

## **MOJAVE TARPLANT**

*Hemizonia mohavensis* Keck

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**Management Status:** Federal: USFWS Species of Concern  
California: Endangered, S1.1, G1 (CDFG, 1998)  
CNPS: List 1A; (Skinner and Pavlik, 1994). The CNPS status of 1A, reported by both sources, indicates that the species is believed extinct. It has been rediscovered and this status will be altered, presumably to 1B, in the next edition of the CNPS Inventory.

### **General Distribution:**

The Mojave tarplant is endemic to California and is restricted to several moist drainages on the arid slopes of the Peninsular Range (including the San Jacinto Mountains) in Riverside and San Diego Counties, one site at the north foot of the San Bernardino Mountains in San Bernardino County, and two sites on the desert slope of the southern Sierra Nevada Mountains in Kern County. It may also occur at Red Rock Canyon on the northwestern Mojave Desert (Faull, pers. com., 1998), but this has not been confirmed. Until the last few years, the habitat of this species was not understood, the species was believed extinct, and was known from only two historic sites (Tanowitz, 1982). It is possible that additional populations remain to be discovered, especially in the Southern Sierra Nevada Mountains. Most of the known localities (i.e., those in Riverside and San Diego Counties) are outside the WMPA, but the San Bernardino and Kern County localities are within the boundaries of the plan area. The species is not known from the south side of the San Bernardino Mountains, despite the report in Hickman (1993).

### **Distribution in the West Mojave Planning Area:**

Only three sites are known within the WMPA, though it is possible that additional localities will be found. The type locality is at the confluence of the Mojave River and Deep Creek (Keck, 1935), which is along the southern edge of the plan area; the recently identified southern Sierra Nevada Mountains localities at Cross Mountain and Short Canyon are also within the area. Five-rayed tarplants at Red Rock Canyon that were previously reported (Faull, 1987) as Kellogg's tarplant (*Hemizonia kelloggii*) may actually to be Mojave tarplant (Faull, pers. comm., 1998).

The species is known at Deep Creek only from two collections made in 1933 (Keck, 1935; Tanowitz, 1982). It has not been seen at that locality since, despite extensive searching there and at numerous nearby localities with suitable habitat (Tanowitz, 1982; Sanders et al., 1997). These searches have extended over a period of several years and have involved several investigators. The inability of anyone to find the species, at the one locality from which it was unquestionably known, lead to the

conclusion that it was probably extinct. It may have been extirpated at that locality, but is now known to occur elsewhere.

The southern Sierra Nevada localities were discovered during the preparation of this manuscript. A specimen in the UCR Herbarium, collected in 1977 at Cross Mountain, was found to be Mojave tarplant, rather than *H. arida* as it was labeled. This re-identification has been confirmed by Bruce Baldwin at UC Berkeley (Baldwin, pers. comm., 1998). Field work in the southern Sierra Nevada in the fall of 1998 failed to rediscover the Cross Mountain Population, but did discover a sizable population in Short Canyon near the Inyo County line, which had been rumored to exist.

### **Natural History:**

The Mojave tarplant was collected three times in the early part of this century but was not found again for over 60 years and was widely thought to be extinct (e.g., Tanowitz, 1982; Hickman, 1993; Skinner and Pavlik, 1994). Despite repeated searches of the type locality on the Mojave River, this plant could not be found. Even at the time it was described, it was thought to be “exceedingly rare and in a precarious position as regards extinction” (Keck, 1935). A 1924 locality in the San Jacinto Mountains of Riverside County was widely questioned because the habitat at this site is so different from that at the type locality, and because a few searches had failed to find the species (e.g., Skinner and Pavlik 1994). Purely by chance, in January 1994 the species was rediscovered on the north slope of the San Jacinto Mountains along Twin Pines and Brown Creeks. Examination of herbarium specimens revealed the existence of misidentified collections of this species from the same general area. During the fall of 1994 and 1995 many suitable areas on the north and west sides of the San Jacinto Mountains were searched and a number of additional populations were discovered.

