities (Hare, 1995). All occurrences are threatened by off highway vehicle (OHV) use on public land, and any future construction on private land. While there is no current known cattle grazing around the populations, the area has been used for cattle grazing in the past (Hare, 1995). Future cattle grazing, construction, logging or mining could potentially threaten the remaining populations (Skinner and Pavlik, 1994) by both destruction of individual plants and reduction and/or elimination of their habitat, or the habitat of their pollinators and populations should be protected from these threats to the degree possible.

Biological Standards:

The extent and condition of all populations needs to be determined as soon as possible. With portions of populations already destroyed by wind energy development (see Threats above), the need for careful range and habitat assessment is obvious. Listing may discourage future development on BLM land. Private landowners need to be formally notified of the existence of this rare species, where it is, and how to prevent future disturbance of individual plants or the species' habitat. Soil disturbance could be easily prevented by restricting vehicular access to roads and jeep trails, through use of locked gates. Jeep trails through the habitat area should at least be closed when they are wet, which is when soil compaction is greatest. Perhaps the Cache Peak occurrences on public lands can be protected due to the fact that there are recorded archaeological sites at Sweetridge just southwest of Cache Peak (Robinson and Riddell 1984; Uli and Schiffman, 1984; Whitley and Simon, 1991). Due to the proximity of the Pacific Crest Trail to Cache Peak, it is recommended that BLM put up signs asking hikers to stay on the trail due to rare plants occurring in the area.

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