**LITTLE SAN BERNARDINO MOUNTAINS GILIA**
*Gilia maculata* Parish
[*Linanthus maculatus* (Parish) Mlkn.]

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**Management Status:** Federal: USFWS Species of Concern; BLM Sensitive
California: S1.1, G1 (CDFG, 1998)
CNPS: List 1B, RED code 3-2-3 (Skinner and Pavlik, 1994)

**General Distribution:**

Little San Bernardino Mountains gilia is endemic to southern California. It is restricted to dry canyons and alluvial fans in the Little San Bernardino Mountains, near the mouth of Dry Morongo Canyon and near Desert Hot Springs at the head of the Coachella Valley, in Whitewater Canyon in the eastern San Bernardino Mountains, and from Whitewater to Palm Springs (the type locality). It is also known from a very recently discovered locality at the mouth of Rattlesnake Canyon on the north side of the San Bernardino Mountains (Sanders, in press).

The populations in Palm Springs, Whitewater Canyon, along the Whitewater River and elsewhere around the head of the Coachella Valley (e.g., mouth of Dry Morongo Canyon) are not within the WMPA.

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

The most extensive populations of this species are along washes at the northern edge of Joshua Tree National Park in the Little San Bernardino Mountains, within the WMPA. These populations are near the cities of Yucca Valley, Joshua Tree, and Twentynine Palms, with most reported in the vicinity of Yucca Valley and Joshua Tree. The other population of the species that is definitely within the WMPA is at Rattlesnake Canyon. It is probable that there are additional populations waiting to be discovered along washes somewhere in the 22 mi. (35 km) of hilly country at the east end of the San Bernardino Mountains between Yucca Valley and Rattlesnake Canyon.

**Natural History:**

*Gilia maculata* was described by S.B. Parish in 1892 from a collection made by W. G. Wright at "Agua Caliente" (=Palm Springs) in 1889 (Parish, 1892). Jepson (1943) says that the type collection bears "no exact station", but S.B.Parish (1907) says that Wright collected it just west of the hot springs at Palm Springs. In April 1907 Parish visited the exact site in the company of Wright in an unsuccessful attempt to recollect this elusive species which had not been seen in 18 years. While Parish and Wright were unsuccessful at the type locality, just a few days earlier the species had been found in abundance, and the second collection of the species made, along the Whitewater River (Jepson, 1943) about half way between Whitewater Station and Palm Springs by Charlotte Wilder (Parish, 1907). It then disappeared for another 17 years until it was collected at

Coyote Holes (now in city of Joshua Tree) in the Little San Bernardino Mountains by P. A. Munz in 1924 (Munz, 1925). Since 1924 it has been very elusive and little collected. The specimens in herbaria have been so few that its study has been difficult (Patterson, 1989). Since the publication of Patterson's paper, the exact habitat of the species has finally been identified and a number of new populations have been discovered. For example, G. Helmkamp had been looking for this species for about ten years before he finally found it in 1992, after the correct habitat was identified (G. Helmkamp, pers. comm.). It is undoubtedly true that more plants of this species have been found and collected in the past decade than were found in the previous century.

In addition to its elusive character, this is a species that has been the source of some taxomomic controversy and appears to have no unambiguously close relatives. Its closest relatives may be Inyo gilia (*Gilia inyoensis*) and bell-flowered gilia (*G. campanulata*), which occur 180 mi. (300 km) to the north (Patterson, 1989). Its physical isolation and morphological dissimilarity from its closest apparent relatives suggest that this may be a rather old species. It was first described in *Gilia*, because at the time that was a large and variable genus encompasing a variety of plants. Later it was removed to *Linanthus* because it had no obvious close relatives in Gilia and seemed to share some similarities (mostly overall aspect, probably) with certain *Linanthus* species, notably desert linanthus (*L. demissus)*. A review of the status of the plant by Patterson (1989) revealed that it is not closely related to any species of *Linanthus* and seems best accommodated in the still variable genus *Gilia* in which it was originally described. The more closely one examines this plant, the less it resembles any other species. The genus *Gilia* is still highly variable, lacks a set of distinctive characters (Patterson, 1989) and is likely to be segregated into a number of more homogeneous genera in the future (M. Porter, pers. comm.).

*Linanthus maculatus* is a small annual herb that grows in very loose soft sand on low benches along washes at the southwestern edge of the Mojave Desert and northwestern edge of the Colorado Desert. Despite it's "large" flowers (0.16-0.2 in., 4-5 mm, long), relative to the size of the plant, it is quite inconspicuous and is easily missed by collectors. Perhaps part of the reason it is seldom collected is that the white flowers blend with the white quartz sand in which it often grows. There was a prolonged period when no one could find this plant, at least with any regularity. There were a few collections from the 1940s to the 1960s, but then it went almost uncollected through the 1970s and early 1980s. When its habitat was finally identified, and systematic surveys for it began in appropriate habitats, a number of additional populations were discovered.

The plants have a slender, little-branched, tap root that extends over 6 cm into the sand and which probably taps "deep" supplies of moisture, beyond the reach of atmospheric drying. The plants branch at the ground surface and 3-12 short branches spread over the surface forming small cushions up to 6 cm across. Height of the plants is only 0.8-1.2 in. (2-3 cm). The general morphology of the species is well described by Patterson (1989).