The Mojave tarplant is a tall annual sunflower (Asteraceae) of open moist sites in arid regions near the margins of the desert. Like other species of *Hemizonia*, this plant is characterized by the possession of both ray and disk flowers, a single row of chaffy bracts between the ray and disk flowers; the phyllaries in a single series, each subtending and half-enclosing a ray achene; fertile ray achenes (i.e., producing good seed); a disk pappus of scales or bristles, if not absent (in this case of scales), and not plumose or bristle-tipped; and the foliage lacks tack-shaped glands (Hickman, 1993). Mojave tarplant is in the section *Madiomeris* which is identifiable by presence of an annual habit, beaked ray achenes, chaffy bracts restricted to a fused outer ring, and a lack of spinose tips on the leaves and phyllaries (Tanowitz, 1982). This species is separable from other members of this section by the combination of yellow anthers, a disk pappus of short scales, five ray flowers (and phyllaries), entire basal leaves, and a densely flowered inflorescence (Hickman, 1993). Despite reports in the literature (e.g., Munz, 1959; Tanowitz, 1982), the disk achenes are often fertile. The foliage is pleasantly scented (Munz, 1959) and once experienced this is a memorable and useful characteristic (pers. obs.).

Unlike most species of *Hemizonia*, Mojave tarplant is self-fertile and reproduces freely in cultivation, becoming almost weedy in greenhouses (B. Baldwin, pers. comm., 1998) and also escaping into disturbed areas in a botanical garden (S. Boyd, pers. comm., 1998). In nature, flowering is reported in late July and continues through the fall and sometimes into winter if cold weather does not kill the plants. In cultivation, the plants

seem to flower shortly after the summer solstice, apparently in response to decreasing day length (S. Boyd, pers. comm., 1998). Peak flowering is from August through October, but a few plants have been found flowering as late as January, at least in favorable years. Flowering, once begun, is continuous for as long as the plants are alive and fruit maturity and dispersal is likewise continuous. Nothing is known about seed dispersal vectors, but it may be that the relatively heavy dark colored seeds just fall around the maternal plant and maintain the population in that site. There are no obvious mechanisms for long-distance dispersal of the seeds (e.g., wings, hooks, etc.).

The original collections were evidently of small plants in marginal environmental conditions and so the manuals (Hickman, 1994; Munz, 1959; Munz, 1974; Ferris, 1960) all report that this plant is only 6-12 in. (15-30 cm) tall. In fact, it commonly reaches heights of about 40 in. (1 m), with some plants even reaching 60 in. (1.5 m). Shorter plants in the 6-12 in. (15-30 cm) range are easily found, especially on the margins of the moist habitat this species prefers, but if conditions are good the plants are much taller (Sanders et al., 1997).

### **Habitat Requirements:**

Most known sites are within the belt of desert edge chaparral and the others are on arid coastal facing slopes (Sanders et al., 1997). These sites are often in a zone where rain and fog are infrequent and so skies, during the growing period, are commonly clear. This doubtless results in higher temperatures, lower humidity, and more intense sunlight than at more coastal sites where other *Hemizonia* species occur.

The Mojave tarplant occurs mostly in clay or silty soils that are saturated with water in winter and spring (Sanders et al., 1997). Plants are found along grassy swales, intermittent creeks, and at seeps. Occasional dwarfed plants are found in drier sites near occupied wet areas. This species seems to prefer areas where a fairly substantial water supply is available at depth through the summer, but which are dry at the surface (Sanders et al., 1997). The combination of early saturation and later desiccation may serve to reduce competition from other species. Competition may be further reduced by the complete dryness of these sites during drought years.

The most suitable habitat patches are found on gentle slopes and low gradient stretches of streams in generally mountainous terrain. Shrubs and trees are few and not dominant in the sites actually occupied (Sanders et al., 1997). Mojave tarplant also occurs in sand along intermittent creeks, as at the type locality, but we now suspect that most of these plants were waifs and that this is not a habitat where the species maintains permanent populations. There are some cases where substantial populations are found in sand immediately adjacent to more typical habitat (Sanders et al., 1997).

All populations occur between 2800 and 5250 ft. (850-1600 m) elevation, but most are located between 3000 and 4000 ft. (915-1225 m). The Cross Mountain locality has not yet been precisely enough located to determine elevation, but is probably at about 3300 ft. (1000 m). The Lawler Lodge site, 5250 ft. (1600 m), is well above the rest of the known locations and is densely wooded with pines and oaks (Sanders et al., 1997). There are no moist openings and the specimen was collected on the roadside (G. Helmkamp, pers. comm., 1996), which is the only open habitat present. The area was searched in fall

of 1994 and the species was not found; it appears that the specimen was from a roadside waif.

### **Population Status:**

The distribution of Mojave tarplant appears highly discontinuous and possibly somewhat relictual in character. It is locally common, but only in a few very restricted habitat patches. Populations fluctuate in response to environmental conditions, probably especially rainfall. The 1994 population at Twin Pines Creek, for example, was noticeably smaller than the 1993 population had been, based on dried skeletons from 1993 still present (Sanders et al., 1997).

Population estimates exist for many of the populations of this species, but unfortunately they are all based on observations from a single season. At the type locality, Mojave River at Deep Creek, there were only about ten plants present the last time the plants were seen (Keck, 1935). In fall of 1994, the total population in the Twin Pines Creek drainage of the San Jacinto Mountains was estimated at about 6000 plants (Sanders, et al., 1998). In fall of 1995, the populations in the Palomar Mountains of northern San Diego County, Cutca Valley and Long Creek, were estimated at 10,000 individuals, but there could easily have been twice that many. The populations in the vicinity of Indian Flats and Chihuahua Valley have not been counted, but probably total several thousand individuals. The size of the Cross Mountain population in Kern County is completely unknown, both with respect to physical size and number of individuals present. All that is known is that in 1977 two young and healthy individuals were collected.

All the known extant populations are physically relatively small, occupying a total area of no more than 2-3 mi<sup>2</sup> (5-8 km<sup>2</sup>), but even within that small area the actual area of occupied habitat is much smaller. Populations are very strongly restricted to low damp areas and are seldom found more than a few meters from the bottom of a drainage way or a seep.

Many areas have now been searched that do not appear to support the species, even though the general habitat appears suitable. Areas in the San Bernardino Mountains, along the southern edge of the WMPA, searched in 1994 and 1995 that do not appear to support Mojave tarplant populations are listed by Sanders et al. (1997). The species was also not found in the Tule Valley and Anza areas of Riverside County, which are outside the WMPA.

### **Threats Analysis:**

The type locality has been heavily modified by construction of a flood control structure, the Mojave River Forks Dam, and upstream the Mojave River is flooded under the permanent waters of Silverwood Lake (Sanders et al., 1997). Both these structures were built before there was any requirement for significant environmental review and so if this species was present, this cannot now be known. If the type collection was a population of waifs washed down from a permanent population upstream, this original population will now never be identified. There is potentially suitable habitat on the Las Flores Ranch, but that private property has not been available for botanical exploration (Sanders et al., 1997).

The type locality, probably at or just below the present Mojave River Forks Dam, is heavily used by off road vehicles in drier areas and is permanently wet and wooded or swampy in low places as a result of seepage from the dam (Sanders et al., 1997). Much of the upland area has been denuded by excessive vehicle use.

Habitat areas around Twin Pines Creek have been modified by low density development, mostly of a rural residential character (pers. obs.). It is likely that some populations on private land have been eliminated by this activity.

Grazing by cattle occurs in some Mojave tarplant occupied areas, and in the southern Sierra Nevada is locally intense, which may potentially pose a threat to populations. Plants of the genus *Hemizonia* are generally not very palatable to cattle, so the threat from livestock may not be great. There may be localized problems with trampling around isolated water sources in arid areas.

### **Biological Standards:**

The immediate need for the protection of this species within the WMPA is extensive surveys of areas of suitable habitat, especially in the southern Sierra Nevada and along the north foot of the Transverse Range (San Gabriel Mountains, in particular). The identity of the five-rayed tarplant populations at Red Rock Canyon should be determined as soon as possible. Until the size and location of any remaining populations in the WMPA can be clearly specified, management will not be possible.

It may be that the most important populations of this species are outside the WMPA and that the known sites within the plan area are marginal or even insignificant. The Mojave River population appears to have been extirpated and we have no significant information on the size, or even the exact location, of the Cross Mountain population. All we know is that a population exists at a spring somewhere near Cross Mountain, and that plants are not common in the immediate vicinity. The only potentially important population known within the WMPA is the recently discovered one in Short Canyon.

Fortunately, many of the known populations outside the WMPA are on the San Bernardino or Cleveland National Forests and hence receive some degree of protection. The ownership of the land occupied by the Cross Mountain population is unknown.

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