Pollinators, germination requirements, seed longevity, and most other aspects of the biology of this species are unknown (Patterson, 1989). The color and form of the flowers suggests that this species is almost certainly insect pollinated, but the nature of the pollinators is unrecorded. The species is not even mentioned in the major work on

pollination in the phlox family (Grant and Grant, 1965). The white color suggests a nocturnal visitor, but many diurnally pollinated flowers are white as well. The flowers are white and usually have 5 dark reddish-purple, "vermilion" (Munz, 1974) or "pink" (Munz, 1925) spots. Some plants have spotless flowers. The open corolla, color spots, and relatively large size (though still small) all suggest that this species is not autogamous, but rather is insect pollinated.

**Habitat Requirements:**

This plant seems to require very soft open sandy flats with few or no competing species and certainly with no large shrubs or trees in the microsites occupied. The sand is always loose and well aerated: soft to the touch and not consolidated. Populations are only found on sandy benches on the margins of washes and not on the disturbed sand of the bed of the wash, on soils with a hard surface layer of either rock or clay, or on loose blow sand in areas away from washes. Shrubs are always present in the general areas occupied, but these are not common on the sandy benches where *Gilia* actually is found. These loosely associated shrubs include: creosote bush (*Larrea tridentata*), brittle bush (*Encelia farinosa*), burro bush (*Ambrosia dumosa*), cheesebush (*Hymenoclea salsola*) and desert catalpa (*Chilopsis linearis*). *Gilia maculata* always occupies open sunny sites and is never found in the shade of larger plants. It is commonly associated only with other dwarf herbs such as sigmoid thread plant (*Nemacladus sigmoideus),* blushing thread plant *(N. rubescens),* evening-primrose *(Camisonia pallida),* common loeflingia *(Loeflingia squarrosa),* Arizona nest-straw *(Filago arizonica),* Wallace's woolly sunflower *(Eriophyllum wallacei),* etc. There are never dense stands of weedy annuals at the sites occupied. Populations have been found at elevations from 500-4000 ft. (150-1200 m).

**Population Status:**

Some recently discovered populations contain many thousands of plants, though others may contain as few as 200. Recent intensive searches for the species, since its habitat came to be understood, have revealed that it is much more numerous than previously believed, though only slightly more widespread.

There are about four major populations, two within the WMPA, though the major population area in the Joshua Tree and Yucca Valley area is broken into a number of discrete population units associated with individual washes. This species has a very narrow set of habitat requirements and its populations are correspondingly restricted.

Available population estimates are few, but the following give an idea of the size of known populations. North of Indian Ave. near mouth of Big Morongo Canyon -- ca. 10,000 plants in spring 1996 (G. Helmkamp, pers. comm.); between Joshua Tree and Indian Cove, right at the JTNP boundary -- plants were widespread in spring 1995 in flat areas along washes (G. Helmkamp, pers. comm.). Populations here contained thousands of individuals; Dry Morongo Canyon north of the county line -- a few hundred plants in 1995 (and earlier in 1992), but only 6 found in 1996 (G. Helmkamp, pers. comm.); South of the town of Joshua Tree on the road to JTNP -- 100 in 1986 (Patterson, 1989), "reduced markedly" in 1987 (Patterson, 1989), 150-200 in 1988, 25-30 in 1990, and 1000 in 1993 (CDFG, 1996).

It is obvious from examination of the above population estimates, especially those for the last site mentioned, that populations vary greatly with the environmental conditions between years. This is a normal phenomenon, but one which makes the determination of trends difficult.

**Threats Analysis:**

The greatest threat to this species is growing urbanization in the Yucca Valley and Joshua Tree area where the largest populations exist. This is a fast growing area and growth is extending right up to the JTNP boundary. The large populations along Morongo Wash, Mission Creek and west of Desert Hot Springs are threatened by urbanization spreading westward from Desert Hot Springs. The population at Palm Springs has probably already been extirpated by the growth of that city. The type locality is now in the middle of town and has undoubtedly been destroyed. When Parish visited in 1907, only five families lived permanently in Palm Springs (Parish, 1907), but today it is a large city. Any other populations in the area have likely been destroyed as well, but there is still some apparently suitable habitat on Agua Caliente Indian Reservation land in Palm Canyon (pers. obs.). Many of the recently discovered large populations near Joshua Tree and Yucca Valley are along washes that cross the park boundary. Many of these populations are partially in areas (private land) that are subject to destruction by development pressures.

A secondary threat to this species is OHV recreation. The small size of these plants, combined with their occurrence in open sandy areas along washes, makes them particularly vulnerable to vehicle damage. Washes are often used as highways by OHVs, because there are not as many shrubs to impede the vehicle's progress.

**Biological Standards:**

The most critical immediate issue is the determination of the extent to which the known populations near Joshua Tree and Yucca Valley extend into JTNP. All populations outside the national park must be considered highly endangered as they occur on relatively flat sites and predominantly on private land subject to development pressures or OHV damage. The extent of any populations on BLM lands must also be determined as soon as possible so that measures can be taken to avoid damage to those my misdirected recreational activities. Any populations on public land should be carefully protected from OHV damage by closing the occupied area to such use.

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